

Wetland Assessment for Restoration at Qwuloolt Marsh, Marysville, WA

Prepared for the Tulalip Landfill Natural Resource Trustees

National Oceanic and Atmospheric Administration
U.S. Fish and Wildlife Service
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1.0 Purpose and Organization

This report describes wetlands of the Qwuloolt wetland complex, City of Marysville, Washington. A team from NOAA's NMFS Restoration Center and NOS Assessment and Restoration Division completed fieldwork and archival research over the Winter and Spring of 2005-2006 on behalf of the Tulalip Landfill Natural Resources Trustees (The Trustees) including representatives from:

The Tulalip Tribes of Washington,
Washington State Department of Ecology,
United States Fish and Wildlife Service, and
National Oceanic and Atmospheric Administration

The Qwuloolt site has been dramatically altered from historic conditions. The Trustees are considering alternatives to restore historic conditions to benefit natural resources and trust species injured by contamination released during the operation of the Tulalip Landfill. Four goals directed this work and define the structure of this document:

SECTION 2 describes the general setting conditions of the Qwuloolt wetland complex and documents the loss of estuarine habitat function.

SECTION 3 documents the presence of jurisdictional wetlands, and describes the hydrology, soils, and vegetation at the Qwuloolt site.

SECTION 4 assesses the potential for loss of wetland area or function from construction of the setback levees required for tidal restoration, and how these losses may be mitigated by the functional enhancement resulting from tidal reconnection.

SECTION 5 assesses available data useful for predicting natural revegetation patterns under a levee breach scenario.

Two terms are used alternately to describe the ecological and cultural boundaries of Qwuloolt. The Qwuloolt wetland complex refers to the extent of entangled wetlands, upland buffers, and surface waters located between and ecologically interlinked with the greater Jones and Allen Creek basins to the North, and the greater Snohomish River Estuary to the South. The Qwuloolt Restoration Site (Qwuloolt site or the site) refers to those properties currently under direct ownership or with an easement owned by the Tulalip Tribes of Washington or their project partners as of the date of this report. This is the boundary within which restoration treatments must be contained and is the area assessed in terms of jurisdictional wetlands (Figure 1).

2.0 Wetland Setting and Condition

2.1 Location and Demographics

The Qwuloolt site is located in sections 33 and 34 of Township 30 North, Range 5 East, with some parcels extending into adjacent sections to the North and South. The site is located within the City of Marysville and is bounded by the City Sewerage Treatment Plant to the West, An industrial park to the Northwest, Residential neighborhoods along Old Pacific Highway, 61st Street NE, and Sunnyside Blvd to the North and East, and Ebey Slough to the south (Figure 1).

The Qwuloolt site is the largest open space within the City of Marysville. Memorial Park is immediately adjacent and upstream on Allen Creek. Harborview Park overlooks the site from a residential development to the East. The Snohomish Estuary Water Trail System, managed by Snohomish County Parks and Recreation, follows Ebey Slough to the south, although no ‘trailside’ amenity is currently provided at this site. The City of Marysville has proposed recreational trails surrounding the site, and has completed construction of a short trail segment on the eastern boarder, but does not have private property access agreements required to build the trail at this time. The Marysville Shoreline Master Plan (2006) specifically recommends consideration of Qwuloolt for restoration, but exempts properties that would be adjacent to a restored Qwuloolt from some of the regulations that affect other shoreline lands.

Urban residential development has been increasing North and East of the wetland complex. Across the greater Allen and Jones Creek watersheds rural residential neighborhoods are being replaced by more urban housing densities. The 2000 Census indicates mean adult per capita income of \$15,000-25,000 per year in blocks surrounding the site with 20-40% having completed a high school diploma, and 20-40% under the age of 18. Population densities in surrounding urbanized Marysville range from 2000-10,000 persons per square mile (EPA, 2006).

2.2 Climate and Growing Season

Qwuloolt marsh is located near sea level in the lowland Puget Sound at approximately 41 degrees North Latitude. The Puget Sound’s maritime climate is characterized by mild wet winters with brief periods of freezing weather, and dry warm summers. Local climate data and a precipitation over the period of wetland observation can be found in Appendix A.

The definition used for ‘growing season’ is critical to the legal definition of wetland hydrology. The U.S. Department of Agriculture, Natural Resources Conservation Service currently defines the growing season as the portion of the year when soil temperatures at 19.7 inches below the soil surface are higher than 41° F (USDA, 1991).

The State Manual (page 28, paragraph 46), states that the beginning and end of the growing season can be approximated by identifying the first and last dates where daily low temperature drops below 28 degrees F in five years out of ten. Using data for the Everett weather station provided in Tables 2 and 3 of the Snohomish County Soil Survey (USDA, 1983) the growing season for the site occurs between March 13th and November 20th and is 251 days in length.

Although evapotranspiration slows during winter months and some species are completely dormant, winter low temperatures on the site are moderated by proximity to the Puget Sound such that plant growth may occur at any time of year in many years. Section 46 of the Washington Manual states that “if the predominant plants of the area in questions are growing, it is the growing season”, and that it is important to use “careful observation to determine if the growing season is in progress”. Active shoot growth by reed canarygrass, bluegrass, and

creeping buttercup was observed during a site visit on January 27th. It appears likely that in some years the site has a year-round growing season. This more conservative definition of growing season would reduce the duration of soil saturation required to indicate wetland hydrology.

2.3 Topography and Soils

The Qwuloolt wetland complex is located where Jones and Allen Creeks descend from the surrounding glacial plain and enter the Snohomish River Floodplain. Soil characteristics are described in the Snohomish County Soil survey (USDA, 1983; Figure 6). Surrounding uplands are a mixture of fine textured glacial outwash plain to the north and northwest (Ragnar fine sandy loams - #57) and gravelly glacial till (Tokul gravelly loam #72-74) to the northeast and east. Some fine textured soils typically found on old lake terraces (Pastik silt-loam #47-49) and lacustrine depressions (Bellingham silty-clay loam #7) can be found immediately to the north of the marsh and in inclusions within the glacial plain. Upland landforms likely developed during and following the Wisconsin Glaciation, while the Snohomish River Floodplain is of recent origin.

The floodplain marsh is bounded by a break in slope where the glacial plain descends into the alluvial deposits of the Snohomish River. Based on a 2005 topographic survey the floodplain ranging from approximately 3 to 7 feet NAVD. Naturally occurring high points in the floodplain reach 7-8 feet NAVD, and are primarily associated with the channel edges of Jones and Allen Creeks. The basins between these natural channel edge levees are pockmarked with local low spots scattered across the undulating floodplain surface.

The three soil series that dominate the site are the common soil types found throughout the Snohomish River estuary and are listed in Hydric Soils of Washington (USDA, 1995). The majority of the site is reported as Puget silty clay loam with local inclusions of Snohomish silt loam and Mukilteo Muck (Figure 6). Even following dike construction and drainage, agricultural activity in these soils is typically limited by seasonally high water tables (USDA, 1983).

Puget silty-clay loam (55) – a very deep soil formed of fine textured alluvium, found in depressional areas of floodplains. Permeability is slow with seasonal high water tables of 24 to 48 inches found November to May. Typically nine inches of medium to coarse granular dark grayish brown (2.5Y 4/2) silty clay loam is overlain on more coarse angular blocky olive gray or gray (5Y 5/2) silty clay loam with medium distinct reddish brown mottles (5YR 3/3)

Snohomish silt loam (64) – a deep floodplain soil formed of fine textured alluvium underlain by peat and muck. Depth to organic material ranges from 17 to 32 inches. Permeability is slow with seasonal high water tables of 24 to 48 inches found November to May. Typically 6 inches of fine granular very dark grayish brown (10YR 6/2) silt loam is found overlain on medium subangular blocky gray (5Y 6/1) silt loam with coarse prominent dark reddish brown (2.5YR 3/4) mottles on peds.

Mukilteo muck (34) – typically 4 inches of dark reddish brown muck (5YR 2/2) overlying reddish brown and black (5YR 2/2, 3/2) organic material. This series is associated with depressions, with organics typically derived from sedges.

2.4 Hydrology

The Qwuloolt marsh is located at the confluence of Allen and Jones Creeks and Ebey Slough and is geomorphically contiguous with the greater Snohomish Estuary Floodplain. For over 70 years

it has been isolated from the tidal and alluvial influences of the Snohomish Estuary by a system of levees and tidegates. Jones and Allen creeks now discharge into Ebey Slough through four partially functioning top-hinged flap tide gates. Behind the levees a system of ditches were constructed to reduce the duration of spring inundation to improve the land for agriculture. Local NRCS staff report drain tiles have also been installed. The current extent and function of the drain tile and ditch system has not been fully surveyed. No drainage system maintenance has been conducted since the purchase of the property in 1996, fields continue to be flooded as late as June, and a significant culvert under the main farm road crossing of Jones Creek clogged over the 2005-06 water year. In the absence of active farm stewardship, the drainage system is deteriorating.

The flood protection provided by levees is tenuous and does not meet current FEMA standards (Adolfson, pers. coms.). The USACE (2002) reports that there is a history of levee failure on the north bank near river mile 3.5 where Ebey Slough bends sharply to the west. Were it not for the levee system, Puget Sound tides in combination with rain-on-snow floods on the Snohomish River would be the primary flood sources, and drivers of alluvial dynamics at this site.

A long term tidal record does not exist at this site. NOAA established a tide gauge on Ebey Slough (NOAA 9447729) to monitor tidal elevation – data were collected from November 2000 to March 2002. The USACE compared these data to Seattle (NOAA 9447130) to take advantage of the Seattle gauges longer period of record for calculation of accurate mean tidal parameters. Ebey Slough tides were found to be slightly higher (0 to 0.3 feet), and delayed by a few minutes as compared to Seattle tides but otherwise closely correlated in stage and timing (USACE 2002). Seattle tides were used without adjustment as a surrogate for Ebey Slough tides for purposes of flood modeling in the 2002 engineering report produced by the USACE.

For the purposes of this report and the maintain consistency with simultaneous work completed by Adolfson and Associates, Seattle, Washington, elevations from other sources reported relative to MLLW were converted from MLLW to NAVD by subtracting 2.25 feet from reported elevation. Tidal datums in NAVD based on original verified NOAA CO-OPS data are listed in Table 1 and documented with datum sheets in Appendix B.

More extensive analysis of tidal and flood characteristics can be found in the Qwuloolt/Poortinga Technical Report (USACE, 2002) and with the publishing of work currently underway by Adolfson and Associates and their subcontractor Phillip Williams and Associates.

Table 1 – Tidal statistics for three NOAA gauges in the vicinity of Qwuloolt. Units are in feet elevation in NAVD based on accepted 1983-2001 Epoch data supplied by NOAA CO-OPS. Original data sheet in Appendix B.

Datum (NAVD)	Seattle (NOAA 947130)	Everett (NOAA 9447659)	Ebey Slough (NOAA 9447729)
MHHW	+9.02	+9.06	+9.23
MHW	+8.15	+8.18	+8.36
MLW	+0.49	+0.77	No data
MLLW	-2.34	-2.03	No data

2.5 Historic Changes at Qwuloolt

Land use history was observed using U.S. Coast & Geodetic Survey topographic sheets (T-sheets; circa 1884), a 1938 aerial photograph, and a USDA DOQQ air photo (circa 1991-1997).

Qwuloolt appears to be among the earliest sites in the Lower Snohomish estuary developed by European settlers. T-sheets show that in the late 1800's the current location of the Marysville mitigation site was a homestead with fields and two structures surrounded by marsh and swamp. The majority of the Qwuloolt site, north of the last bend of Jones Creek was labeled spruce swamp, with the area between Jones creek and Ebey Slough labeled as marsh (Figure 2).

By 1938, the time of the first aerial photo record, the majority of the site was cleared with levees constructed (Figure 3). Ebey slough was being used for log raft storage. The well ordered grid of the town of Marysville is present, but surrounded by rural lands. A few patches of woody vegetation remained within the Qwuloolt site, typically associated with creek channels. Except for a notable remnant stand of spruce swamp off-site and upstream of the project area, the vicinity had been largely cleared of forest. The alignment of Jones and Allen Creeks appeared to have been largely unaltered. Numerous blind sloughs were either present and bounded by woody vegetation, or had been incorporated into agricultural fields only discernable on the aerial photo by tonal variation of field vegetation. Ditches had begun to increase drainage to the creeks and sloughs.

USGS DOQQ aerial photos from the 1990's indicate active farming operations including well maintained farm roads throughout the site, field cultivation, and harvesting. (Figure 4). None of the records reviewed have documented the use and character of the land under farm management. Approximately 20-40% of Jones and Allen creek channels had been filled and replaced by ditches. The off-site spruce swamp remnant observed in the 1938 air photo was still present. At this potential reference site, a rapid comparison of canopy trees suggests that stand structure has changed over time, but that many of the trees in the 1938 photo appear to be still present over 50 years later, suggesting that this site may have some value as a reference site for historic conditions.

In 1994 the City of Marysville breached a levee to restore tidal marsh to mitigate for wetland impacts caused by expansion of sewage treatment facilities. A setback levee was constructed, and 13.7 acres were reconnected to Ebey slough. In 1996, the U.S. NRCS Wetland Reserve Program purchased a conservation easement on the Poortinga farm, north and east of the site, ending the era of active farm management.

Subsidence caused by oxidation of organic matter following diking and draining has been reported at other diked estuarine marsh (Cornu & Sadro, 2002; Cunningham & Polayes-Wien, 1995). Subsidence of diked land can result in current elevations that cannot support historic vegetation. It is unclear to what degree existing elevations at the Qwuloolt site differ from historic elevations. T-sheet maps indicate woody vegetation in areas that are currently surveyed between 4 and 6 feet NAVD. Surveys of reference vegetation don't show woody vegetation below 9.65 feet NAVD (See Section 5). This suggests that soils may have subsided between 3.65 and 5.65 feet. Not all of this elevation loss is necessarily due to subsidence. Land development may have included extensive clearing, burning, and leveling that may have resulted in an initial loss of elevation due to removal of woody debris and filling of channels and low spots.

3.0 Determination of Jurisdictional Wetlands

While the majority of the site is covered by state listed hydric soils, the National Wetland Inventory (NWI) indicates only small isolated patches of emergent wetland at Qwuloolt (Figure 8). Based in part on a determination of widespread wetland presence completed in 1995, the NRCS purchased a conservation easement on the Poortinga property under the Wetland Conservation Reserve Program. Observations made in this study confirm the NRCS's findings of wetland conditions throughout the Qwuloolt site and indicate that NWI observations dramatically underestimate wetland area.

10 years after the NRCS determinations, a routine wetland determination was conducted attempting to relocate the NRCS plots. Methods were consistent with approaches described within the Washington State Department of Ecology's Washington State Wetlands Identification and Delineation Manual (1997), and the US Army Corps of Engineers (USACE) Wetlands Identification and Delineation Manual (1989), hereafter referred to as the Wetland Manuals. Additional plots were surveyed in areas on the site that were not included in the NRCS survey.

3.1 Summary of 1995 NRCS Determination

NRCS completed its site investigation on June 21st and 22nd, 1995. Standard wetland data sheets with survey points sketched on air photos, were provided by the NRCS. The original sketch map and data sheets are located in Appendix C.

Twenty-two of twenty-three selected points were surveyed for wetland indicators. Plot #4 was outside the Poortinga property and was not surveyed. Although no report was identified, plot locations appear random – plots were located throughout the easement area. The NRCS used routine wetland determination methods to survey for indicators of wetland conditions.

Table 2 – Results of NRCS wetland determination. A total of 22 plots where characterized before the purchase of an NRCS easement on the old Poortinga Property. Determinations were made for presence and absence of wetland indicators, and finally for the presence or absence of wetlands.

	<u>Vegetation</u>	<u>Soils</u>	<u>Hydrology</u>	<u>Wetland</u>
Yes	14	21	0	16
No	8	1	16	1
Unmarked	0	0	5	5

The NRCS survey relied on reports of flooding and spring wetness to support indication of wetland conditions. On each sheet, "atypical situation" was marked, likely describing the agricultural practices and drainage infrastructure which affected vegetation and hydrology. Eight of 22 plots did not have vegetative indicators of wetland conditions, and species composition from the data sheets suggests the site was managed as pasture. A final wetland determination was not made for 5 out of 22 plots, perhaps due to the absence of both vegetation and hydrology. In the end the NRCS determined that jurisdictional wetlands were present at 16 of 22 observed points. One point (# 21) was clearly located on the hillslope outside the Qwuloolt wetland complex.

3.2 Field Sampling Methods for 2006 Determination

Between December 1 and June 2, 2006 NOAA staff made 5 site visits (Table 3) for the purposes of confirming the NRCS wetland determination and making observations of wetland character at

the Qwuloolt Site over the course of the early growing season.

Table 3 – Dates of field activities by NOAA staff

<u>Date</u>	<u>Activity</u>
1 December 2005	Relocation of NRCS plots, determination in SE sector
27 January 2006	Documentation in NW sector.
13 March 2006	Determination in NW sector and
16 March 2006	Reconnaissance of NW sector and surrounding Allen Creek.
2 June 2006	Determination in NE sector

During these visits, the entire extent of the site was walked or waded on foot. Plots originally surveyed by the NRCS were relocated using GPS and orienteering from landmarks visible on aerial photos. These plot locations are only intended to be an approximate duplication of NRCS locations. In several cases relocated NRCS plots were inundated. If locally available, another plot location was haphazardly selected in a more elevated position out of the zone of inundation, to allow better characterization of soils and vegetation. Where plots were located within a large area of inundation, we approximated the original plot position and retrieved and described a shallow soil sample from the mud to illustrate wetland soil characteristics.

Additional parcels had been acquired by the Tulalip Tribes outside the NRCS easement boundary since 1996. Additional plots were haphazardly located outside of the original NRCS easement area. To better characterize the range of conditions present in the irregular surface of the Qwuloolt wetlands, two of these plots (N1 and N2) were paired: one at a high point in the local landscape, and one at a nearby low point, approximately 50 feet away. In addition, near NRCS plot #21, a series of soil pits were dug in a transect from low to high elevations, to identify the approximate edge of jurisdictional wetlands in relation to the floodplain slope break. Each plot was described using routine wetland determination methods.

Vegetation Methods

The presence of hydrophytic vegetation was identified consistent with the State Manual and current regulatory guidance. Species identifications and taxonomic nomenclature follows Hitchcock and Cronquist (1973). Dominant species in each of three strata (tree, sapling/shrub/woody vine, and herb) were identified. ‘Dominant’ was determined as those species in each stratum that comprised at least 20 percent aerial cover. Aerial cover is defined as the area found within a perimeter defined by the greatest extent of branching. Each species' indicator status was assigned using the National List of Plant Species that Occur in Wetlands: Northwest - Region IX (Reed, 1988). A species indicator status refers to the relative frequency with which the species occurs in jurisdictional wetlands (Table 4).

Table 4 – Wetland indicator status definitions

<u>Indicator Status</u>	<u>Definition</u>
Obligate Wetland (OBL)	Occur almost always (estimated probability >99%) under natural conditions in wetlands.
Facultative Wetland (FACW)	Usually occur in wetlands (estimated probability 67%-99%), but occasionally found in non-wetlands.

Facultative (FAC)	Equally likely to occur in wetlands or non-wetlands (estimated probability 34%-66%).
Facultative Upland (FACU)	Usually occur in non-wetlands, but occasionally found in wetlands (1%-33%).
Obligate Upland (UPL)	Plants that rarely occur (estimated probability <1%) in wetlands, but occur almost always in non-wetlands under natural conditions.
No Indicator Status (NI)	Insufficient information exists to assign an indicator status.
Not Listed (NL)	Not on the National List in any region.

According to the State Manual an area meets the hydrophytic vegetation criteria when, under normal circumstances, more than 50 percent of the dominant species from each stratum are obligate wetland (OBL), facultative wetland (FACW), and/or facultative (FAC) species. For the purposes of State Manual protocol, a plus (+) or a minus (-) sign is often included in the designation to specify a higher or lower level of the indicator status, and a FAC- indicator status is not considered to be an indicator of hydrophytic vegetation (*i.e.*, it is treated in the same way as a facultative upland [FACU], upland [UPL], and a not listed [NL] species). In the Pacific Northwest where a pronounced summer drought occurs, the Corps Seattle District allows for the presence of facultative upland (FACU) dominated plant communities where the presence of wetland hydrology is clearly identified (Corps, Seattle District, 5-94 Public Notice).

We were unable to positively identify all plants to species, particularly grasses, however due to 1) the prevalence of wetland adapted vegetation at many plots, 2) the frequent and clear indications of wetland hydrology and soils, and 3) the ‘atypical conditions’ of active pasture management, we chose to not return during flowering to positively identify all remnant pasture species.

Soil Methods

The presence of hydric soils was determined consistent with the State Manual. The definition of a hydric soil is "... a soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part" (USDA, NRCS 1996). The definition of a hydric soil is satisfied by the fulfillment of at least one of four technical criteria. As stated in page 20, paragraph 36 of the State Manual the hydric soils criteria are:

1. All Histosols except Folists, or
2. Soils in Aquic suborders, great groups, or subgroups, Albolls suborder, Aquisalsids, Pachic subgroups, or Cumulic subgroups that are:
 - a. Somewhat poorly drained with a water table equal to 0.0 foot (ft) from the surface during the growing season, or
 - b. poorly drained or very poorly drained and have either:
 - i. water table equal to 0.0 ft. during the growing season if textures are coarse sand, sand, or fine sand in all layers within 20 inches (in.), or for other soils
 - ii. water table at less than or equal to 0.5 ft. from the surface during the growing season if permeability is equal to or greater than 6.0 in/hour (hr) in all layers within 20 in., or
 - iii. a water table at less than or equal to 1.0 ft. from the surface during

the growing season if permeability is less than 6.0 in/hr in any layer within 20 in., or

3. Soils that are frequently ponded for long or very long duration during the growing season,
4. Soils that are frequently flooded for long or very long duration during the growing season.

Fulfillment of the technical criteria for hydric soil can be inferred by using a combination of published soils information and field indicators. The indicators available for determining whether a soil satisfies the basic definition and the technical criteria for hydric soils include, but are not limited to the following: the soil is a histosol, a histic epipedon is present, hydrogen sulfide odor is present, the soil is gleyed, the soil has a depleted matrix, the soil has a low chroma matrix with redoximorphic features (e.g., mottles), iron and/or manganese concretions are present, the soil occurs in an aquic or peraquic soil moisture regime, and the soil appears on the hydric soils list.

Categorical terms used to describe soils are consistent with definitions described in the USDA, NRCS, Field Book for Describing and Sampling Soils (Schoenberg et al, 2002). Soil pits were excavated by hand and soil colors quantified using the Munsell color system.

Hydrologic Methods

Consistent with the State Manual, and current regulatory guidance found therein, the presence of wetland hydrology can be determined by direct and indirect indicators. Field indicators of wetland hydrology listed in the State Manual include, but are not limited to, visual observation of inundation and/or soil saturation, oxidized channels (rhizospheres) associated with living roots and rhizomes, water marks on vegetation or fixed objects, drift lines, water-born sediment deposits, water-stained leaves, surface scoured areas, wetland drainage patterns, morphological plant adaptations, and hydric soil characteristics.

According to the State Manual, The presence of wetland hydrology may be defined by the presence of saturated or inundated soils for a duration greater than 5% or 12.5% of the growing season. Based on assumptions described in Section 2 the growing season on this site is expected to be no less than 251 days in length. A period equal to 5% of the growing season would be 13 days, and a period equal to 12.5% of the growing season would be 31 days. Therefore, consistent with page 28, paragraph 46 of the State Manual, areas where soil saturation to the surface or inundation occurs for over 13 days during the growing season starting March 13th, on may be wetlands in the presence of wetland vegetation and wetland soil indicators.

Due to the moderating influences of the maritime climate it could be argued that the growing season is year round. Given the assumption of a 365-day growing season and the presence of hydric soils and vegetation, only 19 days of continuous surface saturation or inundation, at any point in the year would be sufficient to indicate wetland hydrology, and would reflect a precautionary approach to wetland protection.

3.3 Results and Discussion

Wetland Determination

The Qwuloolt site contains extensive jurisdictional wetlands, with some small inclusions where soil saturation was not observed at a sufficiently shallow depth or duration to provide clear wetland indicators. Plot locations for the NOAA surveys are shown in Figure 1. Data sheets are

located in Appendix D.

All points except plot #21 had some wetland indicators. Plot #1 was not observed to have wetland hydrology, but was adjacent to areas with obvious wetland hydrology. The timing of some observations made positive identification of grass species difficult, such that wetland vegetative indicators were difficult to demonstrate. This was compounded by the still lingering influence of historic pasture management on species composition. None-the-less, the clear presence of vegetative, hydrologic and edaphic wetland indicators at locations throughout the site suggests that the majority of the site is jurisdictional “waters of the united states, including wetlands” with occasional inclusions of upland habitat on local high points (Table 5).

During exploratory observations on March 16, 2006 near plot 21, a jurisdictional wetland boundary was most clearly identified using depth to redoximorphic features, primarily high chroma concretions in a low chroma mottled matrix, and presence of saturated soils, as indicated by water seeping from the pit wall. The wetland boundary was typically located within 20 horizontal feet of the floodplain break in slope. This pattern was broken when indicators of wetland soils and hydrology were observed farther up the slope, suggesting that elevation alone may not been an accurate indicator of wetland extent. Slope or riverine wetlands associated with localized groundwater discharge or surface water channels are likely to extend above the topographic break between upland slopes and the greater Snohomish river floodplain.

Table 5 – Presence of wetland indicators in 2006 survey. Plots numbers are used to indicate if indicators are present or absent and the final determination made for each plot. Unknown vegetation indicates that the survey was completed before predominant vegetation could be positively identified. Unknown soils were plots with deep inundation in June such that soil observation was deemed unnecessary. Plot 21 was located outside the historic floodplain.

	<u>Indicators Present</u>	<u>Indicators not present</u>	<u>Indicators uncertain</u>
Vegetation	1,2,5,6,8,10,11,12,13,14,15,16,17,18,19,20,22,23,N2,N3,N4	21,N1	3,9
Hydrology	2,3,5,6,8,9,10,11,12,13,14,15,16,17,18,19,20,22,23,N1,N2,N3,N4	1,21	
Soils	1,2,3,5,6,8,9,10,11,12,13,14,15,16,17,20,22,23,N2,N3,N4	21,N1	18,19
Wetland	2,3,5,6,8,9,10,11,12,13,14,15,16,17,18,19,20,22,23,N2,N3,N4	1,21,N1	

Soil Patterns

Soils observed in field surveys were consistent with published descriptions of Puget and Snohomish soils, with the exception of plot 21 which was located above the alluvial plain. Observed soils were typically well-rooted, crumbly, silty-clay or clay loam near the surface (typically 10YR 4/2), with increasing low chroma mottling, iron concentrations, and a transition from a crumb to a sub-angular blocky structure with increasing depth. Depth to hydric soil indicators varied from at the surface to near the 10 inch depth. In the case of plot #N1, a local high spot, redoximorphic features were located at 11 inches depth. At plots 18 and 19 soils were not characterized due to the presence of 18 inches of standing water and duckweed in June.

The most common wetland soil indicator was the presence of high chroma iron concentrations in a mottled low chroma matrix, at a depth shallower than 10 inches. Oxidized root channels were common but few soil pits had a sulfidic odor. Some sites had extremely low chroma layers suggesting permanent inundation at shallow depths. In more severely reduced layers, iron concentrations were typically coating the faces of low chroma sub-angular blocky peds, suggesting some aeration at some point during the growing season.

Plots 2, 3 and 7 had un-decomposed woody organic matter at between 6 and 10 inches depth. The Snohomish County Soil Survey indicates patches of organic soils in the vicinity, but soil descriptions describe these deposits as sedge peat. The wood we found is more likely a relic of the tidal spruce swamp and woody debris that once covered the floodplain, that was then mixed into soils when the land was cleared, burned and leveled.

Rototillers and mould board plows can compact soil below the depth of cultivation, resulting in shallow subsurface compaction called “plow pan.” At several test pit locations, increased soil density, and a shift from subangular block structure to a nearly platy structure was observed at approximately 12 inches in depth. Saturated soils are particularly prone to tillage-induced changes in structure. Given the high seasonal water table, it is likely that this site was worked while soils were very wet or saturated, potentially modifying soils structure immediately below the depth of tillage.

A system of farm road was used and maintained on the Poortinga farm. Some of these farm roads are grown over with pasture species, however soils are still severely compacted (Figure 17). These old road beds may affect patterns of sediment transport on a restored marsh surface and inhibit natural formation of channels.

Hydrologic Patterns

Observed inundation varied dramatically between visits, and contrasted with the NRCS survey. During the June 2nd field survey inundation depths across the northern portion of the site were greater than during the March 13th visit. Several plots were surveyed while wading through thigh-deep water, with duckweed floating by. During the NRCS survey, performed June 20th, but 10 years prior, no free water was observed in any of the 18 to 21 inch soil pits. This seemingly dramatic difference in hydrology suggests that either inflows to the site have increased, or outflow has decreased.

The farm road culvert on Jones Creek failed over the course of field work (between plots #10 and #12) sometime between December 1st, 2005 and March 13th. The road grade now serves as a dam resulting in an approximate 2 foot drop from the upstream to downstream side of Jones Creek at the old Poortinga farm road. Ditch alignments suggest that most of the site was designed to drain through Jones Creek. It is possible that the failure of the Jones creek culvert has caused extensive ponding of runoff. Beaver sign is abundant on Allen Creek, and a beaver run, and a possibly beaver tunnel was observed near the site of the culvert failure. It is unclear to what degree beaver are involved in the degradation of the drainage system, although Beaver frequently stuff culverts with debris as a labor saving approach to creating ponds.

Jones and Allen Creeks enter the site from the Northeast and northwest respectively, and a small unnamed drainage enters from the east. Allen creek is the largest of these rain-fed surface water inputs with a basin area of 7.27 square miles (Snohomish County web data). Each of these basins is becoming more developed – land is increasingly covered by impervious surfaces, which tends to increase the frequency and decrease the duration of peak discharges, as more water is delivered more quickly to creeks.

Perhaps due to restricted outflows or changing basin hydrology, the marsh appears to be very responsive to precipitation. Our final visit on June 2nd was immediately after a rain (~0.7 inches over a 4 day period) following a dry spell (~1.2 inches over a 45 day period). We found mole hills in soils that were shallowly inundated – the crumb structure of these hills was still largely intact suggesting they were recently dug. Since moles don’t dig under water, this suggests that a brief storm cell with less than an inch of precipitation over several days had caused a dry field suitable for burrowing moles to be inundated with several inches of standing water.

This pattern of wetting and drying in response to precipitation is supported by soil observations. Redoximorphic soil features observed during the wetland determination survey suggests alternate wetting and drying (mottled iron depletion and concentrations) were typically observed at 4-8 inches depth, with more permanently reduced soils (low chroma matrix, sub-angular structure, with iron concentrations only on ped faces) found primarily at 10 inches or below.

In summary, it appears that the site is getting wetter as drainage infrastructure deteriorates, and that flooding is strongly affected by creek flows that are strongly linked to precipitation. Failure of the Jones Creek culvert on the old Poortinga farm road over the last water year may have had a substantial affect on site drainage. Beaver may be involved in the decline of drainage infrastructure and become future architects of hydrology.

Vegetation Patterns

In 1996, NRCS staff observed pasture and hayfields dominated by orchard grass, ryegrass, and bentgrass. Only 8 sites indicated reed canarygrass as present, and in only 2 of those was it a dominant part of the vegetation. Ten years later, 17 plots were completely dominated by reed canarygrass. Typically remnants of pasture were located on highpoints with reed canarygrass spreading outward from low areas. In areas that are still dominated by pasture species, reed canarygrass can still be found, and the overlapping circular shape of the patches is indicative of clonal expansion. Plots outside the Poortinga property are typically in a monoculture of reed canarygrass.

Based upon guidance provided by Wetland Manuals and USACE Regulatory Guidance Letters 82-2, 86-9, and 90-7, wetlands that have been disturbed through natural and/or anthropogenic alteration of vegetation, soils, and/or hydrology do not necessarily exist under "normal circumstances." If one or more parameters have been significantly altered by an activity that would normally require a permit, an "atypical" situation may exist. Pasture stewardship by Mr. Poortinga certainly constituted an active alteration of plant community composition. Following the end of pasture management, and the decline of drainage infrastructure, the site has begun to revert to more 'normal' circumstances. Reed canarygrass is the species both positioned for invasion and best suited for site conditions, and has extended its dominance.

Woody vegetation was associated almost exclusively with ditch and channel edges, and old fence lines. Although more of the site likely could supports woody vegetation, four factors likely contribute to this pattern. First, fence lines and watercourses were found on field edges that were not tilled and mowed as part of agricultural management. Second, both fencelines and watercourses provide opportunities for woody plant dispersal, either from floating seed or with birds ejecting guano while perching on fences. Natural channel edge levees are high points where woody species can escape saturated soils. And finally, dense rhizomatous Eurasian pasture grasses, create formidable competition for the establishment of woody plant seedlings, limiting the spread of woody plants to clonal expansion. Naturally occurring woody species were primarily (in general order of decreasing frequency): Himalayan blackberry (*Rubus discolor*), Nootka rose (*Rosa nutkana*), hardhack (*Spirea douglasii*), salmonberry (*Rubus spectabilis*), snowberry (*Symphoricarpos albus*), and to a lesser extent, willow (*Salix spp.*), red elderberry (*Sambucus racemosa*), twinberry (*Lonicera involucrata*), nightshade (*Solanum dulcamara*), and trailing evergreen blackberry (*Rubus ursinus*). Red alder (*Alnus rubra*) was largely limited to a few sites, and showed the squat branchy form and loss of apical dominance, likely related to periodic inundation stress.

Wildlife Observations

Beaver forage was common on Allen creek, but no active dam building or fresh sign was observed. A pair of harrier hawks were spotted on practically every visit. Wintering waterfowl were common in the large inundated areas. A dead coyote was found on the second site visit, and a live coyote flushed during a later visit. Several unidentified small rodents were observed, along with small mammal burrows in drier areas.

4.0 Estimated Wetland Impacts from Restoration

Several restoration alternatives are being considered by the trustees that include breaching existing levees to restore tidal flux at the Qwuloolt site. Based on current property ownership by restoration partners, and flood threats to existing infrastructure construction of setback levees is necessary to allow unconstrained tidal flux (USACE, 2002; Adolfson, unpublished data). Setback levee construction will likely result in loss of wetland area.

However, restoration of unconstrained tidal flux would restore a unique suite of estuarine habitat functions. These functions can only be restored in a very finite landscape, at historically estuarine locations like Qwuloolt. These habitat functions are critical to a wide range of estuarine-dependant species including federally threatened Puget Sound Chinook salmon. Restoration of tidal habitat at Qwuloolt would result in an increase in highly valued wetland functions.

The regulatory question is whether this increase in valued wetland functions is sufficient to offset the loss of wetland area. Preliminary analysis is presented below, using estimates of the areas lost under a 'worst case' restoration scenario. This preliminary analysis follows four steps: (1) estimation of areas affected by levee construction, (2) application of the Snohomish Estuary Wetland Integration Plan (SEWIP) as a functional assessment tool, (3) consideration of City of Marysville Critical Areas Ordinances (CAO), and finally (4) some possible approaches for calculating impact mitigation for Qwuloolt restoration.

4.1 Area Estimation Methods and Results

Potential wetland area lost from setback levee construction was based on a 'worst case scenario' estimation of maximum set-back levee construction provided by Adolfson and associates, of 14.1 acres over a total length of approximately 10,370 feet (Appendix G). For purposes of analysis it is assumed that all these levees would be constructed in jurisdictional wetlands.

These assumptions ignore five factors that could be considered as part of a final wetland assessment for a preferred restoration alternative:

1. Areas converted from field to channel are not considered as part of impacts to wetland area. Photographic evidence of historic channel alignment is available to support increasing channel area as restoration to a previous and documented pre-impact condition.
2. Deconstruction of existing levees will result in increased wetland area as the footprint could be restored to wetland elevations, decompacted, and revegetated.
3. Restoration of tidal flux will create mean daily inundation to 9 feet NAVD, reestablishing substantial area of wetlands in a ring around the site.
4. The area of wetland being restored would result in a regionally significant estuarine wetland complex. The biogeographic benefits of a habitat island of this size could justify and accounting of functional lift above and beyond what can be accounted for by an acre by acre equivalency analysis.

4.2 SEWIP Methods and Results

The City of Everett completed a rapid assessment of wetland functions within the Snohomish River estuary, including the project site (SEWIP, 1999). The analysis covered the anticipated extent of estuarine wetlands as predicted by the distribution of hydric soils in the Snohomish

County soil survey. All areas within the analysis boundary were assumed to be wetlands due to the predicted presence of hydric soils and field observations of inundation. The landscape was divided into 367 wetland units using air photos based on the assumption of shared hydrologic regime. In each parcel an independent assessment of wetland function was completed using a IVA (indicator value assessment) approach (Hruby et al, 1995) developed by a technical advisory committee composed of 23 scientists from City of Everett, U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, Natural Resources Conservation Service, Washington State Department of Ecology and Department of Fish and Wildlife, Snohomish County, and several local consulting firms.

Field assessment involved determining the presence or absence of 133 indicators of wetland function, including, hydrologic characteristics, topographic and physical features, soils, vegetation characteristics, buffer conditions, landscape position, presence of specific habitat structures, and evidence of anthropogenic disturbance. Each field indicator was correlated and weighted relative to a series of theoretical habitat functions, arranged in functional groups: socially significant functions, water quality improvement, export of primary productivity, fish habitat, bird habitat, and other species habitat. The presence or absence of indicators, weighted through a conversion matrix, resulted in a habitat function score. These scores were standardized across the estuary to provide a measure of relative function between wetland units. It should be noted that a wetland unit score is meant to reflect a “density of function” per unit area, and not the total function of the observed unit.

Using the same scoring system, wetland function following restoration of tidal connection was evaluated by assessing how restoration would hypothetically change the presence or absence of functional indicators. This exercise was completed for eight wetland complexes including Qwuloolt. Functional lift from restoration of Qwuloolt was based on full hydrologic reconnection, emergent revegetation, reforestation of a 25 foot inland buffer and remaining levee-islands, reconnection of existing streams, and full recovery of a dendritic channel system. Qwuloolt ranked first among 18 reviewed potential restoration units based on a restoration site ranking that considered habitat benefits, land ownership status, and position in the landscape.

Restoration of the wetland complex associated with Qwuloolt (a total of 11 wetland units) was found to provide the greatest opportunity for rehabilitation of estuarine functions in the Snohomish Estuary. Restoration at Qwuloolt was assessed as providing an increase of 57 points per acre on a 100 point scale for wildlife functions, and an increase of 51 points per acre for water quality functions. By contrast, existing leveed wetlands located within the City of Everett’s proposed development footprint were calculated as having a total average functional score of 13 points per acre for wildlife, and 31 points per acre for water quality. Full restoration of the Qwuloolt site alone was estimated to provide sufficient increase in wetland function to compensate for all wetland losses within the City of Everett’s proposed development footprint. Based on the compensation policies proposed in the SEWIP study, each acre of functionally improved Poortinga property would compensate for the loss of 1 acre of degraded leveed wetland as found in the proposed North Smith Island development footprint (see Appendix E).

4.3 City of Marysville Critical Areas Ordinance (CAO)

The City of Marysville has adopted guidelines for determining mitigation ratios for replacement of wetland functions impacted by development in their Critical Areas Management (MMC, Chapter 19.24). Based on Table 3, in Marysville Municipal Code Section 19.24.120, Mitigation ratios are determined by the type of mitigation being attempted, and the value rating of the wetland being impacted. Wetland rating is based on determined by the revised Washington State Department of Ecology’s Wetland Rating System for Western Washington (2004).

Based on the 2004 Wetland Rating System, the Qwuloolt Marsh under current conditions would rate as a Category 2 wetland, based largely on its ability and potential to provide water quality functions and its proximity to areas of contiguous habitat (Appendix F). Opportunity to provide flood control functions was not considered significant in this analysis. Flooding downstream of the Qwuloolt site is controlled by the coincidence of rain-on-snow events in the Stilly-Snoqualmie uplands and high tidal surge (USACE 2002). Compared to these two factors, retention of Allen and Jones Creek flood waters would not constitute an opportunity to reduce flooding and erosion on Ebey Slough.

Because the restoration treatment would result in the restoration of historic functions with a minor increase in wetland area relative to the current wetland area, the restoration would be defined as 'Rehabilitation'. Rehabilitation as a mitigation response to impacts on a category 2 wetland requires an 8:1 mitigation ratio.

4.4 Discussion

The Snohomish Estuary Wetland Integration Study (SEWIP) offers a functional assessment and equivalency analysis methodology designed specifically for the Snohomish Estuary to estimate the relative function of wetland units and how restoration and mitigation could be valued. A digital version of the SEWIP model is not currently available to run a specific restoration scenario; however the study specifically scored the potential benefits of restoration at Qwuloolt, and scored the functions of degraded wetlands of Smith Island. Results of these analyses can be applied to the proposed restoration scenario at Qwuloolt to provide some perspective on the scale of increased function from restoration and to what degree that functional lift could compensate for loss of wetland area to construct a setback levee. The following assumptions and hedge factors were used to apply SEWIP to the Qwuloolt scenario:

- **The existing functional characteristics of Qwuloolt wetlands potentially impacted by setback-levee construction are roughly equivalent to Smith Island wetlands within the City of Everett proposed development footprint.** Based on figures 4.1 and 4.2 of SEWIP (Appendix F) the existing functions of Smith Island and Qwuloolt wetland units are roughly equivalent, however, actual scores for Qwuloolt are not available in the text of the report. For this analysis we assumed existing Qwuloolt wetlands are 50% higher functioning than Smith Island. The existing Smith Island wetlands were given a SEWIP score of 13 for wildlife functions and 31 for water quality functions. For the purpose of this analysis Qwuloolt functions were scored 50% higher than Smith Island. This would yield a score of 19 for wildlife and 47 for water quality functions. Based on mapped value classes (Appendix F), it is clear that the actual value assigned to the wetland units of Qwuloolt Marsh did not exceed 25 points for wildlife, and 50 points for water quality, so these estimates appear reasonable if not conservative. This increase in pre-restoration score was subtracted from the functional lift estimated for restoration, such that:

Wildlife function increase = 57 units – a 6 unit adjustment = 51 units of improved function.

Water quality function increase = 51 units – 16 unit adjustment = 35 units of improved function

- **The selected Qwuloolt restoration alternative will result in the full functional recovery described in the SEWIP project.** Observations at Marysville restoration site and Mid-Ebey Island suggest that marsh recovery can happen without intentional levee breaching and restoration treatment, but takes time. The SEWIP suggests a 25% increase in wetland area to compensation for delayed recovery. For this analysis this contingency was increased to 50%.

Table 6 – Estimation of functional equivalency ratios for Qwuloolt restoration. Functional losses due to conversion of degraded wetlands to uplands are compared to functional lift resulting from restoration of estuarine functions based on the SEWIP model and assumptions discussed in section 4.4. Scores are on a 100 point scale.

	Lost wetland value (points/acre)	Functional lift from restoration (points/acre)	Compensation ratio	Including the 50% contingency
point value for wildlife function	19	51	0.4 : 1	0.6 : 1
point value for water quality functions	47	35	1.3 : 1	2.0 : 1

Under the SEWIP model, functional lift from restoration would be least for hydrologic functions, and so hydrologic function was used to determine a compensation ratio between lost acres and restored acres. Given the assumptions described above and in Table 6, a ratio of 2.0 acres of restoration per acre lost would be required to result in no net loss of function. When comparing the scale of functional recovery across the Qwuloolt project area the loss of function due to construction of setback levees is relatively minor. To compensate for 14.1 acres lost to levee construction 28.2 acres of Qwuloolt to restored as high quality estuarine habitat.

The potential for low restoration effectiveness could justify a more aggressive mitigation program to insure that restored function in fact results in no net loss. Under the City of Marysville CAO, a more rigorous mitigation ratio of 8:1 is suggested when using enhancement to compensate for loss of wetland area in a class 2 wetland (see section 4.3). Under an 8:1 ratio, the destruction of 14.1 acres of reed canary grass marsh by levee construction would require the enhancement of 112.8 acres of the remaining wetland. Again, this is well within many of the scenarios being considered by the Tulalip Landfill NRDA trustees.

Given that a section of levee would be removed and restored as wetland, this wetland restoration should also be considered as part of a final mitigation analysis. Depending on the extent of levee removal, up to 3500 feet of levee could be re-graded to wetland elevations and restored. Given a conservative 30' cross section, this could result in as much as 2.4 acres of wetland reestablishment. City of Marysville CAO (MMC 19.24.120) indicates a 3:1 mitigation ratio to compensate for loss of class II wetland through wetland reestablishment. Based on this analysis, reestablishment of 2.4 acres of wetland in the old levee footprint could compensate for 0.8 acres of wetland loss by setback levee construction. This would reduce the number of acres required for enhancement to 106.4.

This preliminary analysis suggests that enhancement of wetland function through tidal restoration at Qwuloolt will likely be sufficient from a regulatory perspective to offset any losses in wetland area from construction of setback levees, even under very conservative scenarios. It does suggest a rough backstop, whereby a certain area of enhancement, approximately 106 to 113 acres under the Marysville CAO, would be necessary to justify wetland losses caused by the construction of setback levees.

5.0 Vegetation Recovery Following Tidal Restoration

Five vegetation studies have been completed at three sites in the vicinity of Qwuloolt:

- The City of Marysville's Mitigation Site, located adjacent to Qwuloolt, was surveyed by Jones & Stokes (2003) and Hughes (unpublished data)
- Mid-Ebey Island, immediately across Ebey Slough from Qwuloolt, was surveyed by King (2002), Jones and Stokes (2004), and USACE (2002).
- Mid-Spencer Island, upstream of Qwuloolt, was surveyed by Cunningham and Polayes-Wien (1995)

In addition, the City of Everett's SEWIP study (Stanley et al. 1997) describes general elevation zones for vegetation in the Snohomish Estuary. These sources in combination with field observations allow for some speculation about vegetation recovery at Qwuloolt following a levee breach but do not describe the key processes of vegetation recruitment likely to affect the rate of vegetation recovery.

5.1 Sources and Methods

The Marysville Mitigation site is located immediately adjacent and south of the Qwuloolt site. In 1994 a setback levee was constructed and the old Ebey Slough levee breached. Following restoration of tidal inundation Jones & Stokes monitored vegetation development. A final 10-year report was produced in 2003. Elevation of vegetation was only provided for year 10 data, and raw data were not available from Jones & Stokes for further analysis. In 2005 a more detailed description of vegetation patterns was completed by a team from the University of Washington led by Jeanne Hughes (Hughes, Unpublished data).

The Hughes study estimated cover by species in 277 quadrats at 2 meter intervals along 3 transects traversing the site. The majority of observations were made at stations between 3.5 feet and 6.0 feet elevation, corresponding with the range of elevations at the Marysville site (Figure 9). This range of elevations corresponds to those elevations found at Qwuloolt. The resolution of this data offers a fairly clear picture of vegetation distribution across elevation 11 years after the levee breach, but does not describe patterns during early recruitment. To describe species distribution plots were grouped into 0.5 foot elevation classes. Species frequency was tabulated for each elevation class and plotted against elevation (Table 8). A binomial regression function was fitted for each species using least ordinary squares methods (Figure 9).

Mid-Ebey Island offers a longer term example of marsh recovery following natural levee failure and is located directly across Ebey Slough from the Qwuloolt Site. Sometime within the last 68 years the mid-Ebey Island levee failed, flooding agricultural land. The US Army Corps of Engineers (2002), Jones & Stokes (2004), and Sally King (2002) of the UW Wetland Science and Management Program each described vegetation at mid-Ebey Island in relation to elevation for the purpose of predicting how vegetation would develop if tidal inundation were restored at the Qwuloolt wetlands. King (2002) used a builder's level positioned on the Qwuloolt side of Ebey Slough, and commented that the accuracy of elevation readings may have been compromised by the limited capacity of equipment. The U.S. Army Corps of engineers report did not present methods.

5.2 Results

Species distributions across elevation from all reports are summarized in Table 7. Elevations are rounded to the nearest tenth of a foot. A higher level of precision is likely unwarranted. At Qwuloolt, mean higher high water (MHHW) is estimated at 9.0 – 9.1 feet NAVD. MHHW typically marks the transition between low marsh, characterized by Lyngby's sedge dominance, and more diverse high marsh (Eilers 1975; Ewing 1983).

Table 7 – Elevation range of dominant marsh species. All elevations were converted from source data and reported in North American Vertical Datum (1988).

Elevation Data Source	Lyngby's Sedge	Cattail	Bullrush	Liliopsis	Spike rush	Woody shrubs
Mid-Ebey (King, 2002)	1.5 - 7.7	no data	5.3- 8.7	(1.5 +)**	no data	9.8 - 10.8
Mid-Ebey (USACE, 2001)	3.0 - 6.6	6.8 - 7.5	6.8 - 6.9	no data	no data	no data
Mid-Ebey (SEWIP, 1997)	4.65	no data	no data	no data	no data	9.7
Marysville Mitigation (USACE, 2001; citing Jones and Stokes, 1999)	6.3 - 8.8	7.3 - 8.4	8.4 - 8.8	no data	3.7- 6.6	no data
Marysville Mitigation (King, 2002)	4.5- 8.9	7.3 - 10	(4.5-8.0)*	no data	no data	no data
Marysville Mitigation (Hughes, unpublished data)	0.3 - 7.6	4.1 - 9.0	4.1 - 6.7	0.3 - 5.6	0.7 - 5.5	8.5 +

* distribution was reported imprecisely with bullrush mixed with sedge at low elevations and mixed with cattail at the lower end of cattail distribution.

** distribution was reported imprecisely with Liliopsis mixed with sedge at the lower range of its distribution

Table 8 – Frequency of species across elevation at Marysville Site. Based on unpublished data provided by Jeanne Hughes. See Figure 9 for a binomial regression of these data.

ELEV CLASS	n	Spikerush	Liliopsis	Sedge	Cattail	Bullrush
3.50	21	0.38	0.10	0.14	0.00	0.00
4.00	46	0.63	0.28	0.11	0.09	0.04
4.50	43	0.79	0.40	0.14	0.07	0.02
5.00	47	0.30	0.74	0.11	0.19	0.04
5.50	40	0.20	0.28	0.58	0.33	0.20
6.00	36	0.00	0.00	0.94	0.25	0.08

There was considerable variation in the reported range of species between studies and locations. In general Lyngby's sedge had the greatest range. Sedge regeneration at Marysville showed declining frequency at lower elevations. Patterns of shoot growth indicate that sedge had established at higher elevations and has been spreading rhizomatously downhill. From as low as 0.3 feet to nearly MHHW. At the older mid-Ebey Island site, sedge elevation range was compressed with plots above 7.7 feet increasingly dominated by cattail and bulrush perhaps indicating a more natural zonation of vegetation resulting from prolonged competition following establishment.

Cattail and bulrush occupy higher elevation ranges than sedge. At the Marysville site cattail and bulrush were less frequent at lower elevations, and there did not appear to be the aggressive downslope colonization observed with the sedges. At mid Ebey island, presumably a more stable community, cattail and bulrush were not surveyed below 6.8 and 5.3 feet respectively.

Liliopsis appears to coexist at the lower extent of Lygby's sedge distribution. King reported it at the lower extent of sedge distribution on Ebey Island. Hughes found it the lowest extent of sedge distribution on the Marysville site but not above 5.6 feet. Liliopsis frequency peaks as sedge frequency begins to decrease (Figure 9).

At Marysville, small spikerush was distributed between 0.7 and 5.5 feet elevation, with a peak frequency between 4 and 4.5 feet. This species is annual and disperses by seed and was found across the Marysville site. Initial colonization of brass buttons and sandspurry reported in early monitoring reports were not evident in later studies.

King (2002) marked the transition from herbaceous to woody vegetation at 9.8 feet, which is consistent with the SEWIP study's report of 9.7 feet, but differed from the Ewing and Hughes report of 8.5 feet. The Hughes study was measuring canopy cover in small quadrats, and may have recorded woody vegetation in quadrats where the woody vegetation was not rooted, but only overhanging, resulting in a misrepresentation of the elevation tolerances of woody species. A more careful study of the elevations of rooted vegetation, and the characteristics of the rooting medium would provide a more accurate description of species tolerance than cover estimates in quadrats.

5.3 Discussion

Recovery is not accurately reported by total vegetative cover. Short lived species that take advantage of open sediments are common on new sites and on sites with frequent disturbance. Sparse vegetation dominated by small spikerush (*Eleocharis parvula*), sandwort (*Spergularia*), brass buttons (*Cotula*), and goosefoot (*Atriplex*) is technically marsh, but constitutes an early succession, low productivity system compared to potential vegetation. Potential marsh vegetation at Qwuloolot is dominated by perennial rhizomatous competitors: bulrush (*Schoenoplectus acutus* or *S. tabernaemontanii*) and cattail (*Typha latifolia* or *T. angustifolia*) at high marsh elevations, and Lyngby's sedge (*Carex lyngbyei*) at low elevations. Considerable perennial diversity is common within this matrix, including Baltic rush (*Juncus balticus*), Western liliopsis (*Liliopsis occidentalis*), maidenhair grass (*Deschampsia caespitosa*), Seaside arrowgrass (*Triglochin maritimum*) and other salt-tolerant species. This is the target vegetation for restoration, and so the development patterns of these target species are of particular interest.

Of the 5 surveys of vegetation reviewed, only the Marysville mitigation monitoring study documents vegetation change over time following restoration. The remainder of the surveys describes wetland vegetation at a single point in time. The objective of Marysville mitigation monitoring was to describe in the most general terms the changing state of the entire site, and so sampling did not target those areas where the change was occurring. At the Marysville site, elevations between 6 feet NAVD and supratidal elevations are steep, located on the dike walls, and was imprecisely and weakly sampled over the course of marsh development. The precise colonization pattern of these species at Marysville in relation to the 4-6 foot elevation band common at Qwuloolot is unknown. What limited distribution data suggests that dominant perennial marsh species, the workhorses of primary productivity likely established in this poorly documented zone and have been spreading downslope vegetatively.

In their 2002 study the U.S. Army corps of engineers speculated that much of the Qwuloolot site is currently below the elevation needed to support a dense low marsh vegetative community, and

used a 6 foot elevation as the lower limit of low marsh. Nearby studies indicate that Lygby's sedge will survive at elevations as low as 0.3 feet. Approximately 58% of plots between 5.25 and 5.75 feet had sedge present, and sedge frequency was 14% as low as 3.5 feet (Hughes, unpublished data). It is possible that the USACE prediction, based on 8 years of post-restoration data, did not consider the potential of sedge to expand vegetatively once clonal individuals had established at higher elevations. Eilers (1975) reports Lygby's sedge as the most inundation tolerant species in his extensive study of Nehalem marsh. The distribution of Lygby's sedge in adjacent sites with restored tidal inundation suggests that current elevations at Qwuloolt are likely become dominated by sedge marsh over time.

Vegetation patterns at the Marysville site suggests that the dominant marsh species have primarily established on the periphery of the site, but neighboring sites indicate that Lygby's sedge in particular can thrive at much lower elevations. If the short term extent of sedge colonization is not limited by elevation, it may well be limited by patterns of seedling recruitment. Marysville monitoring protocols were not developed with capturing the pattern of seedling recruitment in mind, so we are left with a series of hypothesis that will be tested by restoration of the Qwuloolt site:

1. On a new site, target species establish from seed as opposed to lodging of floating rhizomes recruited by upstream erosion.
2. Regeneration from seed is limited to sites where wrack accumulates primarily around MHHW.
3. Increase in vegetative cover over time is controlled by the distribution of regeneration sites and the rate of rhizomatous spread.
4. Vegetation regeneration will primarily occur in a zone around MHHW and extend downward into the marsh plane.

If these hypotheses are accurate marsh development at Qwuloolt may be very slow since the majority of the site is located between 3 and 7 feet NAVD, below MHHW. The extent to which these hypotheses are inaccurate may dramatically change the pattern of recovery at Qwuloolt. While a majority of regeneration may occur in a bathtub-ring at MHHW on the periphery of the site, the frequency of lower elevation regeneration across the site will strongly drive the rate of vegetation recovery. Observations at the Marysville site suggest that this rate of expansion may be 3-10 feet per year – a modest rate for a site where some areas are over 1000 feet from the nearest point above MHHW.

Vegetation development within the bathtub ring may be influenced by restoration practices. Roughness created by remnant vegetation may increase seed deposition below MHHW. This roughness can be enhanced or reduced by site treatments like tillage. The degree to which flood waters move freely into and out of the site, driven by the size and orientation of levee breaches will influence patterns of flotsam deposition, including seeds.

Factors that will influence seedling recruitment at Qwuloolt are poorly understood. The effects of restoration treatments on seedling recruitment are unknown. Vegetation regeneration patterns have a dramatic effect on functional recovery.

Vegetation monitoring at Qwuloolt, informed by an accurate elevation and hydrologic dataset, and with the opportunity for variable pre-flooding restoration treatments, could improve the ability to predict revegetation patterns at large brackish marsh restoration sites, directing the application of future restoration treatments. The methods developed for a vegetation monitoring strategy should consider the following potential factors:

- Variable spatial patterns of seed deposition and recruitment are affected by currents and depositional patterns, multiple freshwater inputs, and variable soil conditions.
- The surface of the Qwuloolt site is uneven with localized depressions. Channel development may be constrained by the remnant creek bank levees and the destruction of historic sloughs by agricultural development. Sediment inputs are likely different than in the historic estuary. The development of a new drainage system will occur over time in an uncertain geomorphic environment. The development of this drainage system will both affect patterns of seed dispersal and hospitability of sites for seedling establishment, and will change over time.
- Large wood may influence sediment deposition and wrack accumulation as well as provide sites for recruitment of woody species. Unstable rolling and floating wood may disturb the soil surface and arrest vegetation development.

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Figures

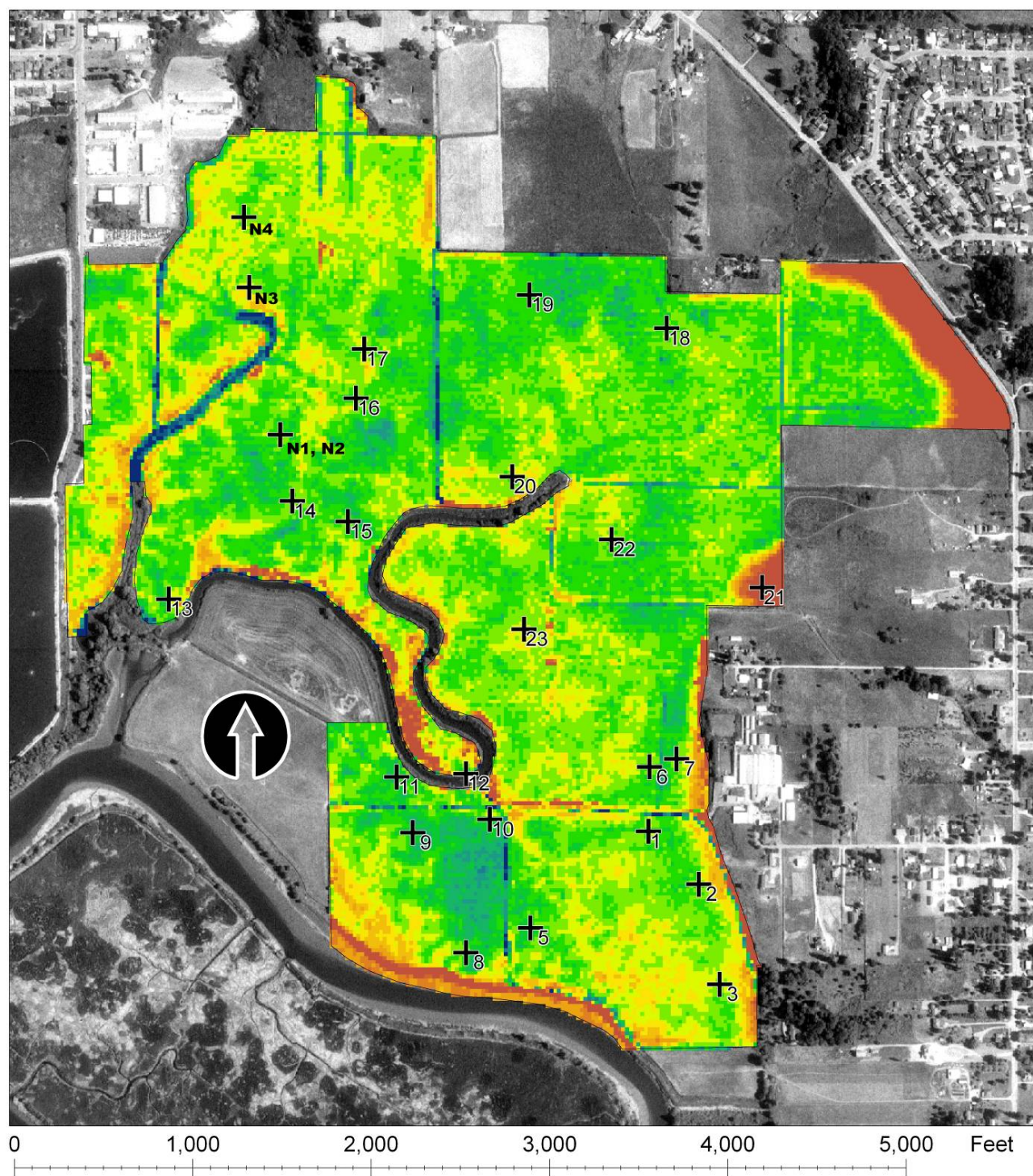


Figure 1 – Site boundary and wetland plot locations. Data documenting the presence or absence of wetland indicators were collected at 26 plots. 22 plot locations were based on the records of a previous NRCS wetland survey (note that while plots are labeled 1 to 23, plot 4 was located outside the site boundary and not sampled). Four additional plots (N1-4) were observed to characterize some areas outside the original NRCS survey.

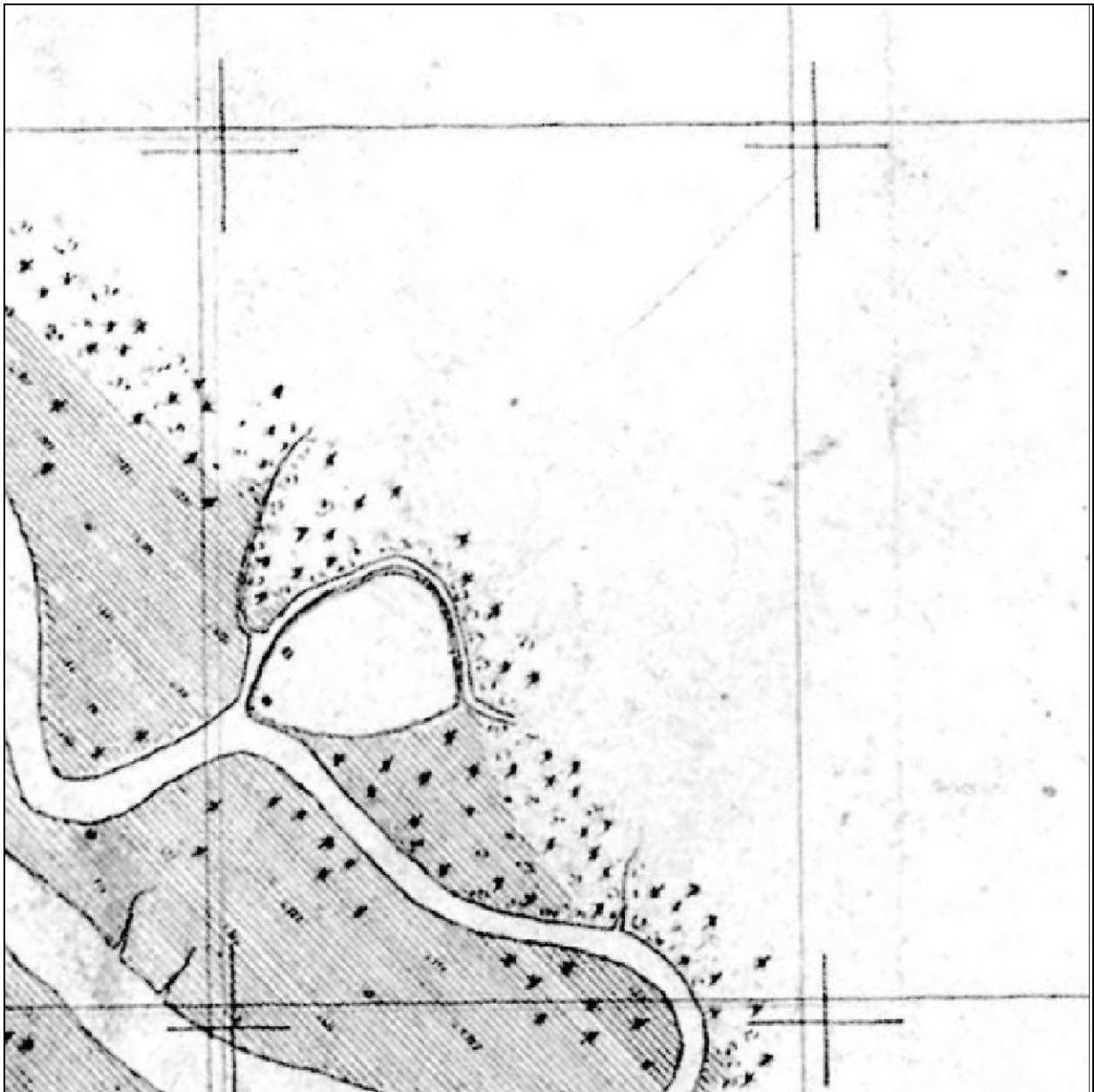


Figure 2 – U.S. Coastal and Geodetic Survey c. 1891. Dark hatch indicates marsh. Light indicates woody vegetation. White area with two squares indicates cleared agricultural land. From U.S. Coastal and Geodetic Survey. 1891. Admiralty Inlet and Puget Sound to Seattle. Chart 6450. Plate No 2181.



Figure 3 – Pre-WW2 Aerial Photograph of Qwuloolt and vicinity c. 1938. Qwuloolt is diked with fields under management. Remnant sloughs can still be observed in fields. Patches of remnant swamp are still present. Mid-Ebey island is diked and under agricultural management.



Figure 4 – USDA DOQQ Aerial Photo c. 1992-1997. Qwuloolt fully cleared and under active agricultural management. Mid-Ebey Island levee has failed with marsh recovering.



Figure 5 – Recent Aerial Photo c. 2005. By this data Qwuloolt Marsh has been largely acquired by The Tulalip Tribes and City of Marysville. Naturalized vegetation has begun to colonize fence lines. Clonal expansion of reed canarygrass (*Phalaris arundinacea*) is evident. Marysville mitigation site has been constructed. Note increasing urbanization of upland buffers.

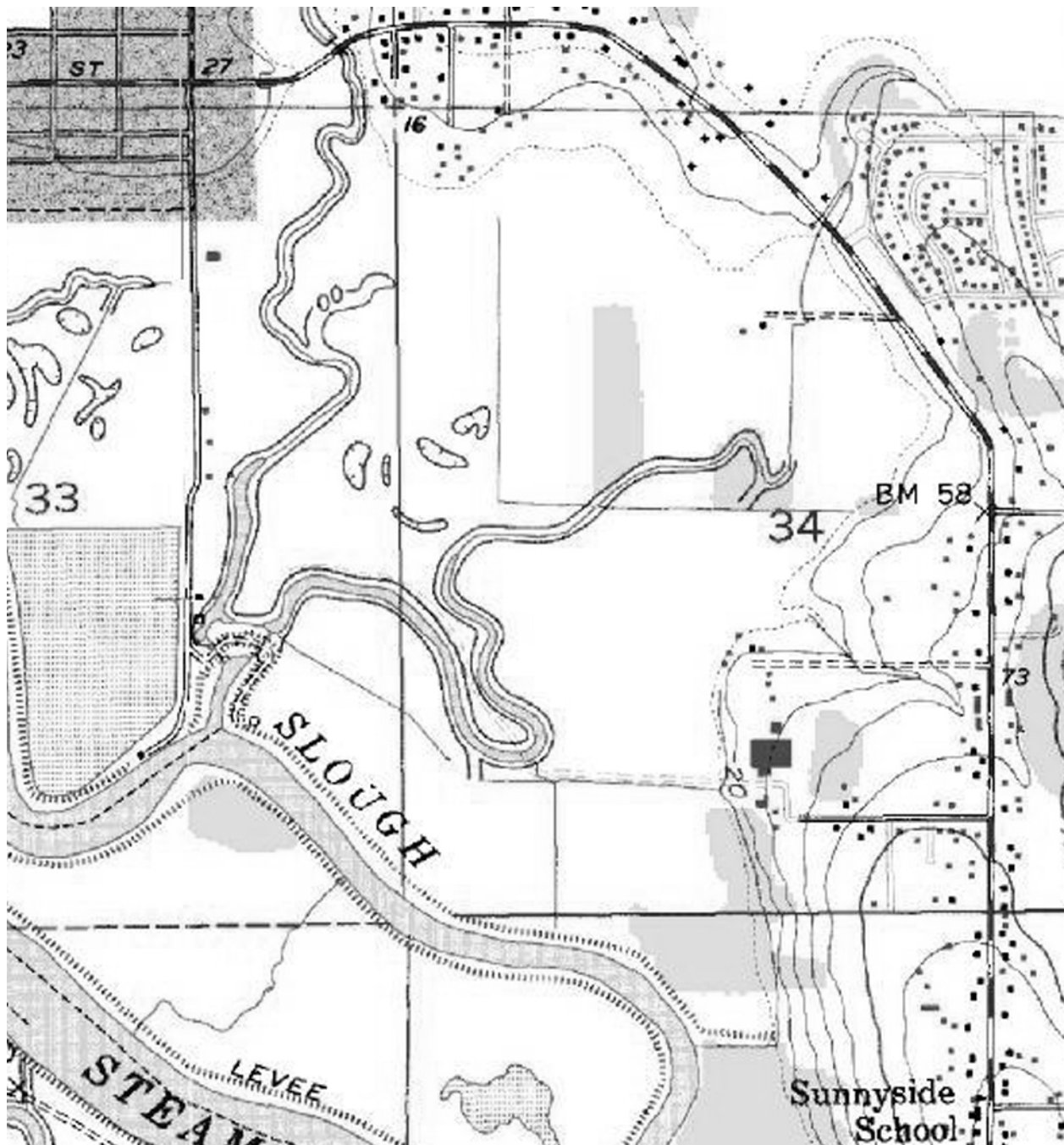


Figure 6 – USGS Topographic Map. Note the slope break that roughly corresponds defines the extent of wetland soils and the interface between glacial terrain and the floodplain.



Figure 7 – Snohomish County Soil Survey. Soil series are indicated by numbered polygons. Hydric soils were identified using the county hydric soil list (USDA, 2001).

- 7 – Bellingham silty clay loam (hydric soil)
- 13 – Custer fine sandy loam
- 34 – Mukilteo muck (hydric soil)
- 47 – Pastik Silt Loam, 0-8% slope
- 55 – Puget silty clay loam (hydric soil)
- 57 – Ragnar fine sandy loam, 0-8% slopes
- 64 – Snohomish silt loam (hydric soil)
- 69 – Terric medisaprists, nearly level (hydric soil)
- 72 – Tokul gravelly loam, 0-8% slopes
- 73 – Tokul gravelly loam, 8-15% slopes
- 77 – Tokul-Winston gravelly loams, 25-65% slopes
- 83 – Water

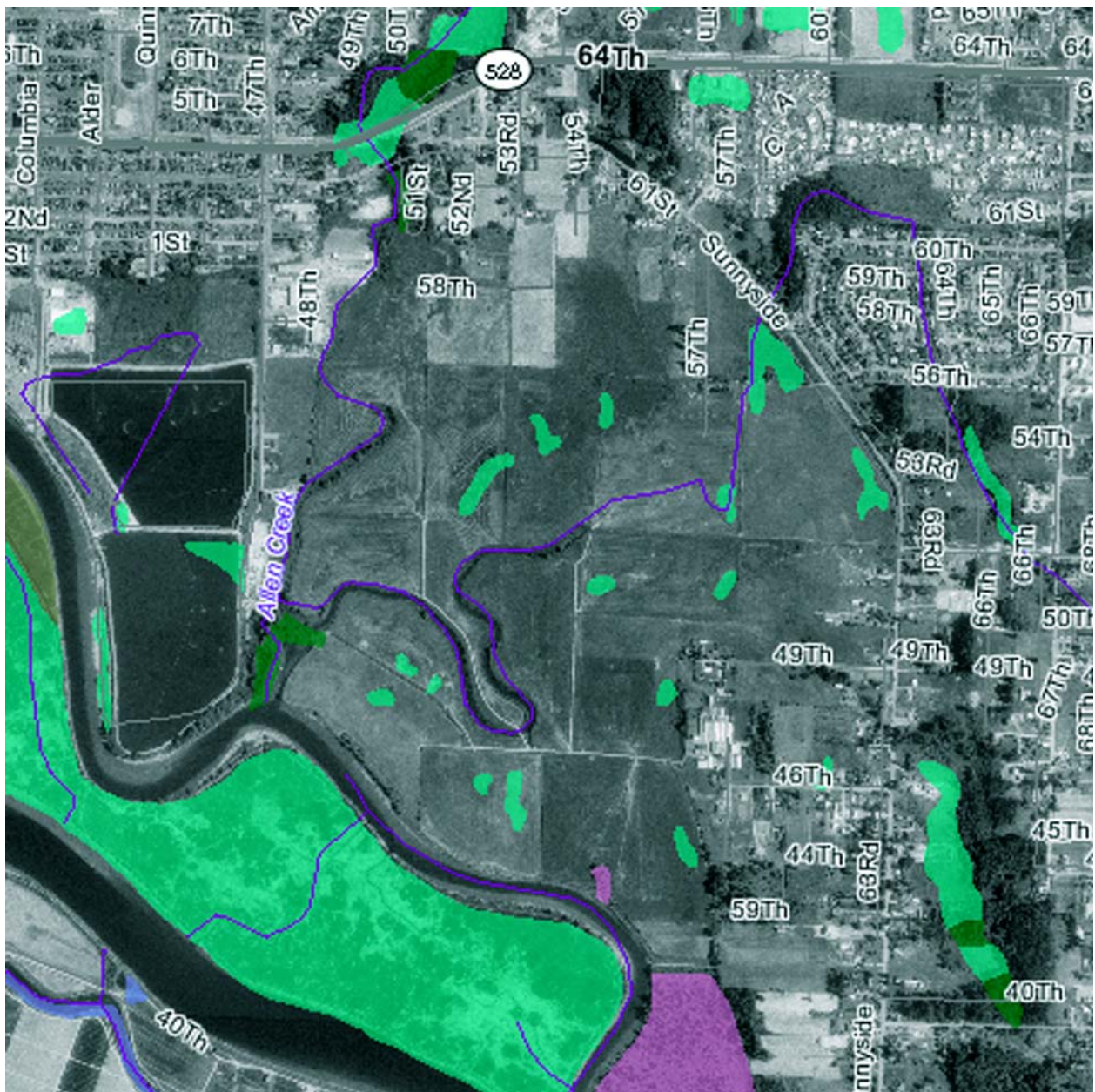


Figure 8 – National Wetland Inventory. Light green indicates emergent wetlands – inaccurate inclusion of Mid-Ebey Island marsh which is now tidally influenced. Purple indicates tidal scrub-shrub wetland, medium green indicates tidal forested wetland, and dark olive-green indicates forested wetland. Wetland extent described in NWI substantially less than conditions observed on the ground.

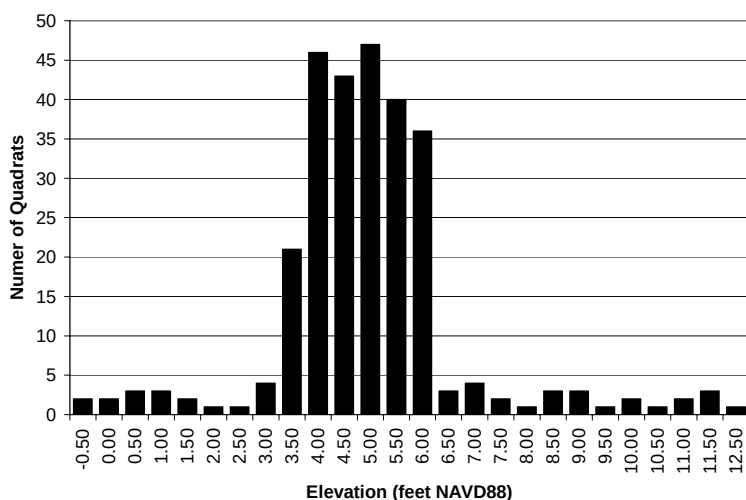


Figure 9 – Frequency of elevation classes at Marysville site. Based on observation of 277 plots distributed on three transects. From Hughes (unpublished data).

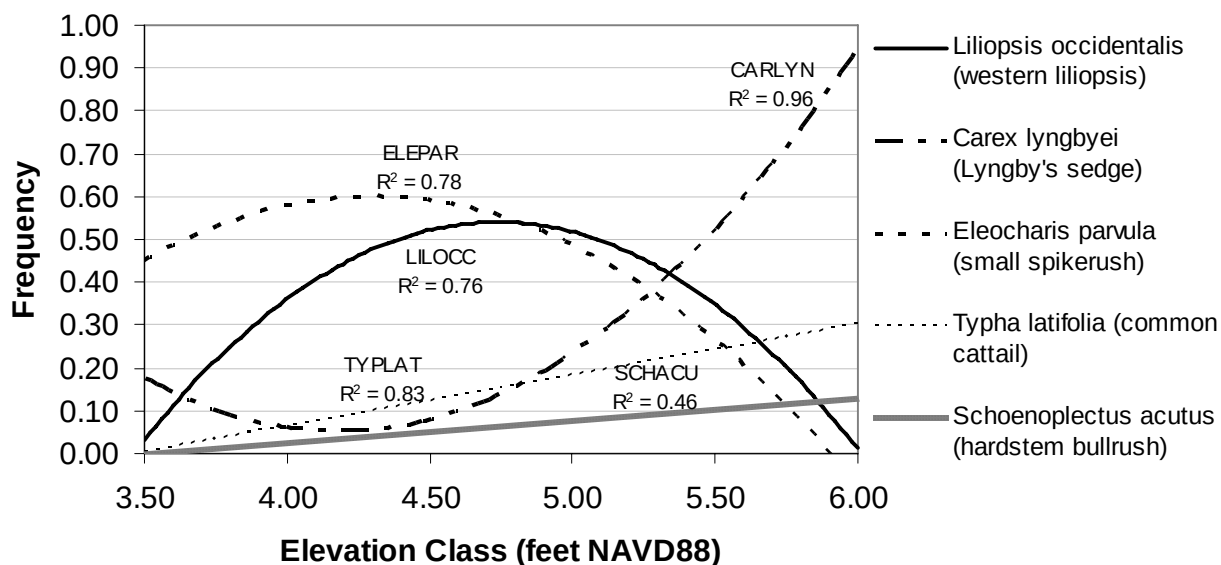


Figure 10 – Species frequency across elevation at Marysville Site. Trend lines are binomial functions fitted to 6 frequency data points using ordinary least squares methods (Table 8). Dominant rhizomatous marsh species decline in frequency with decreasing elevation. Ruderal annual *Eleocharis parvula* establishes from seed across elevations



Figure 11 – The Mouth of Jones creek (5 May 2005). Photographer is standing above the eastern most tide gate facing south. The mouth of the Marysville mitigation site is obscured by blackberry on the left.



Figure 12 – Spruce swamp visible from vicinity of plot 2 (1 December 2005). Patchy inundation was found across the area, increasingly dominated by clonal reed canarygrass. A relatively unmodified spruce swamp reference site can be seen immediately upstream on Ebey Slough in the background.



Figure 13 – Typical view of the northern reaches of Allen Creek (13 March 2006). Note the soil core sampler indicating water depth and the extent of overhanging reed canarygrass in the channel. The fence for the neighboring industrial park is located on the left. This image was taken northwest of plot N4 facing upstream.



Figure 14 – Typical view of lower Jones Creek and vegetation (13 March 2006). The observed water levels were likely influenced by the failure of the old farm road culvert (figure 15). This shot was taken facing upstream immediately north of plot 12.



Figure 15 – New Jones Creek channel crossing old farm road (13 March 2006). Jo Gardiner is standing on the old farm road immediately SE of plot 12, following the failure of the Jones creek culvert.



Figure 16 – Extensive June flooding (2 June 2006). This view eastward from plot 19 shows areas of continuous flooding (evidenced by duckweed populations). Late season flooding observed in 2006 may be caused by clogging of the Jones Creek-farm road water crossing (Figure 15).



Figure 17 – Overgrown but compacted farm road (2 June 2006). Old grown over farm roads (visible on the DOQQ air photos) may affect natural erosion of new marsh surface following revegetation.



Figure 18 – View of likely vicinity of Allen Creek realignment. View is facing south from north edge of site. The relatively flat topography, with saturated soils, dominated by reed canarygrass, is dissected by drainage ditches.



Figure 19 – Hummocky terrain producing vegetation mosaic (2 June 2006). The shovel marks a local highpoint at plot N1 dominated by pasture grasses, without wetland indicators, while Nancy Lou is standing at a nearby lowpoint N2, dominated by reed canarygrass with wetland indicators present.



Figure 20 – One year old beaver sign (13 March 2006). Extensive foraging was observed near the northern reaches of Allen Creek. No dam building was observed.



Figure 21 – Animal trail and subsurface water flow on Jones Creek (13 March 2006). Despite continuous traffic over the period of observation, no tracks were observed suggesting beaver, whose tails tend to obliterate tracks.



Figure 22 – Marysville mitigation site regeneration 10 years after reconnection (5 May 2005). Note occasional sedge seedlings located in flats away from prevalence of regeneration associated with wrack line.

5 May 2005



Figure 23 – Detail of Marysville mitigation site regeneration pattern (5 May 2005). *Carex lyngbyei* spreading downslope, *Lileopsis occidentalis* at the front, and annual *Eleocharis parvula* throughout.



Figure 24 – Reference vegetation at mid-Ebey Island marsh (5 May 2005). Approximately 60 years after natural breach, agricultural fields are completely colonized by Lygby's sedge, with Bullrush and cattail at higher elevations, dissected by steep-walled, mud-bottomed channels.

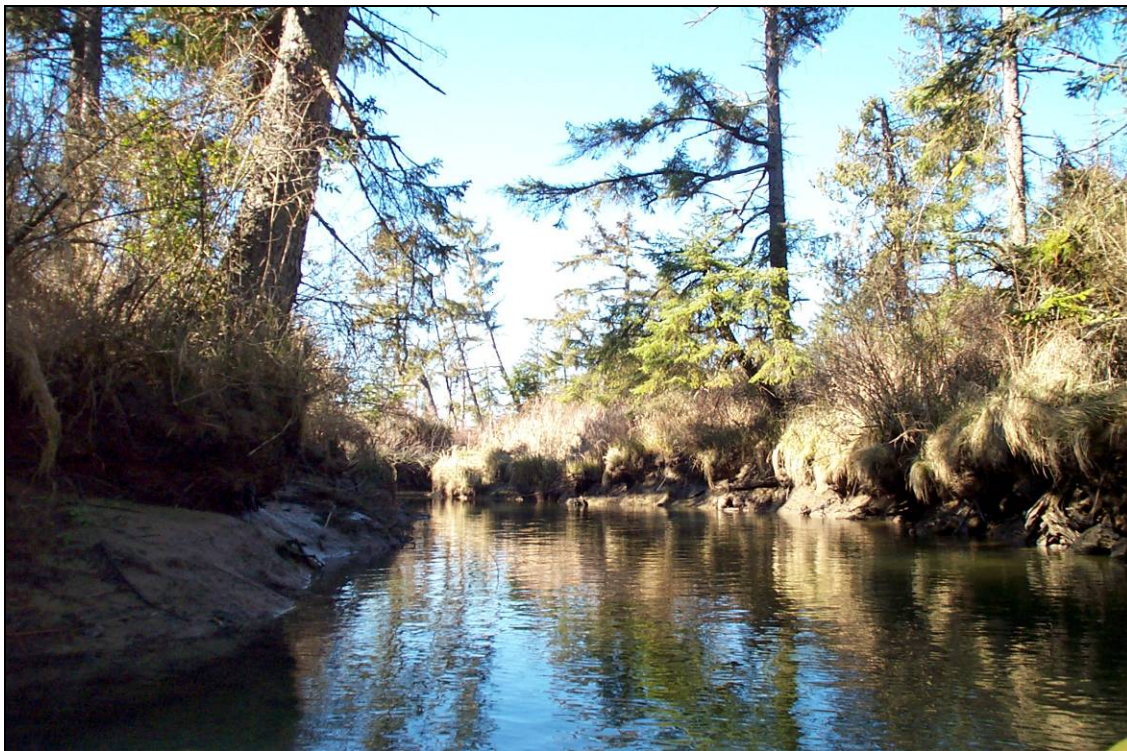


Figure 25 – Reference blind slough channel structure on Otter Island (November 2004). Eroding bank heavy with roots above a sedge colonized slump zone, above a low water channel. Woody debris is embedded throughout, with hydrology affected by beaver activity.

Appendix A – Climate and Weather Data

EVERETT JR COLLEGE, WASHINGTON (452675)

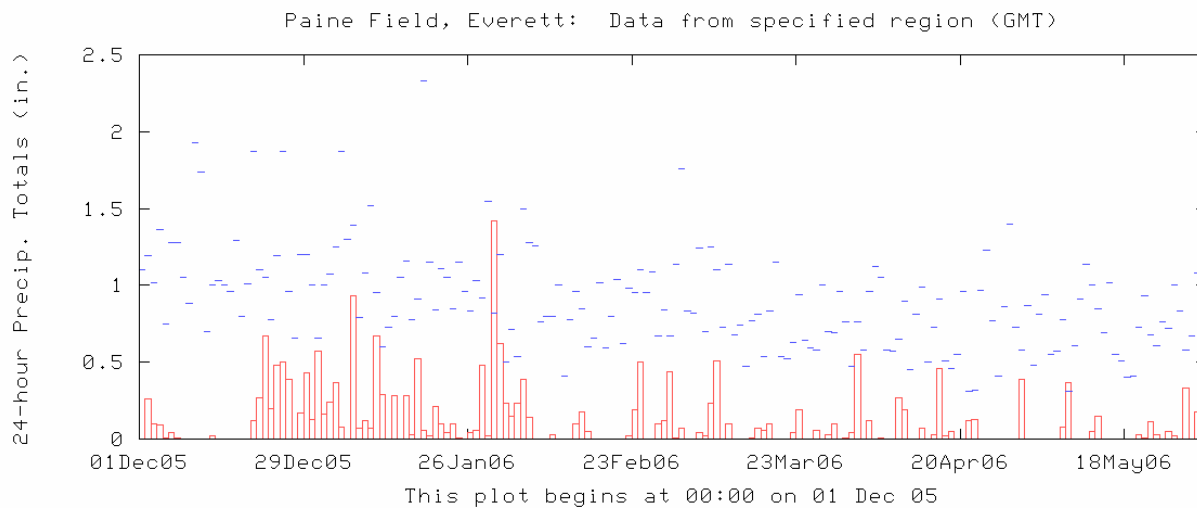
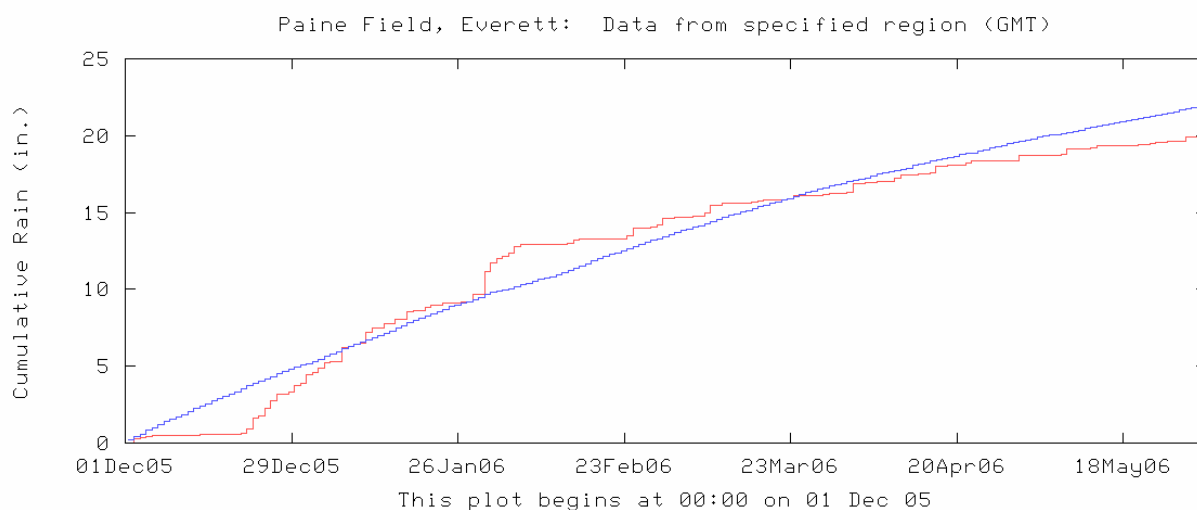
Period of Record Monthly Climate Summary

Period of Record : 6/ 1/1948 to 12/31/2002

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	45.1	49.0	52.6	57.8	63.7	68.4	72.8	73.2	68.5	59.7	51.0	45.7	59.0
Average Min. Temperature (F)	33.1	34.6	36.6	40.4	45.6	50.8	53.5	53.2	48.5	42.5	37.5	34.4	42.6
Average Total Precipitation (in.)	4.55	3.47	3.59	2.68	2.35	2.20	1.23	1.34	1.99	3.43	4.88	5.10	36.83
Average Total SnowFall (in.)	2.4	0.7	0.6	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.0	5.2
Average Snow Depth (in.)	0	0	0	0	0	0	0	0	0	0	0	0	0

Percent of possible observations for period of record.

Max. Temp.: 99.3% Min. Temp.: 99.3% Precipitation: 98.8% Snowfall: 96.1% Snow Depth: 94.2%



Appendix B – NOAA CO-OPS Tidal Datum Reports

Jul 25 2006 16:10

ELEVATIONS ON STATION DATUM
National Ocean Service (NOAA)

Station: 9447130
Name: SEATTLE, PUGET SOUND, WA
Status: Accepted

T.M.: 0 W
Units: Feet
Epoch: 1983-2001

Datum	Value	Description
-----	-----	-----
MHHW	19.30	Mean Higher-High Water
MHW	18.43	Mean High Water
DTL	13.62	Mean Diurnal Tide Level
MTL	14.60	Mean Tide Level
MSL	14.58	Mean Sea Level
MLW	10.77	Mean Low Water
MLLW	7.94	Mean Lower-Low Water
GT	11.36	Great Diurnal Range
MN	7.66	Mean Range of Tide
DHQ	0.87	Mean Diurnal High Water Inequality
DLQ	2.84	Mean Diurnal Low Water Inequality
HWI	0.40	Greenwich High Water Interval (in Hours)
LWI	6.64	Greenwich Low Water Interval (in Hours)
NAVD	10.28	North American Vertical Datum
Maximum	22.42	Highest Water Level on Station Datum
Max Date	19830127	Date Of Highest Water Level
Max Time	04:36	Time Of Highest Water Level
Minimum	2.90	Lowest Water Level on Station Datum
Min Date	19160104	Date Of Lowest Water Level
Min Time	00:00	Time Of Lowest Water Level

To refer Water Level Heights to a Tidal Datum, apply the desired Datum Value.

Click [HERE](#) for further station information including New Epoch products.

Jul 25 2006 16:13

ELEVATIONS ON STATION DATUM
National Ocean Service (NOAA)

Station: 9447659
Name: EVERETT, WA
Status: Accepted

T.M.: 0 W
Units: Feet
Epoch: 1983-2001

Datum	Value	Description
-----	-----	-----
MHHW	10.83	Mean Higher-High Water
MHW	9.95	Mean High Water
DTL	5.28	Mean Diurnal Tide Level
MTL	6.25	Mean Tide Level
MSL	6.22	Mean Sea Level
MLW	2.54	Mean Low Water
MLLW	-0.26	Mean Lower-Low Water
GT	11.09	Great Diurnal Range
MN	7.41	Mean Range of Tide
DHQ	0.87	Mean Diurnal High Water Inequality
DLQ	2.81	Mean Diurnal Low Water Inequality
HWI	0.41	Greenwich High Water Interval (in Hours)
LWI	6.61	Greenwich Low Water Interval (in Hours)
NAVD	1.77	North American Vertical Datum
Maximum		Highest Water Level on Station Datum
Max Date		Date Of Highest Water Level
Max Time		Time Of Highest Water Level
Minimum		Lowest Water Level on Station Datum
Min Date		Date Of Lowest Water Level
Min Time		Time Of Lowest Water Level

To refer Water Level Heights to a Tidal Datum, apply the desired Datum Value.

Click [HERE](#) for further station information including New Epoch products.

Jul 25 2006 16:14

ELEVATIONS ON STATION DATUM
National Ocean Service (NOAA)

Station: 9447729
Name: EBEY SLOUGH, QWUL00LT, POSSESSION SOUND, WA
Status: Accepted

T.M.: 0 W
Units: Feet
Epoch: 1983-2001

Datum	Value	Description
-----	-----	-----
MHHW	11.59	Mean Higher-High Water
MHW	10.72	Mean High Water
DTL		Mean Diurnal Tide Level
MTL		Mean Tide Level
MSL		Mean Sea Level
MLW		Mean Low Water
MLLW		Mean Lower-Low Water
GT		Great Diurnal Range
MN		Mean Range of Tide
DHQ	0.87	Mean Diurnal High Water Inequality
DLQ		Mean Diurnal Low Water Inequality
HWI	0.56	Greenwich High Water Interval (in Hours)
LWI		Greenwich Low Water Interval (in Hours)
NAVD		North American Vertical Datum
Maximum	13.76	Highest Water Level on Station Datum
Max Date	20020107	Date Of Highest Water Level
Max Time	19:30	Time Of Highest Water Level
Minimum		Lowest Water Level on Station Datum
Min Date		Date Of Lowest Water Level
Min Time		Time Of Lowest Water Level

To refer Water Level Heights to a Tidal Datum, apply the desired Datum Value.

Click [HERE](#) for further station information including New Epoch products.

Appendix C – 1995 NRCS Wetland Determination

Project/Site: WRP
 Applicant/Owner: Portinga
 Investigator(s): KW/KAK

Sec: 34 Date: 6-21-95
 Township: 30N County: SNOW
 Range: 5E State: Washington

Normal Circumstances exist on the site?
 Is the site significantly & recently disturbed? (Atypical Situation)
 Is the area a potential Problem Area? (explain in final remarks)

Yes ☒ No ☐
 Yes ☒ No ☐
 Yes ☒ No ☐
 Plot ID: 1
 Transect ID:
 Community ID:

VEGETATION Pasture - grazed by sheep
 Dominant Plant Species Stratum Indicator

1. Oreochloa 40 FACU
 2. wh. clover 20 FAC
 3. Poa pr 10 FAC
 4. Plantain - broad 10 FACU+
 5. common dandelion 10 FACU

Dominant Plant Species Stratum Indicator

6. pineapple weed FACU?
 7. at drive way to field
 8. CAN bluegrass (barkgrass?) 10 FACU+
 9.
 10.

Percent of Dominant Species that are
 OBL, FACW or FAC (excluding FAC-) %

Hydrophytic Vegetation Present? Yes ☒ No ☐
 Basis for determination:

REMARKS:

GRAZED, mowed

HYDROLOGY

Recorded Data (Describe in Remarks):

☐ Stream, Lake or Tide Gauge
☐ Aerial Photographs
☐ Other
☐ None

PRIMARY Indicators

☐ Inundated
☐ Saturated in Upper 12"
☐ Water Marks
☐ Drift Lines
☐ Sediment Deposits
☐ Drainage Patterns in Wetlands

SECONDARY Indicators

☐ Oxidized Root Channels in Upper 12"
☐ Water Stained Leaves
☐ Local Soil Survey Data
☐ FAC-Neutral Test
☐ Other (Explain in Remarks)

Field Observations

Depth of Surface Water: None (in.) Depth to Free Water in Pit: 18 (in.) Depth to Saturated Soil: 18 (in.)

Wetland Hydrology Present? Yes ☒ No ☐

Basis for determination:

REMARKS: Ditch 50' N is ~10' W x 5' deep

history of flooding (seasonal)

SOILS

Soils Mapped As: Puert/Snow

Drainage Class: P

Field Observations

Confirm Mapped Type? ☒ Yes ☐ No

Taxonomy (Series and Phase):

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle (Abundance/Contrast)	Texture, Concretions, Structure, etc.
0-6		10YR 3/2			sil
6-12		10YR 3/2	7.5YR 3/4	C2D	interior of peds 10YR 4/1, sil
12-		2.5Y 5/2	10YR 4/6	M1 2/2	sil mixed w organic material

Hydric Soil Indicators:

☐ Histosol
☐ Histic Epipedon
☐ Sulfidic Odor
☐ Aquic Moisture Regime
☒ Reducing Conditions
☒ Gleyed or Low Chroma Colors
☐ Concretions
☐ High Organic Content in Surface Layer in Sandy Soils

☒ Organic Streaking in Sandy Soils
☒ Listed on Local Hydric Soils List
☒ Listed on National Hydric Soils List

Hydric Soils Present? ☒ Yes ☐ No

Basis for determination:

REMARKS:

WETLAND DETERMINATION

Is this Sampling Point Within a Wetland? ☒ Yes ☐ No

Basis for determination:

INVESTIGATOR:

Project/Site: WRP
 Applicant/Owner: Portinger
 Investigator(s): AIN/KAK

Sec: 34 Date: 6-21-95
 Township: 30 County: Snoho
 Range: 5 State: Washington

Do natural circumstances exist on the site?
 Is the site significantly & recently disturbed? (Atypical Situation)
 Is the area a potential Problem Area? (explain in final remarks)

Yes ☒ No ☐
 Yes ☒ No ☐
 Yes ☐ No ☒
 Plot ID: 2
 Transect ID: _____
 Community ID: _____

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <u>Quackgrass</u>	<u>50</u>	<u>FAC-</u>	6. <u>orchardgrass</u>	<u>10</u>	<u>FACU</u>
2. <u>wh. clover</u>	<u>30</u>	<u>FAC</u>	7. _____	_____	_____
3. <u>Poa sp.</u>	<u>20</u>	<u>FAC</u>	8. _____	_____	_____
4. <u>Ryegrass</u>	<u>10</u>	<u>FAC+</u>	9. _____	_____	_____
5. <u>common dandelion</u>	<u>10</u>	<u>FACU</u>	10. _____	_____	_____

Percent of Dominant Species that are
 OBL, FACW or FAC (excluding FAC-) _____ %

Hydrophytic Vegetation Present? ☒ Yes ☐ No
 Basis for determination:

REMARKS:

GRAZED, mowed

HYDROLOGY

Recorded Data (Describe in Remarks):

- ____ Stream, Lake or Tide Gauge
 ____ Aerial Photographs
 ____ Other
 ____ None

PRIMARY Indicators

- ____ Inundated
 ____ Saturated in Upper 12"
 ____ Water Marks
 ____ Drift Lines
 ____ Sediment Deposits
 ____ Drainage Patterns in Wetlands

SECONDARY Indicators

- ____ Oxidized Root Channels in Upper 12"
 ____ Water Stained Leaves
 ____ Local Soil Survey Data
 ____ FAC-Neutral Test
 ____ Other (Explain in Remarks)

Field Observations

Depth of Surface Water: None (in.) Depth to Free Water in Pit: 720 (in.) Depth to Saturated Soil: 220 (in.)

Wetland Hydrology Present? Yes ☒ No ☐
 Basis for determination:

REMARKS:

history of flooding (seasonal)

SOILS

Soils Mapped As: Snoho

Drainage Class: P

Field Observations
 Confirm Mapped Type? ☒ Yes ☐ No

Taxonomy (Series and Phase): _____

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle (Abundance/Contrast)	Texture, Concretions, Structure, etc.
<u>0-2</u>	_____	<u>2.5Y3/2</u>	<u>—</u>	<u>—</u>	<u>sil</u>
<u>2-11</u>	_____	<u>2.5Y4/1</u>	<u>7.5YR4/4</u>	<u>C1,2 CORE</u>	<u>sil</u>
<u>11-20</u>	_____	_____	_____	_____	<u>organic</u>

Hydric Soil Indicators:

- ____ Histosol
 ____ Histic Epipedon
 ____ Sulfidic Odor
 ____ Aquic Moisture Regime
 ____ Reducing Conditions
 ____ Gleyed or Low Chroma Colors
 ____ Concretions
 ____ High Organic Content in Surface Layer in Sandy Soils

- ☒ Organic Streaking in Sandy Soils
☒ Listed on Local Hydric Soils List
☒ Listed on National Hydric Soils List

Hydric Soils Present? ☒ Yes ☐ No
 Basis for determination:

REMARKS:

WETLAND DETERMINATION

Is this Sampling Point Within a Wetland? ☒ Yes ☐ No
 Basis for determination:

INVESTIGATOR: _____

ROUTINE WETLAND DETERMINATION - DATA FORM

1987 MANUAL

Project/Site: WRP
 Applicant/Owner: Portman
 Investigator(s): KAK/ANP

Sec: 3 Date: 6-21-95
 Township: 29N County: Snoho.
 Range: 5E State: Washington

☐ Normal Circumstances exist on the site?
☐ Is the site significantly & recently disturbed? (Atypical Situation)
 Is the area a potential Problem Area? (explain in final remarks)

Yes ☒ No ☐
 Yes ☒ No ☐
 Yes ☐ No ☒
 Plot ID: 3
 Transect ID: _____
 Community ID: _____

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <u>Orchardgrass</u>	<u>40</u>	<u>FACU</u>	6. <u>Reed Can. grass</u>	<u>2</u>	<u>FACU</u>
2. <u>white clover</u>	<u>20</u>	<u>FAC</u>	7. _____	_____	_____
3. <u>Canada blue</u>	<u>20</u>	<u>FACU+</u>	8. _____	_____	_____
4. <u>common dandelion</u>	<u>20</u>	<u>FACU</u>	9. _____	_____	_____
5. <u>Poa pr.</u>	<u>20</u>	<u>FAC</u>	10. _____	_____	_____

Percent of Dominant Species that are
 OBL, FACW or FAC (excluding FAC-) _____ %

Hydrophytic Vegetation Present? Yes ☒ No ☐
 Basis for determination:

REMARKS:

HYDROLOGY

Recorded Data (Describe in Remarks):
☐ Stream, Lake or Tide Gauge
☐ Aerial Photographs
☐ Other
☐ None

PRIMARY Indicators

☐ Inundated
☐ Saturated in Upper 12"
☐ Water Marks
☐ Drift Lines
☐ Sediment Deposits
☐ Drainage Patterns in Wetlands

SECONDARY Indicators

☐ Oxidized Root Channels in Upper 12"
☐ Water Stained Leaves
☐ Local Soil Survey Data
☐ FAC-Neutral Test
☐ Other (Explain in Remarks)

Field Observations

Depth of Surface Water: None (in.) Depth to Free Water in Pit: >18 (in.) Depth to Saturated Soil: >18 (in.)

Wetland Hydrology Present? Yes ☒ No ☐
 Basis for determination:

REMARKS:

history of flooding, wet spring

SOILS

Soils Mapped As: PUGET

Drainage Class: P

Field Observations
 Confirm Mapped Type? ☒ Yes ☐ No

Taxonomy (Series and Phase): _____

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle (Abundance/Contrast)	Texture, Concretions, Structure, etc.
<u>0-3</u>	_____	<u>2.5Y4/2</u>	<u>-</u>	<u>-</u>	<u>sil</u>
<u>3-10</u>	_____	<u>10YR4/3</u>	<u>10YR5/6</u>	<u>F2,3D</u>	<u>sil</u>
<u>10-17</u>	_____	<u>5Y5/2</u>	<u>10YR4/6</u>	<u>C2D</u>	<u>sil</u>

Hydric Soil Indicators:

☐ Histosol
☐ Histic Epipedon
☐ Sulfidic Odor
☐ Aquic Moisture Regime
☒ Reducing Conditions
☒ Gleyed or Low Chroma Colors
☐ Concretions
☐ High Organic Content in Surface Layer in Sandy Soils

☒ Organic Streaking in Sandy Soils
☒ Listed on Local Hydric Soils List
☒ Listed on National Hydric Soils List

Hydric Soils Present? ☒ Yes ☐ No
 Basis for determination:

REMARKS:

WETLAND DETERMINATION

Is this Sampling Point Within a Wetland? ☒ Yes ☐ No
 Basis for determination:

INVESTIGATOR: _____

ROUTINE WETLAND DETERMINATION - DATA FORM

1987 MANUAL

Project/Site: WRP
 Applicant/Owner: _____
 Investigator(s): _____

Sec: 3 Date: 6-21-95
 Township: 29N County: _____
 Range: 5E State: Washington
 Plot ID: 4
 Transect ID: _____
 Community ID: _____

Normal Circumstances exist on the site?
 Is the site significantly & recently disturbed? (Atypical Situation)
 Is the area a potential Problem Area? (explain in final remarks)

Yes ☒ No ☐
 Yes ☒ No ☐
 Yes ☒ No ☐

VEGETATION abandoned field

Dominant Plant Species	Stratum	Indicator
1. <u>O. Richard grass</u>		
2. <u>RC Grass</u>		
3. <u>1</u>		
4. _____		
5. _____		

Dominant Plant Species	Stratum	Indicator
6. <u>far ponderosa - mitch</u>		
7. <u>(ditch banks)</u>		
8. <u>- himalayan evergreen</u>		
9. <u>himalayan</u>		
10. _____		

Percent of Dominant Species that are
 OBL, FACW or FAC (excluding FAC-) _____ %

Hydrophytic Vegetation Present? Yes No
 Basis for determination:

REMARKS:

Cannot access from this side

HYDROLOGY

Recorded Data (Describe in Remarks):

Stream, Lake or Tide Gauge
 Aerial Photographs
 Other
 None

PRIMARY Indicators

Inundated
 Saturated in Upper 12"
 Water Marks
 Drift Lines
 Sediment Deposits
 Drainage Patterns in Wetlands

SECONDARY Indicators

Oxidized Root Channels in Upper 12"
 Water Stained Leaves
 Local Soil Survey Data
 FAC-Neutral Test
 Other (Explain in Remarks)

Field Observations

Depth of Surface Water: _____ (in.) Depth to Free Water in Pit: _____ (in.) Depth to Saturated Soil: _____ (in.)

Wetland Hydrology Present? Yes No
 Basis for determination:

REMARKS:

SOILS

Soils Mapped As: _____

Drainage Class: _____

Field Observations

Confirm Mapped Type? Yes No

Taxonomy (Series and Phase): _____

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle (Abundance/Contrast)	Texture, Concretions, Structure, etc.
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

Hydric Soil Indicators:

Histosol
 Histic Epipedon
 Sulfidic Odor
 Aquic Moisture Regime
 Reducing Conditions
 Gleyed or Low Chroma Colors
 Concretions
 High Organic Content in Surface Layer in Sandy Soils

Organic Streaking in Sandy Soils
 Listed on Local Hydric Soils List
 Listed on National Hydric Soils List

Hydric Soils Present? Yes No
 Basis for determination:

REMARKS:

WETLAND DETERMINATION

Is this Sampling Point Within a Wetland? Yes No
 Basis for determination:

INVESTIGATOR: _____

Landowner says this field is not his

ROUTINE WETLAND DETERMINATION - DATA FORM

1987 MANUAL

Project/Site: WRP
 Applicant/Owner: Portage
 Investigator(s): KAVAN

Sec: 3 Date: 6-21-95
 Township: 29N County: _____
 Range: 5E State: Washington

1. ☐ Normal Circumstances exist on the site?
 Is the area a potential Problem Area? (Atypical Situation)
 Is the area a potential Problem Area? (explain in final remarks)

Yes ☒ No ☐
 Yes ☒ No ☐
 Yes ☒ No ☐
 Plot ID: 5
 Transect ID: _____
 Community ID: _____

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <u>Orchardgrass</u>	<u>30</u>	<u>FACU</u>	6. <u>Canada Blue</u>	<u>10</u>	<u>FACU+</u>
2. <u>Quackgrass</u>	<u>10</u>	<u>FAC-</u>	7. _____	_____	_____
3. <u>wh. clover</u>	<u>20</u>	<u>FAC</u>	8. _____	_____	_____
4. <u>creeping ranunculus</u>	<u>20</u>	<u>FACW</u>	9. _____	_____	_____
5. <u>common dandelion</u>	<u>10</u>	<u>FACU</u>	10. _____	_____	_____

Percent of Dominant Species that are
 OBL, FACW or FAC (excluding FAC-) _____ %

Hydrophytic Vegetation Present? ☒ Yes ☐ No
 Basis for determination:

REMARKS:

GRAZED, mowed

HYDROLOGY

Recorded Data (Describe in Remarks):

____ Stream, Lake or Tide Gauge
 ____ Aerial Photographs
 ____ Other
 ____ None

PRIMARY Indicators

____ Inundated
 ____ Saturated in Upper 12"
 ____ Water Marks
 ____ Drift Lines
 ____ Sediment Deposits
 ____ Drainage Patterns in Wetlands

SECONDARY Indicators

____ Oxidized Root Channels in Upper 12"
 ____ Water Stained Leaves
 ____ Local Soil Survey Data
 ____ FAC-Neutral Test
 ____ Other (Explain in Remarks)

Field Observations

Depth of Surface Water: None (in.) Depth to Free Water in Pit: 718 (in.) Depth to Saturated Soil: > 18 (in.)

Wetland Hydrology Present? Yes ☒ No ☐

Basis for determination:

REMARKS:

history of flooding Big ditch along STW

SOILS

Soils Mapped As:

PUGET

Drainage Class:

Field Observations

Confirm Mapped Type? ☒ Yes ☐ No

Taxonomy (Series and Phase):

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle (Abundance/Contrast)	Texture, Concretions, Structure, etc.
<u>0-4</u>	_____	<u>2.5Y3/2</u>	_____	_____	<u>sil</u>
<u>4-9</u>	_____	<u>2.5Y4/2</u>	<u>10YR4/6</u>	<u>C1,2D</u>	<u>sil</u>
<u>9-17</u>	_____	<u>5Y4/2</u>	<u>7.5YR4/6</u>	<u>C1,2D</u> <u>CORC</u>	<u>100% organics</u>

Hydric Soil Indicators:

____ Histosol
 ____ Histic Epipedon
 ____ Sulfidic Odor
 ____ Aquic Moisture Regime

☒ Reducing Conditions
☒ Gleyed or Low Chroma Colors
 ____ Concretions
 ____ High Organic Content in Surface Layer in Sandy Soils

☒ Organic Streaking in Sandy Soils
☒ Listed on Local Hydric Soils List
☒ Listed on National Hydric Soils List

Hydric Soils Present? ☒ Yes ☐ No
 Basis for determination:

REMARKS:

WETLAND DETERMINATION

Is this Sampling Point Within a Wetland? ☒ Yes ☐ No
 Basis for determination:

INVESTIGATOR: _____

Project/Site: WRP
Applicant/Owner: Portage
Investigator(s): Kay/Vaw

Sec: 34 Date: 6-21-95
Township: 30N County: SnOho.
Range: 5e State: Washington
Plot ID: 6
Transect ID: _____
Community ID: _____

Do ☐ mal Circumstances exist on the site?
Is ☐ site significantly & recently disturbed? (Atypical Situation)
Is the area a potential Problem Area? (explain in final remarks)

Yes ☐ No ☒
Yes ☐ No ☒
Yes ☐ No ☒

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <u>Orchard Grass</u>	<u>20</u>	<u>FACU</u>	6. <u>composite</u>		
2. <u>white clover</u>	<u>20</u>	<u>FAC</u>	7. _____		
3. <u>2nd pr.</u>	<u>10</u>	<u>FAC</u>	8. _____		
4. <u>Common dandelion</u>	<u>5</u>	<u>FAC</u>	9. _____		
5. <u>CANADA Blue</u>	<u>30</u>	<u>FACU</u>	10. _____		

Percent of Dominant Species that are
OBL, FACW or FAC (excluding FAC-) _____ %

Hydrophytic Vegetation Present? Yes ☐ No ☒
Basis for determination:

REMARKS:

HYDROLOGY

Recorded Data (Describe in Remarks):	PRIMARY Indicators	SECONDARY Indicators
☐ Stream, Lake or Tide Gauge	☐ Inundated	☐ Oxidized Root Channels in Upper 12"
☐ Aerial Photographs	☐ Saturated in Upper 12"	☐ Water Stained Leaves
☐ Other	☐ Water Marks	☐ Local Soil Survey Data
☒ None	☐ Drift Lines	☐ FAC-Neutral Test
	☐ Sediment Deposits	☐ Other (Explain in Remarks)
	☐ Drainage Patterns in Wetlands	

Field Observations
Depth of Surface Water: None (in.) Depth to Free Water in Pitt: 7 1/8 (in.) Depth to Saturated Soil: 7 1/8 (in.) Yes

Wetland Hydrology Present? Yes ☐ No ☒
Basis for determination:

REMARKS: highest spot in field 100' + W of ditch
(low area to West has higher elevation 6' +)

SOILS

Soils Mapped As: PUGET Drainage Class: P
Field Observations
Confirm Mapped Type? Yes ☒ No ☐
Taxonomy (Series and Phase): _____

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle (Abundance/Contrast)	Texture, Concretions, Structure, etc.
<u>0-4</u>		<u>2.5Y 3/2</u>	<u>-</u>	<u>-</u>	<u>sil</u>
<u>4-17</u>		<u>2.5Y 4/2</u>	<u>5YR 3/4</u>	<u>0.12P 10RC</u>	<u>sil</u>
			<u>7.5YR 3/4</u>	<u>M1, 2, 3D</u>	

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☒ Reducing Conditions
- ☒ Gleyed or Low Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☒ Organic Streaking in Sandy Soils
- ☒ Listed on Local Hydric Soils List
- ☒ Listed on National Hydric Soils List

Hydric Soils Present? Yes ☒ No ☐
Basis for determination:

REMARKS:

WETLAND DETERMINATION

Is this Sampling Point Within a Wetland? Yes ☐ No ☒
Basis for determination:

INVESTIGATOR: _____

ROUTINE WETLAND DETERMINATION - DATA FORM

Project/Site: WRP
 Applicant/Owner: POORTINGA
 Investigator(s): LAK/AN

Sec: 34 Date: 6-21-95
 Township: 30N County: SNOHO
 Range: 5E State: Washington

Do natural circumstances exist on the site?
 Is the area significantly & recently disturbed? (Atypical Situation)
 Is the area a potential Problem Area? (explain in final remarks)

Yes ☒ No ☐
 Yes ☐ No ☒
 Yes ☐ No ☐

Plot ID: 7
 Transect ID: _____
 Community ID: _____

VEGETATION clipped + grazed recently
 Dominant Plant Species _____ Stratum _____ Indicator _____

Dominant Plant Species _____ Stratum _____ Indicator _____

1. Cithusale _____ FACU
2. ordardgrass _____ FACU
3. Poa P _____ FAC
4. _____
5. _____

6. _____
7. _____
8. _____
9. _____
10. _____

Percent of Dominant Species that are
 OBL, FACW or FAC (excluding FAC-) _____ %

Hydrophytic Vegetation Present? Yes ☐ No ☒
 Basis for determination:

REMARKS:

HYDROLOGY

Recorded Data (Describe in Remarks):

- ____ Stream, Lake or Tide Gauge
 ____ Aerial Photographs
 ____ Other
 ____ None

PRIMARY Indicators

- ____ Inundated
 ____ Saturated in Upper 12"
 ____ Water Marks
 ____ Drift Lines
 ____ Sediment Deposits
 ____ Drainage Patterns in Wetlands

SECONDARY Indicators

- ____ Oxidized Root Channels in Upper 12"
 ____ Water Stained Leaves
 ____ Local Soil Survey Data
 ____ FAC-Neutral Test
 ____ Other (Explain in Remarks)

Field Observations

Depth of Surface Water: None (in.) Depth to Free Water in Pit: 7 1/2 (in.) Depth to Saturated Soil: 7 1/2 (in.)

Wetland Hydrology Present? Yes ☒ No ☐
 Basis for determination:

REMARKS: Ditches on W & E sides moist

SOILS

Soils Mapped As: Mukilted

Drainage Class: UP
 Field Observations
 Confirm Mapped Type? ☒ Yes ☐ No

Taxonomy (Series and Phase): _____

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle (Abundance/Contrast)	Texture, Concretions, Structure, etc.
0-14		10YR2/1	—	—	organic

Hydric Soil Indicators:

- ☒ Histosol
☐ Histic Epipedon
☐ Sulfidic Odor
☐ Aquic Moisture Regime

- ____ Reducing Conditions
 ____ Gleyed or Low Chroma Colors
 ____ Concretions
 ____ High Organic Content in Surface Layer in Sandy Soils

- ☒ Organic Streaking in Sandy Soils
☒ Listed on Local Hydric Soils List
☒ Listed on National Hydric Soils List

Hydric Soils Present? ☒ Yes ☐ No
 Basis for determination:

REMARKS:

WETLAND DETERMINATION

Is this Sampling Point Within a Wetland? Yes ☐ No ☐
 Basis for determination:

INVESTIGATOR: _____

ROUTINE WETLAND DETERMINATION - DATA FORM

1987 MANUAL

Project/Site: WRP
 Applicant/Owner: Portman
 Investigator(s): VAV/AN

Sec: 3 Date: 6-26-95
 Township: 30N County: Snoho
 Range: 5E State: Washington

Do natural Circumstances exist on the site?
 Is site significantly & recently disturbed? (Atypical Situation)
 Is the area a potential Problem Area? (explain in final remarks)

Yes ☒ No ☐
 Yes ☒ No ☐
 Yes ☒ No ☐
 Plot ID: 8
 Transect ID: _____
 Community ID: _____

VEGETATION Pasture (near dike)

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <u>orchardgrass</u>	<u>50</u>	<u>FAC</u>	6. _____	_____	_____
2. <u>Poa pr.</u>	<u>40</u>	<u>FAC</u>	7. _____	_____	_____
3. <u>common dandelion</u>	<u>15</u>	<u>FACU</u>	8. _____	_____	_____
4. <u>Ryegrass</u>	<u>20</u>	<u>FACU</u>	9. _____	_____	_____
5. _____	_____	_____	10. _____	_____	_____

Percent of Dominant Species that are
 OBL, FACW or FAC (excluding FAC-) _____ %

Hydrophytic Vegetation Present? ☒ Yes ☐ No
 Basis for determination:

REMARKS:

HYDROLOGY

Recorded Data (Describe in Remarks):

____ Stream, Lake or Tide Gauge
 ____ Aerial Photographs
 ____ Other
 ____ None

PRIMARY Indicators

____ Inundated
 ____ Saturated in Upper 12"
 ____ Water Marks
 ____ Drift Lines
 ____ Sediment Deposits
 ____ Drainage Patterns in Wetlands

SECONDARY Indicators

____ Oxidized Root Channels in Upper 12"
 ____ Water Stained Leaves
 ____ Local Soil Survey Data
 ____ FAC-Neutral Test
 ____ Other (Explain in Remarks)

Field Observations

Depth of Surface Water: None (in.) Depth to Free Water in Pit: 718 (in.) Depth to Saturated Soil: 718 (in.)

Wetland Hydrology Present? Yes ☐ No ☒

Basis for determination: history flooding

REMARKS: highest portion of field 70' W. of bldg
ditch 12' wide, bank full

SOILS

Soils Mapped As: PUGET

Drainage Class: P

Field Observations
 Confirm Mapped Type? ☒ Yes ☐ No

Taxonomy (Series and Phase): _____

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle (Abundance/Contrast)	Texture, Concretions, Structure, etc.
<u>0-6</u>	_____	<u>10YR 3/2</u>	<u>—</u>	<u>—</u>	<u>sil</u>
<u>6-11</u>	_____	<u>2.5Y 4/2</u>	<u>—</u>	<u>—</u>	<u>sil</u>
<u>11-17</u>	_____	<u>2.5Y 4/1</u>	<u>7.5YR 4/4</u>	<u>C1, 2D</u>	<u>sil 15% organics</u>

Hydric Soil Indicators:

____ Histosol
 ____ Histic Epipedon
 ____ Sulfidic Odor
 ____ Aquic Moisture Regime
 ____ Reducing Conditions
 ____ Gleyed or Low Chroma Colors
 ____ Concretions
 ____ High Organic Content in Surface Layer in Sandy Soils

Organic Streaking in Sandy Soils
 Listed on Local Hydric Soils List
 Listed on National Hydric Soils List

Hydric Soils Present? ☒ Yes ☐ No
 Basis for determination:

REMARKS:

WETLAND DETERMINATION

Is this Sampling Point Within a Wetland? ☒ Yes ☐ No
 Basis for determination:

INVESTIGATOR: _____

ROUTINE WETLAND DETERMINATION - DATA FORM

1987 MANUAL

Project/Site: WRP
 Applicant/Owner: Portman
 Investigator(s): KAY/AND

Sec: 34 Date: 6-21-95
 Township: 30N County: Sno Ho
 Range: SE State: Washington

Do natural Circumstances exist on the site?
 Is site significantly & recently disturbed? (Atypical Situation)
 Is the area a potential Problem Area? (explain in final remarks)

Plot ID: 9
 Transect ID: _____
 Community ID: _____

VEGETATION <u>Pasture</u>					
Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <u>Quackgrass</u>	<u>40</u>	<u>FAC-</u>	6. <u>Red Clover grass</u>	<u>5%</u>	<u>FACW</u>
2. <u>water fox tail</u>	<u>30</u>	<u>OBL</u>	7. _____	_____	_____
3. <u>thistle weed</u>	<u>10</u>	<u>FACU</u>	8. _____	_____	_____
4. <u>Poa sp.</u>	<u>20</u>	<u>FAC</u>	9. _____	_____	_____
5. <u>broad plantain</u>	<u>10</u>	<u>FACU+</u>	10. _____	_____	_____

Percent of Dominant Species that are
 OBL, FACW or FAC (excluding FAC-) _____ %

Hydrophytic Vegetation Present? Yes No
 Basis for determination:

REMARKS:

HYDROLOGY

Recorded Data (Describe in Remarks):

____ Stream, Lake or Tide Gauge
 ____ Aerial Photographs
 ____ Other
 ____ None

PRIMARY Indicators

____ Inundated
 ____ Saturated in Upper 12"
 ____ Water Marks
 ____ Drift Lines
 ____ Sediment Deposits
 ____ Drainage Patterns in Wetlands

SECONDARY Indicators

____ Oxidized Root Channels in Upper 12"
 ____ Water Stained Leaves
 ____ Local Soil Survey Data
 ____ FAC-Neutral Test
 ____ Other (Explain in Remarks)

Field Observations

Depth of Surface Water: None (in.) Depth to Free Water in Pit: 719 (in.) Depth to Saturated Soil: 719 (in.)
moist

Wetland Hydrology Present? Yes No

Basis for determination:

REMARKS:

SOILS

Soils Mapped As: PUGET

Drainage Class: P

Field Observations

Confirm Mapped Type? Yes No

Taxonomy (Series and Phase): _____

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle (Abundance/Contrast)	Texture, Concretions, Structure, etc.
<u>0-2</u>	_____	<u>10YR3/2</u>	_____	_____	<u>sil</u>
<u>2-11</u>	_____	<u>5Y4/2</u>	<u>7.5YR4/6</u>	<u>M1,2D</u> <u>CORS</u>	<u>sil</u>
<u>11-19</u>	_____	<u>10YR4/2</u>	<u>7.5YR4/6</u>	<u>ELD</u>	<u>25% organics sil 10% clay</u>

Hydric Soil Indicators:

____ Histosol
 ____ Histic Epipedon
 ____ Sulfidic Odor
 ____ Aquic Moisture Regime

____ Reducing Conditions
X Gleyed or Low Chroma Colors
 ____ Concretions
 ____ High Organic Content in Surface Layer in Sandy Soils

X Organic Streaking in Sandy Soils
 ____ Listed on Local Hydric Soils List
 ____ Listed on National Hydric Soils List

Hydric Soils Present? Yes No

Basis for determination:

REMARKS:

WETLAND DETERMINATION

Is this Sampling Point Within a Wetland? Yes No

Basis for determination:

INVESTIGATOR: _____

Project/Site: WRP
 Applicant/Owner: Portinga
 Investigator(s): KAF/AG

Sec: 34 Date: 6-22-95
 Township: 30 County: Snoho
 Range: 5 State: Washington

Do Normal Circumstances exist on the site?
 Is the site significantly & recently disturbed? (Atypical Situation)
 Is the area a potential Problem Area? (explain in final remarks)

Yes ☐ No ☒
 Yes ☐ No ☒
 Yes ☐ No ☒

Plot ID: 10
 Transect ID: _____
 Community ID: _____

VEGETATION Washed corner of Pasture

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <u>Rye grass</u>	<u>30</u>	<u>FACU</u>	6. <u>bull thistle</u>	<u>5</u>	<u>FACU</u>
2. <u>bentgrass - colonial</u>	<u>30</u>	<u>FAC</u>	7. <u>velvet grass</u>	<u>5</u>	<u>FAC</u>
3. <u>orchard grass</u>	<u>20</u>	<u>FACU</u>	8. _____	_____	_____
4. <u>Prairie</u>	<u>20</u>	_____	9. _____	_____	_____
5. <u>RC Grass</u>	<u>5</u>	<u>FACW</u>	10. _____	_____	_____

Percent of Dominant Species that are
 OBL, FACW or FAC (excluding FAC-) _____ %

Hydrophytic Vegetation Present? Yes ☐ No ☒
 Basis for determination:

REMARKS:

small unmowed Area

HYDROLOGY

Recorded Data (Describe in Remarks):

____ Stream, Lake or Tide Gauge
 ____ Aerial Photographs
 ____ Other
 ____ None

PRIMARY Indicators

____ Inundated
 ____ Saturated in Upper 12"
 ____ Water Marks
 ____ Drift Lines
 ____ Sediment Deposits
 ____ Drainage Patterns in Wetlands

SECONDARY Indicators

____ Oxidized Root Channels in Upper 12"
 ____ Water Stained Leaves
 ____ Local Soil Survey Data
 ____ FAC-Neutral Test
 ____ Other (Explain in Remarks)

Field Observations

Depth of Surface Water: None (in.) Depth to Free Water in Pit: 720 (in.) Depth to Saturated Soil: 720 (in.)

Wetland Hydrology Present? Yes ☐ No ☒
 Basis for determination:

REMARKS:

SOILS

Soils Mapped As: PUGET

Drainage Class: P

Field Observations

Confirm Mapped Type? ☒ Yes ☐ No

Taxonomy (Series and Phase): _____

Profile Description:

Depth (Inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle (Abundance/Contrast)	Texture, Concretions, Structure, etc.
0-5		10YR3/3	—	—	sil
→ 13-20		2.5Y4/2	7.5YR4/6	C1D	sil
→ 5-13		2.5Y4/1	7.5YR4/6	M1,2 FORS	sil

Hydric Soil Indicators:

____ Histosol
 ____ Histic Epipedon
 ____ Sulfidic Odor
☒ Aquic Moisture Regime

☒ Reducing Conditions
☒ Gleyed or Low Chroma Colors
 ____ Concretions
 ____ High Organic Content in Surface Layer in Sandy Soils

☒ Organic Streaking in Sandy Soils
☒ Listed on Local Hydric Soils List
☒ Listed on National Hydric Soils List

Hydric Soils Present? ☒ Yes ☐ No
 Basis for determination:

REMARKS:

WETLAND DETERMINATION

Is this Sampling Point Within a Wetland? ☒ Yes ☐ No
 Basis for determination:

INVESTIGATOR: _____

Project/Site: WRP
 Applicant/Owner: Portway
 Investigator(s): KAK/AW

Sec: 34 Date: 6-22-95
 Township: 30N County: Snoko
 Range: 5E State: Washington

Normal Circumstances exist on the site?
 Is the site significantly & recently disturbed? (Atypical Situation)
 Is the area a potential Problem Area? (explain in final remarks)

Yes ☒ No ☐
 Yes ☒ No ☐
 Yes ☐ No ☒

Plot ID: 11
 Transect ID: _____
 Community ID: _____

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <u>Quackgrass</u>	<u>30</u>	<u>FAC-</u>	6. <u>plantain-common</u>	<u>5-10</u>	<u>FACU+</u>
2. <u>ryegrass</u>	<u>20</u>	<u>FACU</u>	7. <u>scattered Ranunculus-cresc</u>	<u>10</u>	<u>FACW</u>
3. <u>Poa sp.</u>	<u>20</u>	<u>FAC</u>	8. _____	_____	_____
4. <u>Orchardgrass</u>	<u>20</u>	<u>FACU</u>	9. _____	_____	_____
5. <u>white clover</u>	<u>5-10</u>	<u>FAC</u>	10. _____	_____	_____

Percent of Dominant Species that are
 OBL, FACW or FAC (excluding FAC-) _____ %

Hydrophytic Vegetation Present? ☒ Yes ☐ No
 Basis for determination:

REMARKS:

GRAZED

HYDROLOGY

Recorded Data (Describe in Remarks):

Stream, Lake or Tide Gauge _____
 Aerial Photographs _____
 Other _____
 None _____

PRIMARY Indicators

Inundated _____
 Saturated in Upper 12" _____
 Water Marks _____
 Drift Lines _____
 Sediment Deposits _____
 Drainage Patterns in Wetlands _____

SECONDARY Indicators

Oxidized Root Channels in Upper 12" _____
 Water Stained Leaves _____
 Local Soil Survey Data _____
 FAC-Neutral Test _____
 Other (Explain in Remarks) _____

Field Observations _____
 Depth of Surface Water: None (in.) Depth to Free Water in Pit: 720 (in.) Depth to Saturated Soil: 720 (in.)

Wetland Hydrology Present? Yes ☒ No ☐
 Basis for determination:

REMARKS: not now, but very wet in spring
according to farm worker

SOILS

Soils Mapped As: PUGETDrainage Class: P

Field Observations

Confirm Mapped Type? ☒ Yes ☐ No

Taxonomy (Series and Phase): _____

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle (Abundance/Contrast)	Texture, Concretions, Structure, etc.
<u>0-5</u>	_____	<u>2.5Y3/2</u>	<u>-</u>	<u>-</u>	<u>sil</u>
<u>5-12</u>	_____	<u>2.5Y5/1</u>	<u>7.5YR4/6</u>	<u>C1,2D</u> <u>CORS</u>	<u>sil</u>
<u>12-20</u>	_____	<u>2.5Y4/1</u>	<u>5YR4/6</u>	<u>C1,2P</u> <u>CORS</u>	<u>sil</u>
_____	_____	_____	<u>7.5YR4/6</u>	<u>C1,2D</u>	_____

Hydric Soil Indicators:

Histosol _____
 Histic Epipedon _____
 Sulfidic Odor _____
 Aquic Moisture Regime ☒

Reducing Conditions _____
 Gleyed or Low Chroma Colors _____
 Concretions _____
 High Organic Content in Surface Layer in Sandy Soils _____

Organic Streaking in Sandy Soils _____
 Listed on Local Hydric Soils List _____
 Listed on National Hydric Soils List _____

Hydric Soils Present? ☒ Yes ☐ No
 Basis for determination:

REMARKS:

WETLAND DETERMINATION

Is this Sampling Point Within a Wetland? ☒ Yes ☐ No FWP
 Basis for determination:

INVESTIGATOR: _____

Project/Site: WRP
 Applicant/Owner: Portinga
 Investigator(s): KAY/AN

Sec: 34 Date: 1-22-95
 Township: 30N County: Stnoho
 Range: 5E State: Washington

Do Normal Circumstances exist on the site?
 Is the site significantly & recently disturbed? (Atypical Situation)
 Is the area a potential Problem Area? (explain in final remarks)

Yes ☒ No ☐
 Yes ☐ No ☒
 Yes ☐ No ☐

Plot ID: 12
 Transect ID: _____
 Community ID: _____

VEGETATION Pasture

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <u>orchardgrass</u>	<u>30</u>	<u>FACU</u>	6. <u>wh. clover</u>	<u>5</u>	<u>FAC</u>
2. <u>velvetgrass</u>	<u>10</u>	<u>FAC</u>	7. <u>water foxtail</u>	<u>5</u>	<u>OBH</u>
3. <u>bentgrass</u>	<u>20</u>	<u>FAC</u>	8. <u>timothy</u>	<u>5</u>	<u>FAC</u>
4. <u>tall fescue</u>	<u>10</u>	<u>FAC</u>	9. _____	_____	_____
5. <u>ryegrass</u>	<u>30</u>	<u>FACU</u>	10. _____	_____	_____

Percent of Dominant Species that are
 OBL, FACW or FAC (excluding FAC-) _____ %

Hydrophytic Vegetation Present? ☒ Yes ☐ No
 Basis for determination:

REMARKS:

HYDROLOGY

Recorded Data (Describe in Remarks):

____ Stream, Lake or Tide Gauge
 ____ Aerial Photographs
 ____ Other
 ____ None

PRIMARY Indicators

____ Inundated
 ____ Saturated in Upper 12"
 ____ Water Marks
 ____ Drift Lines
 ____ Sediment Deposits
 ____ Drainage Patterns in Wetlands

SECONDARY Indicators

____ Oxidized Root Channels in Upper 12"
 ____ Water Stained Leaves
 ____ Local Soil Survey Data
 ____ FAC-Neutral Test
 ____ Other (Explain in Remarks)

Field Observations

Depth of Surface Water: None (in.) Depth to Free Water in Pit: 720 (in.) Depth to Saturated Soil: 720 (in.)

Wetland Hydrology Present? ☐ Yes ☐ No
 Basis for determination:

REMARKS: between the bend in slough

SOILS

Soils Mapped As: PugetDrainage Class: P

Field Observations

Taxonomy (Series and Phase): _____

Confirm Mapped Type? ☒ Yes ☐ No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle (Abundance/Contrast)	Texture, Concretions, Structure, etc.
<u>0-3</u>	_____	<u>2.5Y3/3</u>	<u>—</u>	<u>—</u>	<u>sil</u>
<u>3-13</u>	_____	<u>2.5Y4/2</u>	<u>10YR4/6</u>	<u>CLD</u>	<u>CORS-current sil 10% partially undercomp. wood</u>
<u>13-</u>	_____	<u>2.5Y4/1</u>	<u>10YR4/6</u>	<u>M1,2D CORS</u>	<u>sil</u>

Hydric Soil Indicators:

____ Histosol
 ____ Histic Epipedon
 ____ Sulfidic Odor
☒ Aquic Moisture Regime

____ Reducing Conditions
☒ Gleyed or Low Chroma Colors
 ____ Concretions
 ____ High Organic Content in Surface Layer in Sandy Soils

____ Organic Streaking in Sandy Soils
☒ Listed on Local Hydric Soils List
☒ Listed on National Hydric Soils List

Hydric Soils Present? ☒ Yes ☐ No
 Basis for determination:

REMARKS:

WETLAND DETERMINATION

Is this Sampling Point Within a Wetland? ☐ Yes ☐ No
 Basis for determination:

INVESTIGATOR: _____

Project/Site: WRP
 Applicant/Owner: Portuga
 Investigator(s): KAK/AN

Sec: 34 Date: 6-22-95
 Township: 30N County: Spokane
 Range: 5E State: Washington

Do Normal Circumstances exist on the site?
 the site significantly & recently disturbed? (Atypical Situation)
 the area a potential Problem Area? (explain in final remarks)

Yes ☒ No ☐
 Yes ☒ No ☐
 Yes ☒ No ☐

Plot ID: 13
 Transect ID: _____
 Community ID: _____

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <u>orchardgrass</u>	<u>50</u>	<u>FACU</u>	6. <u>velvetgrass</u>	<u>5</u>	<u>FAC</u>
2. <u>bentgrass</u>	<u>20</u>	<u>FAC</u>	7. <u>common plantain</u>	<u>5</u>	<u>FACU+</u>
3. <u>white clover</u>	<u>10</u>	<u>FAC</u>	8. _____	_____	_____
4. <u>Poa pr.</u>	<u>10</u>	<u>FAC</u>	9. _____	_____	_____
5. <u>common dandelion</u>	<u>5</u>	<u>FACU</u>	10. _____	_____	_____

Percent of Dominant Species that are
 OBL, FACW or FAC (excluding FAC-) _____ %

Hydrophytic Vegetation Present? ☒ Yes ☐ No
 Basis for determination:

REMARKS: adjacent low area has creeping Ranunculus, Quackgrass, RCG also, water by tail

HYDROLOGY

Recorded Data (Describe in Remarks):

____ Stream, Lake or Tide Gauge
 ____ Aerial Photographs
 ____ Other
 ____ None

PRIMARY Indicators

____ Inundated
 ____ Saturated in Upper 12"
 ____ Water Marks
 ____ Drift Lines
 ____ Sediment Deposits
 ____ Drainage Patterns in Wetlands

SECONDARY Indicators

____ Oxidized Root Channels in Upper 12"
 ____ Water Stained Leaves
 ____ Local Soil Survey Data
 ____ FAC-Neutral Test
 ____ Other (Explain in Remarks)

Field Observations

Depth of Surface Water: None (in.) Depth to Free Water in Pit: 720 (in.) Depth to Saturated Soil: 720 (in.)

Wetland Hydrology Present? Yes ☐ No ☐
 Basis for determination:

REMARKS: high area

SOILS

Soils Mapped As: Puget

Drainage Class: P

Taxonomy (Series and Phase): _____

Field Observations
 Confirm Mapped Type? ☒ Yes ☐ No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle (Abundance/Contrast)	Texture, Concretions, Structure, etc.
<u>0-4</u>	_____	<u>2.5Y4/2</u>	_____	_____	<u>sil</u>
<u>4-12</u>	_____	<u>2.5Y4/2</u>	<u>7.5YR4/6</u>	<u>C1,2D</u> <u>MORS</u>	<u>sil</u>
<u>12-</u>	_____	<u>2.5Y4/1</u>	<u>10YR4/4/4/6</u>	<u>C2,3D</u> <u>MORS</u> <u>incl. cement</u>	<u>sil</u>

Hydric Soil Indicators:

____ Histosol
 ____ Histic Epipedon
 ____ Sulfidic Odor
☒ Aquic Moisture Regime
 ____ Reducing Conditions
☒ Gleyed or Low Chroma Colors
 ____ Concretions
 ____ High Organic Content in Surface Layer in Sandy Soils
 ____ Organic Streaking in Sandy Soils
☒ Listed on Local Hydric Soils List
 ____ Listed on National Hydric Soils List

Hydric Soils Present? ☒ Yes ☐ No
 Basis for determination:

REMARKS:

WETLAND DETERMINATION

Is this Sampling Point Within a Wetland? ☒ Yes ☐ No
 Basis for determination:

INVESTIGATOR: _____

Project/Site: WRP
 Applicant/Owner: Portuga
 Investigator(s): LAK/AW

Sec: 34 Date: 6-22-95
 Township: 30N County: Snoho
 Range: 8E State: Washington

Do Normal Circumstances exist on the site?
 Is the site significantly & recently disturbed? (Atypical Situation)
 Is the area a potential Problem Area? (explain in final remarks)

Yes ☒ No
 Yes ☒ No
 Yes ☒ No

Plot ID: 13
 Transect ID: _____
 Community ID: _____

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <u>orchardgrass</u>	<u>40</u>	<u>FACU</u>	6. <u>common plantain</u>	<u>5</u>	
2. <u>wh. clover</u>	<u>20</u>	<u>FAC</u>	7. _____		
3. <u>kentgrass - spike</u>	<u>10-20</u>	<u>FACW</u>	8. _____		
4. <u>common dandelion</u>	<u>10</u>	<u>FACU</u>	9. _____		
5. <u>Poa pr.</u>	<u>20</u>	<u>FAC</u>	10. _____		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-) _____ %

Hydrophytic Vegetation Present? ☒ Yes ☐ No
 Basis for determination:

REMARKS: orchardgrass - 40% h. 10-20%

HYDROLOGY

Recorded Data (Describe in Remarks):

____ Stream, Lake or Tide Gauge
 ____ Aerial Photographs
 ____ Other
 ____ None

PRIMARY Indicators

____ Inundated
 ____ Saturated in Upper 12"
 ____ Water Marks
 ____ Drift Lines
 ____ Sediment Deposits
 ____ Drainage Patterns in Wetlands

SECONDARY Indicators

____ Oxidized Root Channels in Upper 12"
 ____ Water Stained Leaves
 ____ Local Soil Survey Data
 ____ FAC-Neutral Test
 ____ Other (Explain in Remarks)

Field Observations
 Depth of Surface Water: None (in.) Depth to Free Water in Pit: 7/8 (in.) Depth to Saturated Soil: >18 (in.)

Wetland Hydrology Present? Yes ☒ No
 Basis for determination:

REMARKS: just below slight rise in topog.
history of flooding

SOILS

Soils Mapped As: PUGET

Drainage Class: P

Taxonomy (Series and Phase): _____

Field Observations
 Confirm Mapped Type? ☒ Yes ☐ No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle (Abundance/Contrast)	Texture, Concretions, Structure, etc.
<u>0-5</u>		<u>2.5Y3/2</u>	<u>10YR4/6</u>	<u>PID</u>	<u>sil</u>
<u>5-12</u>		<u>2.5Y4/2</u>	<u>10YR4/6</u>	<u>MID FORS</u>	<u>sil</u>
<u>12-16+</u>		<u>2.5Y3/2</u>	<u>7.5YR4/4</u>	<u>M1,2D</u>	<u>sil 20% prt. decomp. organic</u>
			<u>2.5Y5/1</u>	<u>C1,3D</u>	

Hydric Soil Indicators:

____ Histosol
 ____ Histic Epipedon
 ____ Sulfidic Odor
☒ Aquic Moisture Regime
 ____ Reducing Conditions
☒ Gleyed or Low Chroma Colors
 ____ Concretions
 ____ High Organic Content in Surface Layer in Sandy Soils

☒ Organic Streaking in Sandy Soils
☒ Listed on Local Hydric Soils List
☒ Listed on National Hydric Soils List

Hydric Soils Present? ☒ Yes ☐ No
 Basis for determination:

REMARKS:

WETLAND DETERMINATION

Is this Sampling Point Within a Wetland? ☒ Yes ☐ No
 Basis for determination:

INVESTIGATOR: _____

Project/Site: WRP
 Applicant/Owner: Portinco
 Investigator(s): KAY/AB

Sec: 34 Date: 6-22-95
 Township: 30W County: Snodh
 Range: 5E State: Washington

Do Normal Circumstances exist on the site?
 Is the site significantly & recently disturbed? (Atypical Situation)
 Is the area a potential Problem Area? (explain in final remarks)

Yes ☒ No ☐
 Yes ☒ No ☐
 Yes ☒ No ☐
 Plot ID: 15
 Transect ID: _____
 Community ID: _____

VEGETATION Pasture - uncut

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <u>Orchardgrass</u>	<u>30</u>	<u>FACU</u>	6. <u>velvetgrass</u>	<u>10</u>	<u>FAC</u>
2. <u>ryegrass</u>	<u>20</u>	<u>FACU</u>	7. <u>creeping Ranunculus</u>	<u>5</u>	<u>FACW</u>
3. <u>timothy</u>	<u>20</u>	<u>FAC</u>	8. <u>Poa pr.</u>	<u>10</u>	<u>FAC</u>
4. <u>wh. clover</u>	<u>10</u>	<u>FAC</u>	9. _____	_____	_____
5. <u>bentgrass-colonial</u>	<u>10</u>	<u>FAC</u>	10. _____	_____	_____

Percent of Dominant Species that are
 OBL, FACW or FAC (excluding FAC-) _____ %

Hydrophytic Vegetation Present? Yes ☒ No ☐
 Basis for determination: _____

REMARKS:

HYDROLOGY

Recorded Data (Describe in Remarks):

Stream, Lake or Tidal Gauge
 Aerial Photographs
 Other
 None

PRIMARY Indicators

Inundated
 Saturated in Upper 12"
 Water Marks
 Drift Lines
 Sediment Deposits
 Drainage Patterns in Wetlands

SECONDARY Indicators

Oxidized Root Channels in Upper 12"
 Water Stained Leaves
 Local Soil Survey Data
 FAC-Neutral Test
 Other (Explain in Remarks)

Field Observations

Depth of Surface Water: None (in.) Depth to Free Water in Pit: 720 (in.) Depth to Saturated Soil: 720 (in.)

Wetland Hydrology Present? Yes ☒ No ☐
 Basis for determination: _____

REMARKS:

History of Spring wetness.

SOILS

Soils Mapped As: PUGETDrainage Class: P

Field Observations

Confirm Mapped Type? ☒ Yes ☐ No

Taxonomy (Series and Phase): _____

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle (Abundance/Contrast)	Texture, Concretions, Structure, etc.
<u>0-6</u>	_____	<u>2.5Y4/2</u>	_____	_____	<u>sil</u>
<u>6-14</u>	_____	<u>5Y4/1</u>	<u>7.5YR5/6</u>	<u>CID</u> <u>FORC</u>	<u>sil</u>
<u>14-20</u>	_____	<u>2.5Y4/1</u>	<u>7.5YR4/6</u>	<u>CID</u> <u>MORE</u> <u>some current</u>	<u>sil 10% organics</u>

Hydric Soil Indicators:

Histosol
 Histic Epipedon
 Sulfidic Odor
☒ Aquic Moisture Regime

Reducing Conditions
☒ Gleyed or Low Chroma Colors
 Concretions
☒ High Organic Content in Surface Layer in Sandy Soils

Organic Streaking in Sandy Soils
☒ Listed on Local Hydric Soils List
☒ Listed on National Hydric Soils List

Hydric Soils Present? ☒ Yes ☐ No
 Basis for determination: _____

REMARKS:

WETLAND DETERMINATION

Is this Sampling Point Within a Wetland? ☒ Yes ☐ No
 Basis for determination: _____

INVESTIGATOR: _____

Project/Site: WRP
 Applicant/Owner: Bethesda
 Investigator(s): KAK/ANW

Sec: 34 Date: 6-22-95
 Township: 30N County: Snoho
 Range: 3E State: Washington

Do Normal Circumstances exist on the site?
 Is the site significantly & recently disturbed? (Atypical Situation)
 Is the area a potential Problem Area? (explain in final remarks)

Yes ☒ No ☐
 Yes ☐ No ☒
 Yes ☐ No ☒

Plot ID: 16
 Transect ID: _____
 Community ID: _____

VEGETATION Pasture

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <u>Blackgrass</u>	<u>30</u>	<u>FAC-</u>	6. <u>Poa sp.</u>	<u>10+</u>	<u>FAC</u>
2. <u>colonial bentgrass</u>	<u>20</u>	<u>FAC</u>	7. <u>Smartweed?</u>	<u>5</u>	
3. <u>water fox tail</u>	<u>20</u>	<u>OBL</u>	8. <u>bare ground</u>	<u>5</u>	<u>-</u>
4. <u>archard grass</u>	<u>15</u>	<u>FACU</u>	9. <u>RCG</u>	<u>5</u>	
5. <u>wh. clover</u>	<u>5</u>	<u>FAC</u>	10. _____		

Percent of Dominant Species that are
 OBL, FACW or FAC (excluding FAC-) _____ %

Hydrophytic Vegetation Present? ☒ Yes ☐ No
 Basis for determination:

REMARKS:

GRAZED, mowed

HYDROLOGY

Recorded Data (Describe in Remarks):

____ Stream, Lake or Tide Gauge
 ____ Aerial Photographs
 ____ Other
 ____ None

PRIMARY Indicators

____ Inundated
 ____ Saturated in Upper 12"
 ____ Water Marks
 ____ Drift Lines
 ____ Sediment Deposits
 ____ Drainage Patterns in Wetlands

SECONDARY Indicators

____ Oxidized Root Channels in Upper 12"
 ____ Water Stained Leaves
 ____ Local Soil Survey Data
 ____ FAC-Neutral Test
 ____ Other (Explain in Remarks)

Field Observations

Depth of Surface Water: None (in.) Depth to Free Water in Pit: 721 (in.) Depth to Saturated Soil: 721 (in.)

Wetland Hydrology Present? Yes ☒ No ☐
 Basis for determination:

REMARKS: low portion of field, mature

history of high water table, standing in bare spots

SOILS

Soils Mapped As: PUGET

Drainage Class: P

Taxonomy (Series and Phase): _____

Field Observations
 Confirm Mapped Type? ☒ Yes ☐ No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle (Abundance/Contrast)	Texture, Concretions, Structure, etc.
<u>0-7</u>		<u>2.5Y3/2</u>	<u>7.5YR4/6</u>	<u>C1D</u>	<u>sil</u>
<u>7-11</u>		<u>2.5Y4/1</u>	<u>-</u>	<u>-</u>	<u>FORS sil 1" rootmat @ 11"</u>
<u>11-21</u>		<u>2.5Y4/1</u>	<u>-</u>	<u>-</u>	<u>MORS sil 5900 (roots) matter</u>
<u>C, 2, 3 org. staining on P Faves.</u>					

Hydric Soil Indicators:

____ Histosol
 ____ Histic Epipedon
 ____ Sulfidic Odor
☒ Aquic Moisture Regime
 ____ Reducing Conditions
☒ Gleyed or Low Chroma Colors
 ____ Concretions
 ____ High Organic Content in Surface Layer in Sandy Soils
☒ Organic Streaking in Sandy Soils
 ____ Listed on Local Hydric Soils List
 ____ Listed on National Hydric Soils List

Hydric Soils Present? ☒ Yes ☐ No
 Basis for determination:

REMARKS:

WETLAND DETERMINATION

Is this Sampling Point Within a Wetland? ☒ Yes ☐ No
 Basis for determination:

INVESTIGATOR: _____

ROUTINE WETLAND DETERMINATION - DATA FORM

1987 MANUAL

Project/Site: WRP
 Applicant/Owner: Portinga
 Investigator(s): KAK/AN

Sec: 34 Date: 6-22-95
 Township: 30N County: _____
 Range: 5E State: Washington

Do Normal Circumstances exist on the site?
 Is the site significantly & recently disturbed? (Atypical Situation)
 Is the area a potential Problem Area? (explain in final remarks)

Yes ☒ No ☐
 Yes ☒ No ☐
 Yes ☒ No ☐

Plot ID: 17
 Transect ID: _____
 Community ID: _____

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <u>Quackgrass</u>	<u>30</u>	<u>FAC</u>	6. <u>spike bentgrass</u>	<u>10</u>	<u>FACW</u>
2. <u>colonial bentgrass</u>	<u>15</u>	<u>FAC</u>	7. _____	_____	_____
3. <u>Poa pr.</u>	<u>15</u>	<u>FAC</u>	8. _____	_____	_____
4. <u>common dovetail</u>	<u>10</u>	<u>FAC</u>	9. _____	_____	_____
5. <u>Orchard grass</u>	<u>30</u>	<u>FACU</u>	10. _____	_____	_____

Percent of Dominant Species that are
 OBL, FACW or FAC (excluding FAC-) _____%

Hydrophytic Vegetation Present? ☒ Yes ☐ No
 Basis for determination:

REMARKS:

HYDROLOGY

Recorded Data (Describe in Remarks):

____ Stream, Lake or Tide Gauge
 ____ Aerial Photographs
 ____ Other
 ____ None

PRIMARY Indicators

____ Inundated
 ____ Saturated in Upper 12"
 ____ Water Marks
 ____ Drift Lines
 ____ Sediment Deposits
 ____ Drainage Patterns in Wetlands

SECONDARY Indicators

____ Oxidized Root Channels in Upper 12"
 ____ Water Stained Leaves
 ____ Local Soil Survey Data
 ____ FAC-Neutral Test
 ____ Other (Explain in Remarks)

Field Observations
 Depth of Surface Water: None (in.) Depth to Free Water in Pit: 720 (in.) Depth to Saturated Soil: 720 (in.)

Wetland Hydrology Present? Yes ☒ No ☐
 Basis for determination:

REMARKS:

history of spring wetness

SOILS

Soils Mapped As: PugetDrainage Class: P

Taxonomy (Series and Phase): _____

Field Observations
 Confirm Mapped Type? ☒ Yes ☐ No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle (Abundance/Contrast)	Texture, Concretions, Structure, etc.
<u>0-4</u>	_____	<u>2.5Y3/2</u>	<u>-</u>	<u>-</u>	<u>sil</u>
<u>4-11</u>	_____	<u>2.5Y4/2</u>	<u>10YR4/6</u>	<u>C1,2</u>	<u>sil</u>
<u>11-20</u>	_____	<u>2.5Y3/1</u>	<u>5YR 4/6</u>	<u>M1,2</u>	<u>sil</u>

Hydric Soil Indicators:

____ Histosol
 ____ Histic Epipedon
 ____ Sulfidic Odor
☒ Aquic Moisture Regime
 ____ Reducing Conditions
☒ Gleyed or Low Chroma Colors
 ____ Concretions
 ____ High Organic Content in Surface Layer in Sandy Soils
☒ Organic Streaking in Sandy Soils
☒ Listed on Local Hydric Soils List
☒ Listed on National Hydric Soils List

Hydric Soils Present? ☒ Yes ☐ No
 Basis for determination:

REMARKS:

WETLAND DETERMINATION

Is this Sampling Point Within a Wetland? ☒ Yes ☐ No
 Basis for determination:

INVESTIGATOR: _____

Project/Site: WRP
 Applicant/Owner: Portina
 Investigator(s): KAK/AW

Sec: 34 Date: 6-22-95
 Township: 30N County: Snco.
 Range: 5E State: Washington

Do Normal Circumstances exist on the site?
 Is the site significantly & recently disturbed? (Atypical Situation)
 Is the area a potential Problem Area? (explain in final remarks)

Yes ☒ No ☐
 Yes ☐ No ☒
 Yes ☐ No ☒

Plot ID: 18
 Transect ID: _____
 Community ID: _____

VEGETATION Pasture

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <u>Orchardgrass</u>	<u>40</u>	<u>FACU</u>	6. <u>common plantain</u>	<u>5</u>	<u>FACU+</u>
2. <u>quailgrass</u>	<u>20</u>	<u>FAC-</u>	7. _____	_____	_____
3. <u>Poa pr.</u>	<u>20</u>	<u>FAC</u>	8. _____	_____	_____
4. <u>wh. clover</u>	<u>10</u>	<u>FAC</u>	9. _____	_____	_____
5. <u>common dandelion</u>	<u>5</u>	<u>FACU</u>	10. <u>psilocain?</u>	_____	_____

Percent of Dominant Species that are
 OBL, FACW or FAC (excluding FAC-) _____ %

Hydrophytic Vegetation Present? ☒ Yes ☐ No
 Basis for determination: _____

REMARKS:

HYDROLOGY

Recorded Data (Describe in Remarks):

____ Stream, Lake or Tide Gauge
 ____ Aerial Photographs
 ____ Other
 ____ None

PRIMARY Indicators

____ Inundated
 ____ Saturated in Upper 12"
 ____ Water Marks
 ____ Drift Lines
 ____ Sediment Deposits
 ____ Drainage Patterns in Wetlands

SECONDARY Indicators

____ Oxidized Root Channels in Upper 12"
 ____ Water Stained Leaves
 ____ Local Soil Survey Data
 ____ FAC-Neutral Test
 ____ Other (Explain in Remarks)

Field Observations

Depth of Surface Water: None (in.) Depth to Free Water in Pit: 720 (in.) Depth to Saturated Soil: 720 (in.)

Wetland Hydrology Present? Yes ☐ No ☒
 Basis for determination: _____

REMARKS: high spot in field

SOILS

Soils Mapped As: PursetDrainage Class: P

Field Observations

Taxonomy (Series and Phase): _____

Confirm Mapped Type? ☒ Yes ☐ No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle (Abundance/Contrast)	Texture, Concretions, Structure, etc.
<u>0-9</u>	_____	<u>10YR 3/3</u>	<u>7.5YR 4/6</u>	<u>CID</u>	<u>sil</u>
<u>9-20</u>	_____	<u>5Y 4/1</u>	<u>10YR 4/6</u>	<u>M/R</u>	<u>sil</u>
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

Hydric Soil Indicators:

____ Histosol
 ____ Histic Epipedon
 ____ Sulfidic Odor
☒ Aquic Moisture Regime

☒ Reducing Conditions
☒ Gleyed or Low Chroma Colors
 ____ Concretions
☒ High Organic Content in Surface Layer in Sandy Soils

☒ Organic Streaking in Sandy Soils
☒ Listed on Local Hydric Soils List
☒ Listed on National Hydric Soils List

Hydric Soils Present? ☒ Yes ☐ No
 Basis for determination: _____

REMARKS:

WETLAND DETERMINATION

Is this Sampling Point Within a Wetland? ☒ Yes ☐ No
 Basis for determination: _____

INVESTIGATOR: _____

ROUTINE WETLAND DETERMINATION - DATA FORM

1987 MANUAL

Project/Site: WRP
 Applicant/Owner: Portinga
 Investigator(s): KAK/AN

Sec: 34 Date: 6-22-95
 Township: 30N County: Snoho
 Range: 5E State: Washington

Do Normal Circumstances exist on the site?
 Is the site significantly & recently disturbed? (Atypical Situation)
 Is the area a potential Problem Area? (explain in final remarks)

Yes ☒ No ☐
 Yes ☒ No ☐
 Yes ☐ No ☒

Plot ID: 19
 Transect ID: _____
 Community ID: _____

VEGETATION Pasture - mowed short!

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <u>Quackgrass</u>	<u>30</u>	<u>FAC</u>	6. _____	_____	_____
2. <u>bentgrass - colonial?</u>	<u>30</u>	<u>FAC</u>	7. _____	_____	_____
3. <u>RC Grass</u>	<u>30</u>	<u>FACW</u>	8. _____	_____	_____
4. _____	_____	_____	9. _____	_____	_____
5. _____	_____	_____	10. _____	_____	_____

Percent of Dominant Species that are
 OBL, FACW or FAC (excluding FAC-) _____ %

Hydrophytic Vegetation Present? ☒ Yes ☐ No
 Basis for determination:

REMARKS:

HYDROLOGY

Recorded Data (Describe in Remarks):

____ Stream, Lake or Tide Gauge
 ____ Aerial Photographs
 ____ Other
 ____ None

PRIMARY Indicators

____ Inundated
 ____ Saturated in Upper 12"
 ____ Water Marks
 ____ Drift Lines
 ____ Sediment Deposits
 ____ Drainage Patterns in Wetlands

SECONDARY Indicators

____ Oxidized Root Channels in Upper 12"
 ____ Water Stained Leaves
 ____ Local Soil Survey Data
 ____ FAC-Neutral Test
 ____ Other (Explain in Remarks)

Field Observations

Depth of Surface Water: None (in.) Depth to Free Water in Pit: 718 (in.) Depth to Saturated Soil: 718 (in.)

Wetland Hydrology Present? Yes ☐ No ☐
 Basis for determination:

REMARKS:

low area topography

SOILS

Soils Mapped As: _____

Drainage Class: _____

Taxonomy (Series and Phase): _____

Field Observations

Confirm Mapped Type? Yes ☐ No ☐

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle (Abundance/Contrast)	Texture, Concretions, Structure, etc.
<u>0-8</u>	_____	<u>2.5Y 9/2</u>	<u>2.5Y 9/1</u>	<u>F2D</u>	_____
<u>8-16+</u>	_____	<u>10YR 4/1</u>	<u>7.5YR 4/4</u>	<u>C1,2D</u>	<u>FORS moist sil</u> <u>carries it</u>

Hydric Soil Indicators:

____ Histosol
 ____ Histic Epipedon
 ____ Sulfidic Odor
☒ Aquic Moisture Regime

☒ Reducing Conditions
 ____ Gleyed or Low Chroma Colors
 ____ Concretions
 ____ High Organic Content in Surface Layer in Sandy Soils

☒ Organic Streaking in Sandy Soils
 ____ Listed on Local Hydric Soils List
 ____ Listed on National Hydric Soils List

Hydric Soils Present? ☒ Yes ☐ No
 Basis for determination:

REMARKS:

WETLAND DETERMINATION

Is this Sampling Point Within a Wetland? ☒ Yes ☐ No
 Basis for determination:

INVESTIGATOR: _____

ROUTINE WETLAND DETERMINATION - DATA FORM

1987 MANUAL

Project Site: WRT
 Applicant/Owner: Portinger
 Investigator(s): RAC/AN

Sec: 34 Date: 6-22-95
 Township: 30N County: Snoho
 Range: 5E State: Washington

Do Normal Circumstances exist on the site?
 Is the site significantly & recently disturbed? (Atypical Situation)
 Is the area a potential Problem Area? (explain in final remarks)

Yes ☒ No ☐
 Yes ☒ No ☐
 Yes ☒ No ☐

Plot ID: 20
 Transect ID: _____
 Community ID: _____

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <u>Archival grass</u>	<u>40</u>	<u>FAC</u>	6. _____	_____	_____
2. <u>Canada bluegr</u>	<u>20</u>	<u>FACU</u>	7. _____	_____	_____
3. <u>Common claudelion</u>	<u>5</u>	<u>FAC</u>	8. _____	_____	_____
4. <u>RC Grass</u>	<u>10</u>	<u>FACU</u>	9. _____	_____	_____
5. <u>Poa sp.</u>	<u>20</u>	<u>FAC</u>	10. _____	_____	_____

Percent of Dominant Species that are
 OBL, FACW or FAC (excluding FAC-) _____ %

Hydrophytic Vegetation Present? ☒ Yes ☐ No
 Basis for determination: _____

REMARKS:

HYDROLOGY

Recorded Data (Describe in Remarks):

____ Stream, Lake or Tide Gauge
 ____ Aerial Photographs
 ____ Other
 ____ None

PRIMARY Indicators

____ Inundated
 ____ Saturated in Upper 12"
 ____ Water Marks
 ____ Drift Lines
 ____ Sediment Deposits
 ____ Drainage Patterns in Wetlands

SECONDARY Indicators

____ Oxidized Root Channels in Upper 12"
 ____ Water Stained Leaves
 ____ Local Soil Survey Data
 ____ FAC-Neutral Test
 ____ Other (Explain in Remarks)

Field Observations

Depth of Surface Water: None (in.) Depth to Free Water in Pit: > 18 (in.) Depth to Saturated Soil: > 18 (in.)

Wetland Hydrology Present? Yes ☒ No ☐
 Basis for determination: _____

REMARKS:

none in June history of spring wetness

SOILS

Soils Mapped As: PugetDrainage Class: P

Taxonomy (Series and Phase): _____

Field Observations
 Confirm Mapped Type? ☒ Yes ☐ No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle (Abundance/Contrast)	Texture, Concretions, Structure, etc.
<u>0-10</u>	_____	<u>2.5Y4/2</u>	<u>7.5YR4/6</u>	<u>FLD</u>	<u>sil</u>
<u>10-16+</u>	_____	<u>2.5Y5/1</u>	<u>7.5YR4/4/6</u>	<u>M1,2,3 FDRS</u>	<u>sil, lots of organic staining</u>

Hydric Soil Indicators:

____ Histosol
 ____ Histic Epipedon
 ____ Sulfidic Odor
☒ Aquic Moisture Regime
 ____ Reducing Conditions
☒ Gleyed or Low Chroma Colors
 ____ Concretions
 ____ High Organic Content in Surface Layer in Sandy Soils
☒ Organic Streaking in Sandy Soils
☒ Listed on Local Hydric Soils List
☒ Listed on National Hydric Soils List

Hydric Soils Present? ☒ Yes ☐ No
 Basis for determination: _____

REMARKS:

WETLAND DETERMINATION

Is this Sampling Point Within a Wetland? ☒ Yes ☐ No
 Basis for determination: _____

INVESTIGATOR: _____

ROUTINE WETLAND DETERMINATION - DATA FORM

1987 MANUAL

Project/Site: WRP
 Applicant/Owner: Portage
 Investigator(s): KAC/AMB

Sec: 34 Date: 6-22-95
 Township: 30N County: Snook
 Range: 5E State: Washington

Do Normal Circumstances exist on the site?
 Is the site significantly & recently disturbed? (Atypical Situation)
 Is the area a potential Problem Area? (explain in final remarks)

Yes ☒ No ☐
 Yes ☒ No ☐
 Yes ☒ No ☐

Plot ID: 21
 Transect ID: _____
 Community ID: _____

VEGETATION Pasture

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <u>Quackgrass</u>	<u>20</u>	<u>FAC-</u>	6. <u>common plantain</u>	<u>5</u>	<u>FACU+</u>
2. <u>wh. clover</u>	<u>15</u>	<u>FAC</u>	7. _____	_____	_____
3. <u>orchardgrass</u>	<u>20</u>	<u>FACU</u>	8. _____	_____	_____
4. <u>common dandelion</u>	<u>10</u>	<u>FACU</u>	9. _____	_____	_____
5. <u>ryegrass</u>	<u>20</u>	<u>FACU</u>	10. _____	_____	_____

Percent of Dominant Species that are
 OBL, FACW or FAC (excluding FAC-) _____%

Hydrophytic Vegetation Present? Yes ☒ No ☐
 Basis for determination:

REMARKS:

HYDROLOGY

Recorded Data (Describe in Remarks):

____ Stream, Lake or Tide Gauge
 ____ Aerial Photographs
 ____ Other
 ____ None

PRIMARY Indicators

____ Inundated
 ____ Saturated in Upper 12"
 ____ Water Marks
 ____ Drift Lines
 ____ Sediment Deposits
 ____ Drainage Patterns in Wetlands

SECONDARY Indicators

____ Oxidized Root Channels in Upper 12"
 ____ Water Stained Leaves
 ____ Local Soil Survey Data
 ____ FAC-Neutral Test
 ____ Other (Explain in Remarks)

Field Observations

Depth of Surface Water: None (in.) Depth to Free Water in Pit: > 18 (in.) Depth to Saturated Soil: 7/8 (in.)

Wetland Hydrology Present? Yes ☒ No ☐
 Basis for determination:

REMARKS: far, highest portion in field

SOILS

Soils Mapped As: Smolmish

Drainage Class: _____

Taxonomy (Series and Phase): _____

Field Observations

Confirm Mapped Type? Yes ☒ No ☐

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle (Abundance/Contrast)	Texture, Concretions, Structure, etc.
<u>0-8</u>	_____	<u>10YR3/2</u>	<u>—</u>	<u>—</u>	<u>sil</u>
<u>8-13</u>	_____	<u>10YR3/3</u>	<u>10YR5/6</u>	<u>FID</u>	<u>sil < 1% redox</u>
<u>13-18</u>	_____	<u>5Y6/3</u>	<u>10YR5/6</u>	<u>CID</u>	<u>sil compacted or dense till</u>

Hydric Soil Indicators:

____ Histosol
 ____ Histic Epipedon
 ____ Sulfidic Odor
☒ Aquic Moisture Regime

☒ Reducing Conditions
☒ Gleyed or Low Chroma Colors
 ____ Concretions
 ____ High Organic Content in Surface Layer in Sandy Soils

____ Organic Streaking in Sandy Soils
 ____ Listed on Local Hydric Soils List
 ____ Listed on National Hydric Soils List

Hydric Soils Present? Yes ☒ No ☐
 Basis for determination:

REMARKS:

Slope is 6%

WETLAND DETERMINATION

Is this Sampling Point Within a Wetland? Yes ☒ No ☐
 Basis for determination:

INVESTIGATOR: _____

ROUTINE WETLAND DETERMINATION - DATA FORM

1987 MANUAL

Project/Site: WRP
 Applicant/Owner: Portnevo
 Investigator(s): KARAW

Sec: 34 Date: 6-22-95
 Township: 30N County: Sho
 Range: 5E State: Washington

Do Normal Circumstances exist on the site?
 Is the site significantly & recently disturbed? (Atypical Situation)
 Is the area a potential Problem Area? (explain in final remarks)

Yes ☐ No ☒
 Yes ☐ No ☒
 Yes ☐ No ☒

Plot ID: 22
 Transect ID: _____
 Community ID: _____

VEGETATION Pasture

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <u>RC Grass</u>	<u>60+</u>	<u>FACW</u>	6. _____	_____	_____
2. <u>Buckgrass</u>	<u>10</u>	<u>FAC-</u>	7. <u>shepherd's purse</u>	<u>2</u>	<u>FACU</u>
3. <u>bentgrass - ?</u>	<u>20</u>	<u>FAC</u>	8. _____	_____	_____
4. <u>common plantain</u>	<u>105</u>	<u>FACU</u>	9. _____	_____	_____
5. <u>timothy</u>	<u>10</u>	<u>FAC-</u>	10. _____	_____	_____

Percent of Dominant Species that are
 OBL, FACW or FAC (excluding FAC-) _____%

Hydrophytic Vegetation Present? ☒ Yes ☐ No
 Basis for determination:

REMARKS:

HYDROLOGY

Recorded Data (Describe in Remarks):

____ Stream, Lake or Tide Gauge
 ____ Aerial Photographs
 ____ Other
 ____ None

PRIMARY Indicators

____ Inundated
 ____ Saturated in Upper 12"
 ____ Water Marks
 ____ Drift Lines
 ____ Sediment Deposits
 ____ Drainage Patterns in Wetlands

SECONDARY Indicators

____ Oxidized Root Channels in Upper 12"
 ____ Water Stained Leaves
 ____ Local Soil Survey Data
 ____ FAC-Neutral Test
 ____ Other (Explain in Remarks)

Field Observations

Depth of Surface Water: None (in.) Depth to Free Water in Pit: 718 (in.) Depth to Saturated Soil: 718 (in.)
moist

Wetland Hydrology Present? Yes ☒ No ☐
 Basis for determination:

REMARKS: box drain?history of spring wetness

SOILS

Soils Mapped As: PugetDrainage Class: P

Taxonomy (Series and Phase): _____

Field Observations
 Confirm Mapped Type? ☒ Yes ☐ No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle (Abundance/Contrast)	Texture, Concretions, Structure, etc.
<u>0-4</u>	_____	<u>2.5Y4/2</u>	<u>2.5Y5/1</u>	<u>M1D</u>	<u>PORS sil FID-7.5YR4/6 mottled</u>
<u>4-13</u>	_____	<u>2.5Y4/1</u>	<u>7.5YR4/4</u>	<u>C1D</u>	<u>EDRC + current sil. 2FEM org. str.</u>
<u>13-18</u>	_____	<u>5Y4/1</u>	<u>10YR5/6</u>	<u>C1,2D</u>	<u>sil</u>
<u>2mEC organic stains on Faces of Ped.</u>					

Hydric Soil Indicators:

____ Histosol
 ____ Histic Epipedon
 ____ Sulfidic Odor
☒ Aquic Moisture Regime

☒ Reducing Conditions
☒ Gleyed or Low Chroma Colors
 ____ Concretions
 ____ High Organic Content in Surface Layer in Sandy Soils

☒ Organic Streaking in Sandy Soils
☒ Listed on Local Hydric Soils List
☒ Listed on National Hydric Soils List

Hydric Soils Present? ☒ Yes ☐ No
 Basis for determination:

REMARKS:

WETLAND DETERMINATION

Is this Sampling Point Within a Wetland? ☒ Yes ☐ No
 Basis for determination:

INVESTIGATOR: _____

Project/Site: WRP
 Applicant/Owner: Portinga
 Investigator(s): KAK/AN

Sec: 34 Date: 6-22-95
 Township: 30 County: Snoko
 Range: 5 State: Washington

Do Normal Circumstances exist on the site?
 Is the site significantly & recently disturbed? (Atypical Situation)
 Is the area a potential Problem Area? (explain in final remarks)

Yes ☒ No ☐
 Yes ☒ No ☐
 Yes ☐ No ☒
 Plot ID: 23
 Transect ID: _____
 Community ID: _____

VEGETATION Pasture

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <u>orchardgrass</u>		<u>FACU</u>	6. _____		
2. <u>ryegrass</u>		<u>FACU</u>	7. _____		
3. <u>wh. clover</u>		<u>FAC</u>	8. _____		
4. <u>quackgrass</u>	<u>5</u>	<u>FAC-</u>	9. _____		
5. _____			10. _____		

Percent of Dominant Species that are
 OBL, FACW or FAC (excluding FAC-) _____%

Hydrophytic Vegetation Present? Yes ☒ No ☐
 Basis for determination:

REMARKS:

grazed but, hydrology same for small pasture East of here.

HYDROLOGY

Recorded Data (Describe in Remarks):
☐ Stream, Lake or Tide Gauge
☐ Aerial Photographs
☐ Other
☐ None

PRIMARY Indicators

☐ Inundated
☐ Saturated in Upper 12"
☐ Water Marks
☐ Drift Lines
☐ Sediment Deposits
☐ Drainage Patterns in Wetlands

SECONDARY Indicators

☐ Oxidized Root Channels in Upper 12"
☐ Water Stained Leaves
☐ Local Soil Survey Data
☐ FAC-Neutral Test
☐ Other (Explain in Remarks)

Field Observations

Depth of Surface Water: _____ (in.) Depth to Free Water in Pit: _____ (in.) Depth to Saturated Soil: _____ (in.)

Wetland Hydrology Present? Yes ☒ No ☐
 Basis for determination:

REMARKS:
Seasonally Flooded

SOILS

Soils Mapped As: Puget

Drainage Class: P

Field Observations
 Confirm Mapped Type? ☒ Yes ☐ No

Taxonomy (Series and Phase): _____

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle (Abundance/Contrast)	Texture, Concretions, Structure, etc.
<u>0-5</u>		<u>2.5Y4/2</u>			<u>sil</u>
<u>5-11</u>		<u>2.5Y4/2</u>	<u>10YR5/6/5/8</u>	<u>M1,2</u>	<u>sil</u>
<u>11-18</u>		<u>2.5Y4/1</u>		<u>3m org. st. PF</u>	<u>sil</u>
			<u>(7.5YR4/6</u>	<u>1FD)</u>	<u>CORC</u>

Hydric Soil Indicators:

☐ Histosol
☐ Histic Epipedon
☐ Sulfidic Odor
☒ Aquic Moisture Regime
☒ Reducing Conditions
☒ Gleyed or Low Chroma Colors
☐ Concretions
☐ High Organic Content in Surface Layer in Sandy Soils
☒ Organic Streaking in Sandy Soils
☒ Listed on Local Hydric Soils List
☒ Listed on National Hydric Soils List

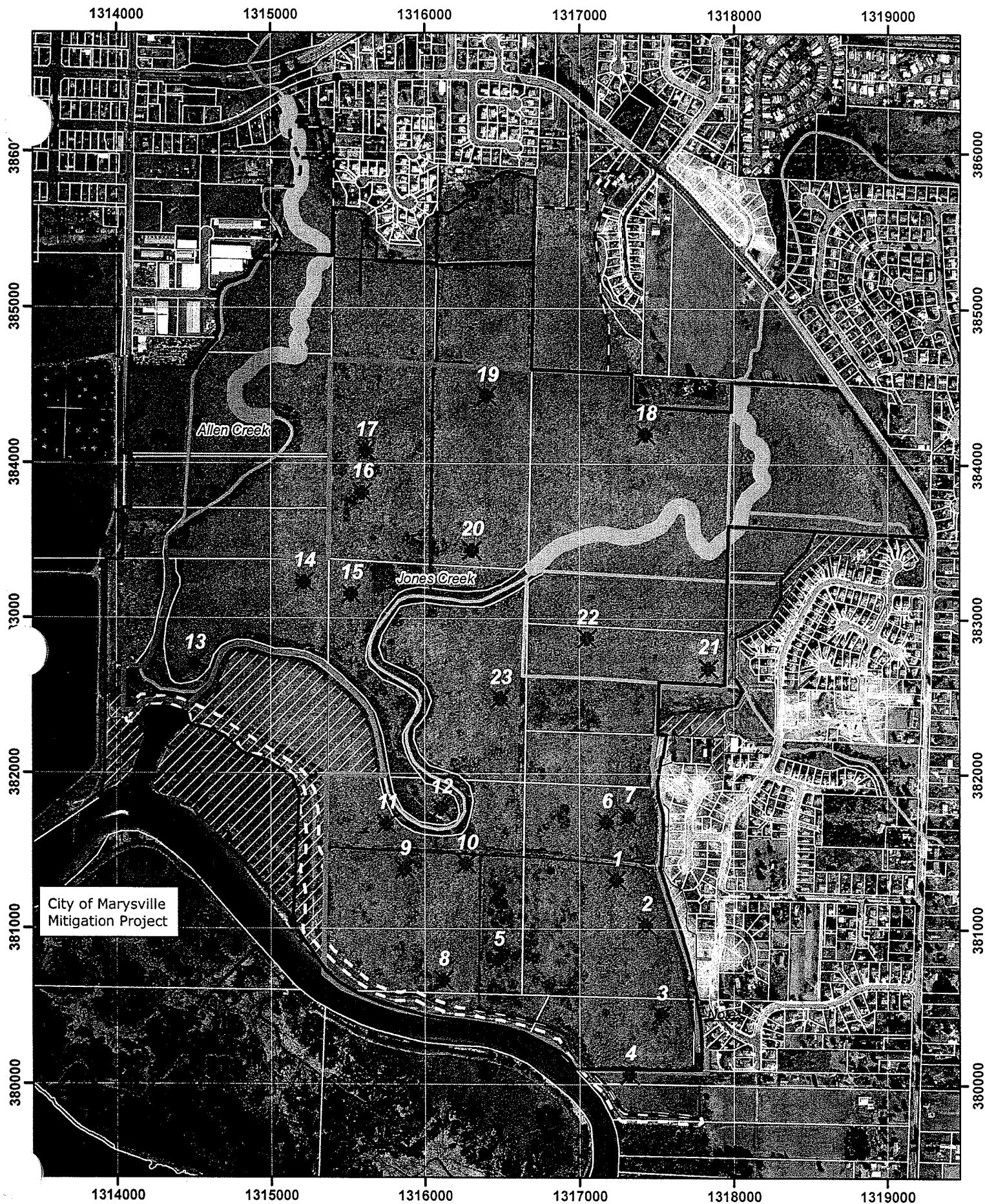
Hydric Soils Present? Yes ☒ No ☐
 Basis for determination:

REMARKS:

WETLAND DETERMINATION

Is this Sampling Point Within a Wetland? Yes ☐ No ☐
 Basis for determination:

INVESTIGATOR: _____



- | | | | |
|--|---------------------------|--|-----------------------------|
| | 1995 NRCS Plots | | Ebey Slough Levee |
| | Proposed Project Boundary | | Restored Creeks |
| | Flowage Easement | | Streams and Ditches |
| | Potential Properties | | City of Marysville Property |
| | NRCS WRP Easement | | Snohomish Co. Parcels |



0 500 1,000 Feet

QWULOOT RESTORATION PROJECT **WETLAND DETERMINATION 2005:** **RECONNAISSANCE**

Mapping: NOAA NOS/ORR 06.27.2005
 Coastal Protection & Restoration Division BDS

F10L



T677

①

14

③

15

④

T679

OUT
OF
PRODUCTION

⑤

T694

6

T657

⑥

6

8

5

H
ant

④

PETE POORTINGA
MARYVILLE

F10L



Appendix D – Wetland Determination Plot Datasheets

DATA FORM 1
Routine Wetland Determination
(WA State Wetland Delineation Manual or
1987 Corps Wetland Delineation Manual)

Project/Site: Qwuloolt Marsh		Date: 12/01/05
Applicant/owner: Tulalip Tribe of Indians		County: Snohomish
Investigator(s): Paul Cereghino & Jo Gardiner, NOAA Restoration Center		State: Washington
		S/T/R: S33-34 T30N R5E

Do normal circumstances exist on the site? ☒ Yes ☐ No	Community ID:
Is the site significantly disturbed (atypical situation)? ☒ Yes ☐ No	Transect ID:
Is the area a potential problem area? ☐ Yes ☒ No	Plot ID: (1)
Explanation of atypical or problem area: <i>pasture management</i>	

VEGETATION (For *strata, indicate T = tree; S = shrub; H = herb; V = vine)					
Dominant Plant Species	*Stratum	Indicator	Dominant Plant Species	*Stratum	Indicator
<i>Phalaris</i>	<i>H</i>	<i>FAZIN</i>			

HYDROPHYTIC VEGETATION INDICATORS:	
% of dominants OBL, FACW, & FAC: <i>100%</i>	
Check all indicators that apply and explain below:	
☐ Regional knowledge of plant communities	☒ Wetland plant list (nat'l or regional)
☐ Physiological or reproductive adaptations	☐ Morphological adaptations
☐ Technical Literature	☐ Wetland plant database
	☐ Other (explain)

Hydrophytic vegetation present? ☒ Yes ☐ No
Rationale for decision/Remarks: <i>prevalant veg adapted to hydric conditions</i>

HYDROLOGY		
Is it the growing season? ☒ Yes ☒ No	Water Marks: ☐ Yes ☐ No	Sediment Deposits: ☐ Yes ☐ No
Based on: <i>obs. plant growth</i>	Drift Lines: ☐ Yes ☐ No	Drainage Patterns: ☐ Yes ☐ No
Depth of inundation: inches	Oxidized Root (live roots) <i>13"</i>	Local Soil Survey: ☒ Yes ☐ No
Depth to free water in pit: <i>13</i> inches	Channels <12 in.: ☐ Yes ☐ No	
Depth to saturated soil: inches	FAC Neutral: ☐ Yes ☐ No	Water-stained Leaves: ☐ Yes ☐ No
Check all that apply & explain below:	Other (explain): <i>plot located on local high point indicates</i>	
☐ Stream, lake or gage data		
☐ Aerial photographs		
☐ Other		

Wetland hydrology present? ☐ Yes ☒ No
Rationale for decision/remarks: <i>plot located on local high point indicates</i> <i>some islands may not show wetland hydrology</i>

SOILS

Map Unit Name (Series and Phase) :

Drainage Class *P*Field observations confirm mapped type? ☒ Yes ☐ No

Taxonomy (subgroup)

*Perjet***Profile Description**

Depth (inches)	Horizon	Matrix color (Munsell moist)	Mottle colors (Munsell moist)	Mottle abundance size and contrast	Texture, concretions, structure, etc.	Drawing of soil profile (match description)
0-12		10YR 3/2	ϕ	ϕ		
12		10YR 5/2	5YR 5/6	30%	rust pores-redox	

Hydric Soil Indicators: (check all that apply)

- ☐ Histosol
☐ Histic Epipedon
☐ Sulfidic Odor
☐ Aquic Moisture Regime
☐ Reducing Conditions
☐ Gleyed or Low-Chroma (≥ 1) matrix

- ☒ Concretions *Fe @ 12"*
☐ High Organic Content in Surface Layer of Sandy Soils
☐ Organic Streaking in Sandy Soils
☒ Listed on Local Hydric Soils List
☒ Listed on National Hydric Soils List
☐ Other (explain in remarks)

Hydric soils present?☒ Yes ☐ No

Rationale for decision/Remarks:

*Hydric soils list.***Wetland Determination**

Hydrophytic vegetation present?

☒ Yes ☐ No

Hydric soils present?

☒ Yes ☐ No

Wetland hydrology present?

☐ Yes ☒ No

Is the sampling point within a wetland?

☐ Yes ☒ No

local highpoint in wetland complex adjacent sites have obvious wetland hydrology

Rationale/Remarks:

NOTES:*pit 25' from ditch facing N.**2mm 30% - mottles**0-12" clay band**9.5l water $\approx$ 13"**NRES Survey*

- maximum low chroma @ 6"*
- substantial shift in veg. from pasture $\rightarrow$ PRAA2U*

DATA FORM 1
Routine Wetland Determination
(WA State Wetland Delineation Manual or
1987 Corps Wetland Delineation Manual)

Project/Site: Qwuloolt Marsh		Date: 12/01/05
Applicant/owner: Tulalip Tribe of Indians		County: Snohomish
Investigator(s): Paul Cereghino & Jo Gardiner, NOAA Restoration Center <i>Jenice Martin</i>		State: Washington
		S/T/R: S33-34 T30N R5E

Do normal circumstances exist on the site? ☒ Yes ☐ No Is the site significantly disturbed (atypical situation)? ☒ Yes ☐ No Is the area a potential problem area? ☐ Yes ☒ No Explanation of atypical or problem area: <i>pasture management</i>	Community ID: Transect ID: 2 Plot ID:
--	--

VEGETATION (For *strata, indicate T = tree; S = shrub; H = herb; V = vine)

Dominant Plant Species	*Stratum	Indicator	Dominant Plant Species	*Stratum	Indicator
<i>Phalaris arundinacea</i>	H	FACW			
<i>Cirsium</i>		FACU			
<i>Urtica</i>		FACU			
<i>Some nettle</i>		FACU			
<i>Patches tall Decid?</i>		UNK			
<i>Some galium</i>		FACU			
<i>Some thistle</i>					

HYDROPHYTIC VEGETATION INDICATORS:

% of dominants OBL, FACW, & FAC: *PHAARD expanding following neglect of pasture!*

Check all indicators that apply and explain below:

☒ Regional knowledge of plant communities	☒ Wetland plant list (nat'l or regional)
☐ Physiological or reproductive adaptations	☐ Morphological adaptations
☐ Technical Literature	☐ Wetland plant database
	☐ Other (explain)

Hydrophytic vegetation present? ☒ Yes ☐ No

Rationale for decision/Remarks: *prevalance adapted to hydric.*

HYDROLOGY

Is it the growing season? ☒ Yes ☒ No Based on: <i>obs. plant growth</i>	Water Marks: ☐ Yes ☐ No Drift Lines: ☐ Yes ☐ No	Sediment Deposits: ☐ Yes ☐ No Drainage Patterns: ☒ Yes ☐ No
Depth of inundation: <i>0"</i> inches Depth to free water in pit: <i>4"</i> inches Depth to saturated soil: <i>0"</i> inches	Oxidized Root (live roots) Channels <12 in.: ☐ Yes ☐ No FAC Neutral: ☐ Yes ☐ No	Local Soil Survey: ☒ Yes ☐ No Water-stained Leaves: ☐ Yes ☐ No

Check all that apply & explain below:

☐ Stream, lake or gage data ☐ Aerial photographs ☐ Other	Other (explain):
---	------------------

Wetland hydrology present? ☒ Yes ☐ No

Rationale for decision/remarks:

SOILS

Map Unit Name (Series and Phase):

Drainage Class *P*

Taxonomy (subgroup)

*Forest / Snodgrass*Field observations confirm mapped type? ☒ Yes ☐ No**Profile Description**

Depth (inches)	Horizon	Matrix color (Munsell moist)	Mottle colors (Munsell moist)	Mottle abundance size and contrast	Texture, concretions, structure, etc.	Drawing of soil profile (match description)
0-8"	A	10YR 3/2			fin 4 clay loam	
8-12"	A		5YR 5/3	~2% ~1mm	"	

Hydric Soil Indicators: (check all that apply)

- ☐ Histosol
☐ Histic Epipedon
☐ Sulfidic Odor
☐ Aquic Moisture Regime
☐ Reducing Conditions
☐ Gleyed or Low-Chroma (=1) matrix
- ☒ Concretions
☐ High Organic Content in Surface Layer of Sandy Soils
☐ Organic Streaking in Sandy Soils
☒ Listed on Local Hydric Soils List
☒ Listed on National Hydric Soils List
☐ Other (explain in remarks)

Hydric soils present?

☒ Yes ☐ No

Rationale for decision/Remarks:

*Fe concretions @ 8"***Wetland Determination**

Hydrophytic vegetation present?

☒ Yes ☐ No

Hydric soils present?

☒ Yes ☐ No

Wetland hydrology present?

☒ Yes ☐ No

Is the sampling point within a wetland?

☒ Yes ☐ No*presence of up wood may indicate atypical situation due to historic clearing and leveling.*

Rationale/Remarks:

NOTES:

saturated to surface
soil has wood channels, little decomposition

*good sized wood chunks ~ 6"**10:01**soil**matrix = silty clay loam**10YR 3/2 matrix**fine mottles**8" water seeping into pit**<5 mm water @ 4" from surface**manganese concretions are black**Ped remove ~ 12"**See @ last site**major wood layer ~ 8"**~2% 1mm**5YR 5/3 = mottles**mottles in matrix**10YR 3/2 @ ~ 8"**NRCS - organic @ 11", CMC @ 2", pasture veg*

DATA FORM 1
Routine Wetland Determination
(WA State Wetland Delineation Manual or
1987 Corps Wetland Delineation Manual)

Project/Site: Qwuloolt Marsh		Date: 12/01/05
Applicant/owner: Tulalip Tribe of Indians		County: Snohomish
Investigator(s): Paul Cereghino & Jo Gardiner, NOAA Restoration Center <i>Margaret Jane Mann</i>		State: Washington
		S/T/R: S33-34 T30N R5E

Do normal circumstances exist on the site? ☒ Yes ☐ No Is the site significantly disturbed (atypical situation)? ☒ Yes ☐ No Is the area a potential problem area? ☐ Yes ☒ No Explanation of atypical or problem area: <i>pasture management</i>	Community ID: Transect ID: Plot ID: 3 3
--	--

VEGETATION (For *strata, indicate T = tree; S = shrub; H = herb; V = vine)

Dominant Plant Species	*Stratum	Indicator	Dominant Plant Species	*Stratum	Indicator
<i>Ranunculus</i>	H	FACW			
<i>Some tall forage</i>	? H	?			
<i>likely for</i>					

HYDROPHYTIC VEGETATION INDICATORS:

% of dominants OBL, FACW, & FAC:

Check all indicators that apply and explain below:

☐ Regional knowledge of plant communities	☐ Wetland plant list (nat'l or regional)
☐ Physiological or reproductive adaptations	☐ Morphological adaptations
☐ Technical Literature	☐ Wetland plant database
	☐ Other (explain)

Hydrophytic vegetation present? ☐ Yes ☐ No

Rationale for decision/Remarks: *insufficient growth for ID*

HYDROLOGY

Is it the growing season? ☒ Yes ☒ No Based on: <i>obs. plant growth</i>	Water Marks: ☐ Yes ☐ No Drift Lines: ☐ Yes ☐ No	Sediment Deposits: ☐ Yes ☐ No Drainage Patterns: ☐ Yes ☐ No
Depth of inundation: 0" inches Depth to free water in pit: 6" inches Depth to saturated soil: 3" inches	Oxidized Root (live roots) Channels <12in: ☐ Yes ☐ No FAC Neutral: ☐ Yes ☐ No	Local Soil Survey: ☒ Yes ☐ No Water-stained Leaves: ☐ Yes ☐ No

Check all that apply & explain below:

☐ Stream, lake or gage data ☐ Aerial photographs ☐ Other	Other (explain):
---	------------------

Wetland hydrology present? ☒ Yes ☐ No

Rationale for decision/remarks:

SOILS

Map Unit Name (Series and Phase):

Drainage Class *P*

Taxonomy (subgroup)

*Puget/Snohomish*Field observations confirm mapped type? ☒ Yes ☐ No**Profile Description**

Depth (inches)	Horizon	Matrix color (Munsell moist)	Mottle colors (Munsell moist)	Mottle abundance size and contrast	Texture, concretions, structure, etc.	Drawing of soil profile (match description)
0-8	A	10YR 3/2			Silt loam	
8-10	A	2.5Y 5/1	7.5YR 4/6	2-5 mm 30%		
10-11	D	coarse organic				

Hydric Soil Indicators: (check all that apply)

- | | |
|---|---|
| ☐ Histosol | ☐ Concretions |
| ☐ Histic Epipedon | ☐ High Organic Content in Surface Layer of Sandy Soils |
| ☐ Sulfidic Odor | ☐ Organic Streaking in Sandy Soils |
| ☐ Aquic Moisture Regime | ☐ Listed on Local Hydric Soils List |
| ☐ Reducing Conditions | ☐ Listed on National Hydric Soils List |
| ☐ Gleyed or Low-Chroma (=1) matrix | ☐ Other (explain in remarks) |

Hydric soils present?

☐ Yes☐ No

Rationale for decision/Remarks:

*Fe concretions (redox) @ 8"***Wetland Determination**

Hydrophytic vegetation present?

☐ Yes☐ No*UNK*

Hydric soils present?

☒ Yes☐ No

Wetland hydrology present?

☒ Yes☐ No

Is the sampling point within a wetland?

☐ Yes☐ No*UNK likely*

Rationale/Remarks:

NOTES:*Prominent mottle in top 3"**Silt loam matrix**Water in hole @ 6"**0-3 drier moisture content**below 3" more moisture in soil**~~Water in pit~~**10-11"**wood layer
coarse organic
material**NRCS - no organic layer concentration @ 3-10"
pasture veg.*

DATA FORM 1
Routine Wetland Determination
(WA State Wetland Delineation Manual or
1987 Corps Wetland Delineation Manual)

Project/Site: Qwuloolt Marsh		Date: 12/01/05
Applicant/owner: Tulalip Tribe of Indians		County: Snohomish
Investigator(s): Paul Cereghino & Jo Gardiner, NOAA Restoration Center		State: Washington
		S/T/R: S33-34 T30N R5E

Do normal circumstances exist on the site?	☒ Yes	☐ No	Community ID:
Is the site significantly disturbed (atypical situation)?	☒ Yes	☐ No	Transect ID:
Is the area a potential problem area?	☐ Yes	☒ No	Plot ID: #5
Explanation of atypical or problem area: historic pasture mgt			

VEGETATION (For *strata, indicate T = tree; S = shrub; H = herb; V = vine)

Dominant Plant Species	*Stratum	Indicator	Dominant Plant Species	*Stratum	Indicator
Phalaris	H	FACW			
Trifolium					
Nettle					
Queen Anne's lace					

} sub-dominant

HYDROPHYTIC VEGETATION INDICATORS:

% of dominants OBL, FACW, & FAC:

Check all indicators that apply and explain below:

☐ Regional knowledge of plant communities	☒ Wetland plant list (nat'l or regional)
☐ Physiological or reproductive adaptations	☐ Morphological adaptations
☐ Technical Literature	☐ Wetland plant database
	☐ Other (explain)

Hydrophytic vegetation present? ☒ Yes ☐ No

Rationale for decision/Remarks: prevalence of spp. hydro

HYDROLOGY

Is it the growing season? ☐ Yes ☒ No	Water Marks: ☐ Yes ☐ No	Sediment Deposits: ☐ Yes ☐ No
Based on:	Drift Lines: ☐ Yes ☐ No	Drainage Patterns: ☐ Yes ☐ No
Depth of inundation: 0" inches	Oxidized Root (live roots)	Local Soil Survey: ☒ Yes ☐ No
Depth to free water in pit: 4" inches	Channels <12in.: ☒ Yes ☐ No	Water-stained Leaves: ☐ Yes ☐ No
Depth to saturated soil: 0" inches	FAC Neutral: ☐ Yes ☐ No	
Check all that apply & explain below:	Other (explain):	
☐ Stream, lake or gage data		
☐ Aerial photographs		
☐ Other		

Wetland hydrology present? ☒ Yes ☐ No

Rationale for decision/remarks: observed water

SOILS

Map Unit Name (Series and Phase):

Drainage Class

Field observations confirm mapped type? ☐ Yes ☐ No

Taxonomy (subgroup)

Profile Description

Depth (inches)	Horizon	Matrix color (Munsell moist)	Mottle colors (Munsell moist)	Mottle abundance size and contrast	Texture, concretions, structure, etc.	Drawing of soil profile (match description)
0-9	A1	10YR 4/2	Ø	Trace 1-3mm iron C	well rooted crumb structure	
9-12		10YR 4/2	2.5Y 5/1	20% 1-2cm	matrix stays same as	
12-14		10YR 4/2	2.5Y 6/1	20% mottling	depletions- mottles	

Hydric Soil Indicators: (check all that apply)

- ☐ Histosol
☐ Histic Epipedon
☒ Sulfidic Odor
☐ Aquic Moisture Regime
☐ Reducing Conditions
☐ Gleyed or Low-Chroma (=1) matrix
- ☒ Concretions
☐ High Organic Content in Surface Layer of Sandy Soils
☐ Organic Streaking in Sandy Soils
☒ Listed on Local Hydric Soils List
☒ Listed on National Hydric Soils List
☐ Other (explain in remarks)

Hydric soils present?

☒ Yes ☐ No

Rationale for decision/Remarks:

multiple indicators @ 9"

Wetland Determination

Hydrophytic vegetation present?

☒ Yes ☐ No

Hydric soils present?

☒ Yes ☐ No

Wetland hydrology present?

☒ Yes ☐ No

Is the sampling point within a wetland?

☒ Yes ☐ No

Rationale/Remarks:

NOTES:Saturated to surface
water in hole @ 4"9-12 { faint sulfur smell light blue
depletions and concretions mostly depleted12-14 { 7.5YR 5/6 ~~the~~ concentrations 20%
20% mottling
depletions & concretions (manganese? black)
iron0-9 - silty clay loam
or
silty clay

~12" silty clay loam

NRCS - pasture veg! Concretions observed @ 4-9"

DATA FORM 1
Routine Wetland Determination
(WA State Wetland Delineation Manual or
1987 Corps Wetland Delineation Manual)

1/27/06

Project/Site: Qwuloolt Marsh	Date: 12/07/05
Applicant/owner: Tulalip Tribe of Indians	County: Snohomish
Investigator(s): Paul Cereghino & Jo Gardiner, NOAA Restoration Center	State: Washington
	S/T/R: S33-34 T30N R5E

Do normal circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (atypical situation)? ☒ Yes ☐ No
Is the area a potential problem area? ☐ Yes ☒ No
Explanation of atypical or problem area: *pasture might (historic)*

Community ID: *N/A*
Transect ID: *N/A*
Plot ID: *(6)*

VEGETATION (For *strata, indicate T = tree; S = shrub; H = herb; V = vine)

Dominant Plant Species	*Stratum	Indicator	Dominant Plant Species	*Stratum	Indicator
<i>PCW</i>	<i>H</i>	<i>FACW</i>			

HYDROPHYTIC VEGETATION INDICATORS:

% of dominants OBL, FACW, & FAC:

Check all indicators that apply and explain below:

- | | |
|--|--|
| ☐ Regional knowledge of plant communities | ☒ Wetland plant list (nat'l or regional) |
| ☐ Physiological or reproductive adaptations | ☐ Morphological adaptations |
| ☐ Technical Literature | ☐ Wetland plant database |
| | ☐ Other (explain) |

Hydrophytic vegetation present? ☒ Yes ☐ No

Rationale for decision/Remarks: *50' W. OF STAKE VEL. SHIFT FROM LCG to PASTURE GRASS*

HYDROLOGY

Is it the growing season? ☒ Yes ☒ No

Based on: *obs. plant growth*

Depth of inundation: *0-0.5"* inches

Depth to free water in pit: *3.5"* inches

Depth to saturated soil: *0* inches

Check all that apply & explain below:

- ☐ Stream, lake or gage data
☐ Aerial photographs
☐ Other

Water Marks: ☐ Yes ☐ No

Drift Lines: ☒ Yes ☐ No

Oxidized Root (live roots)

Channels <12 in.: ☐ Yes ☐ No

FAC Neutral: ☐ Yes ☐ No

Other (explain):

Sediment Deposits: ☐ Yes ☐ No

Drainage Patterns: ☒ Yes ☐ No

Local Soil Survey: ☒ Yes ☐ No

Water-stained Leaves: ☒ Yes ☐ No

Wetland hydrology present? ☒ Yes ☐ No

Rationale for decision/remarks: *multiple indicators
wreck line present 40' W OF STAKE
plot located in local depression see notes of adjacent plots.*

SOILS

Map Unit Name (Series and Phase):

Drainage Class

Taxonomy (subgroup)

Field observations confirm mapped type? ☒ Yes ☐ No**Profile Description**

Depth (inches)	Horizon	Matrix color (Munsell moist)	Mottle colors (Munsell moist)	Mottle abundance size and contrast	Texture, concretions, structure, etc.	Drawing of soil profile (match description)
0-8	A1	10YR 4/2	N/A	N/A	fine GR	
8-12	A2	10YR 4/2	10YR 5/6	20% C/P/2-5mm MED	GR-SBK	
12-16	A3	10YR 5/1	2.5 YR 2.5/4 dark red variable	30% M/P/3mm	↑ density SBK-PL	

Hydric Soil Indicators: (check all that apply)

- | | |
|---|---|
| ☐ Histosol | ☐ Concretions |
| ☐ Histic Epipedon | ☐ High Organic Content in Surface Layer of Sandy Soils |
| ☐ Sulfidic Odor | ☐ Organic Streaking in Sandy Soils |
| ☐ Aquic Moisture Regime | ☒ Listed on Local Hydric Soils List |
| ☐ Reducing Conditions | ☐ Listed on National Hydric Soils List |
| ☐ Gleyed or Low-Chroma (=1) matrix | ☐ Other (explain in remarks) |

Hydric soils present?

☒ Yes ☐ No

Rationale for decision/Remarks:

RMF @ 8" SOIL ON STATE LIST

Wetland Determination

Hydrophytic vegetation present?

☒ Yes ☐ No

Hydric soils present?

☒ Yes ☐ No

Wetland hydrology present?

☒ Yes ☐ No

Is the sampling point within a wetland?

☒ Yes ☐ No

Rationale/Remarks:

NOTES:

Stake in low spot.

Ditch 40' E OF stake

Roots throughout x-section

At 4.5' depth. 16.5" to marsh surface

Resampled - 16.5"

dry parallel

Sample taken ~ 80' W. OF STAKE. reduced soil layer w/ mottle Fe

fract @ 7"

mottles @ 12-16"

distinct at 12" w/ root channels
+ mottles.

< 10" RMF vague

NRCS - pasture reg.
mc @ 4"

(WA State Wetland Delineation Manual or
1987 Corps Wetland Delineation Manual)

Project/Site: Qwuloolt Marsh Applicant/owner: Tulalip Tribe of Indians Investigator(s): Paul Cereghino & Jo Gardiner, NOAA Restoration Center	Date: 12/07/05 1/27/06 County: Snohomish State: Washington S/T/R: S33-34 T30N R5E
Do normal circumstances exist on the site? ☐ Yes ☐ No Is the site significantly disturbed (atypical situation)? ☐ Yes ☐ No Is the area a potential problem area? ☐ Yes ☐ No Explanation of atypical or problem area:	Community ID: Transect ID: Plot ID: #7

VEGETATION (For *strata, indicate T = tree; S = shrub; H = herb; V = vine)

Dominant Plant Species	*Stratum	Indicator	Dominant Plant Species	*Stratum	Indicator
RCG	H	FACW			

HYDROPHYTIC VEGETATION INDICATORS:
 % of dominants OBL, FACW, & FAC: very few rhizomes below 5"
 Check all indicators that apply and explain below: large patches of variegated reeds in vicinity

☐ Regional knowledge of plant communities	☒ Wetland plant list (nat'l or regional)
☐ Physiological or reproductive adaptations	☐ Morphological adaptations
☐ Technical Literature	☐ Wetland plant database
	☐ Other (explain)

Hydrophytic vegetation present? ☒ Yes ☐ No
 Rationale for decision/Remarks:

HYDROLOGY

Is it the growing season? ☒ Yes ☒ No Based on: 165. plant growth	Water Marks: ☐ Yes ☐ No Drift Lines: ☐ Yes ☐ No	Sediment Deposits: ☐ Yes ☐ No Drainage Patterns: ☐ Yes ☐ No
Depth of inundation: NA inches Depth to free water in pit: 3-5 inches Depth to saturated soil: to surface inches	Oxidized Root (live roots) Channels <12 in.: ☐ Yes ☐ No FAC Neutral: ☐ Yes ☐ No	Local Soil Survey: ☒ Yes ☐ No Water-stained Leaves: ☒ Yes ☐ No

Check all that apply & explain below: ☐ Stream, lake or gage data ☐ Aerial photographs ☐ Other	Other (explain):
--	------------------

Wetland hydrology present? ☒ Yes ☐ No
 Rationale for decision/remarks: Saturated conditions + veg + soils

SOILS

Map Unit Name (Series and Phase):

Drainage Class

Taxonomy (subgroup) *Mvkillito*Field observations confirm mapped type? ☐ Yes ☐ No**Profile Description**

Depth (inches)	Horizon	Matrix color (Munsell moist)	Mottle colors (Munsell moist)	Mottle abundance size and contrast	Texture, concretions, structure, etc.	Drawing of soil profile (match description)
0-0		10YR 3/1	NA	NA	granular 2-8mm	
5-10		10YR 3/1				
10-13		10YR 2/1				
13-16		10YR 2/2 XX 10YR 2/1 XX			see notes below	

Hydric Soil Indicators: (check all that apply)

- | | |
|--|---|
| ☐ Histosol | ☐ Concretions |
| ☐ Histic Epipedon | ☐ High Organic Content in Surface Layer of Sandy Soils |
| ☒ Sulfidic Odor | ☐ Organic Streaking in Sandy Soils |
| ☐ Aquic Moisture Regime | ☐ Listed on Local Hydric Soils List |
| ☐ Reducing Conditions | ☐ Listed on National Hydric Soils List |
| ☒ Gleyed or Low-Chroma (=1) matrix | ☐ Other (explain in remarks) |

Hydric soils present?☒ Yes ☐ No

Rationale for decision/Remarks:

*low chroma, odor***Wetland Determination**

- | | | |
|---|---|-----------------------------|
| Hydrophytic vegetation present? | ☒ Yes | ☐ No |
| Hydric soils present? | ☒ Yes | ☐ No |
| Wetland hydrology present? | ☒ Yes | ☐ No |
| Is the sampling point within a wetland? | ☒ Yes | ☐ No |

Rationale/Remarks:

NOTES:

* 13-16 sub-Angular - blocky - platy, very compacted
 ** 50% mixture of 10YR 2/2 and 50% 10YR 2/1 - layered

4" depth to
 yellow brown stain to water

26
 some anorthic drops
 high O-S very low down

organic layer
 9.5 - 11"

note chrom line @ 10"

Sulfur smell when first dug ped

NRES - matches low chroma - pasture spp.

DATA FORM 1
Routine Wetland Determination
(WA State Wetland Delineation Manual or
1987 Corps Wetland Delineation Manual)

Project/Site: Qwuloolt Marsh Applicant/owner: Tulalip Tribe of Indians Investigator(s): Paul Cereghino & Jo Gardiner, NOAA Restoration Center	Date: 12/01/05 County: Snohomish State: Washington S/T/R: S33-34 T30N R5E
Do normal circumstances exist on the site? ☒ Yes ☐ No Is the site significantly disturbed (atypical situation)? ☒ Yes ☐ No Is the area a potential problem area? ☐ Yes ☒ No Explanation of atypical or problem area: <i>historic pasture mgmt.</i>	Community ID: Transect ID: Plot ID: NOAA # 8 8

VEGETATION (For *strata, indicate T = tree; S = shrub; H = herb; V = vine)

Dominant Plant Species	*Stratum	Indicator	Dominant Plant Species	*Stratum	Indicator
PHACELIA		FACW			
ABROPYRON?		?			
CANADA THISTLE		FACW			

HYDROPHYTIC VEGETATION INDICATORS:

% of dominants OBL, FACW, & FAC:

Check all indicators that apply and explain below:

- | | |
|--|--|
| ☐ Regional knowledge of plant communities | ☒ Wetland plant list (nat'l or regional) |
| ☐ Physiological or reproductive adaptations | ☐ Morphological adaptations |
| ☐ Technical Literature | ☐ Wetland plant database |
| | ☐ Other (explain) |

Hydrophytic vegetation present? ☒ Yes ☐ No

Rationale for decision/Remarks: *prevalence of veg hydro*

HYDROLOGY

Is it the growing season? ☒ Yes ☒ No Based on: <i>obs. plant growth</i>	Water Marks: ☐ Yes ☐ No Drift Lines: ☐ Yes ☐ No	Sediment Deposits: ☐ Yes ☐ No Drainage Patterns: ☐ Yes ☐ No
Depth of inundation: <i>6"</i> inches	Oxidized Root (live roots) Channels <12 in.: ☐ Yes ☐ No	Local Soil Survey: ☒ Yes ☐ No
Depth to free water in pit: <i>5" - 9"</i> inches	FAC Neutral: ☐ Yes ☐ No	Water-stained Leaves: ☐ Yes ☐ No
Depth to saturated soil: <i>4"</i> inches		
Check all that apply & explain below: ☐ Stream, lake or gage data ☐ Aerial photographs ☐ Other	Other (explain):	

Wetland hydrology present? ☒ Yes ☐ No

Rationale for decision/remarks: *observed saturation + veg + soils*

SOILS

Map Unit Name (Series and Phase):

Drainage Class

Taxonomy (subgroup)

Field observations confirm mapped type? ☒ Yes ☐ No**Profile Description**

Depth (inches)	Horizon	Matrix color (Munsell moist)	Mottle colors (Munsell moist)	Mottle abundance size and contrast	Texture, concretions, structure, etc.	Drawing of soil profile (match description)
0-8		10YR 4/2		n/a	fine iron conc. trace 4-6"	
8-15		2.5Y 6/1	2.5YR 2.5/4	20% 1-6mm distinct		

Hydric Soil Indicators: (check all that apply)

- | | |
|--|---|
| ☐ Histosol | ☒ Concretions |
| ☐ Histic Epipedon | ☐ High Organic Content in Surface Layer of Sandy Soils |
| ☐ Sulfidic Odor | ☐ Organic Streaking in Sandy Soils |
| ☐ Aquic Moisture Regime | ☒ Listed on Local Hydric Soils List |
| ☐ Reducing Conditions | ☒ Listed on National Hydric Soils List |
| ☒ Gleyed or Low-Chroma (=1) matrix | ☐ Other (explain in remarks) |

Hydric soils present?

☒ Yes ☐ No

Rationale for decision/Remarks:

RMF @ 8" distinct (faint @ 4-6")

Wetland Determination

- | | | |
|---|---|-----------------------------|
| Hydrophytic vegetation present? | ☒ Yes | ☐ No |
| Hydric soils present? | ☒ Yes | ☐ No |
| Wetland hydrology present? | ☒ Yes | ☐ No |
| Is the sampling point within a wetland? | ☒ Yes | ☐ No |

Rationale/Remarks:

NOTES:

0-8 medium crumb some trace Fe conc. obs. @ 4-6"
8-15 coarse crumb to blocky
silt-loam

DATA FORM 1
Routine Wetland Determination
(WA State Wetland Delineation Manual or
1987 Corps Wetland Delineation Manual)

Project/Site: Qwuloolt Marsh		Date: 12/01/05	
Applicant/owner: Tulalip Tribe of Indians		County: Snohomish	
Investigator(s): Paul Cereghino & Jo Gardiner, NOAA Restoration Center		State: Washington	
		S/T/R: S33-34 T30N R5E	

Do normal circumstances exist on the site? ☒ Yes ☐ No Is the site significantly disturbed (atypical situation)? ☒ Yes ☐ No Is the area a potential problem area? ☐ Yes ☒ No Explanation of atypical or problem area: <i>historical pasture mgmt</i>	Community ID: Transect ID: Plot ID: <i>NOAA # 9</i>
---	---

VEGETATION (For *strata, indicate T = tree; S = shrub; H = herb; V = vine)

Dominant Plant Species	*Stratum	Indicator	Dominant Plant Species	*Stratum	Indicator
<i>AGROPYRON</i>		<i>?</i>			

HYDROPHYTIC VEGETATION INDICATORS:

% of dominants OBL, FACW, & FAC:

Check all indicators that apply and explain below:

☐ Regional knowledge of plant communities	☐ Wetland plant list (nat'l or regional)
☐ Physiological or reproductive adaptations	☐ Morphological adaptations
☐ Technical Literature	☐ Wetland plant database
	☐ Other (explain)

Hydrophytic vegetation present? ☐ Yes ☐ No *insufficient growth to ID*

Rationale for decision/Remarks:

HYDROLOGY

Is it the growing season? ☐ Yes ☒ No Based on:	Water Marks: ☐ Yes ☐ No Drift Lines: ☐ Yes ☐ No	Sediment Deposits: ☐ Yes ☐ No Drainage Patterns: ☐ Yes ☐ No
Depth of inundation: _____ inches Depth to free water in pit: <i>2</i> inches Depth to saturated soil: <i>0</i> inches	Oxidized Root (live roots) Channels <12h: ☐ Yes ☐ No FAC Neutral: ☐ Yes ☐ No	Local Soil Survey: ☒ Yes ☐ No Water-stained Leaves: ☐ Yes ☐ No

Check all that apply & explain below:

☐ Stream, lake or gage data ☐ Aerial photographs ☐ Other	Other (explain):
---	------------------

Wetland hydrology present? ☒ Yes ☐ No

Rationale for decision/remarks: *saturation @ 2"*

SOILS

Map Unit Name (Series and Phase):

Drainage Class

Field observations confirm mapped type? ☒ Yes ☐ No

Taxonomy (subgroup)

*Rjet***Profile Description**

Depth (Inches)	Horizon	Matrix color (Munsell moist)	Mottle colors (Munsell moist)	Mottle abundance size and contrast	Texture, concretions, structure, etc.	Drawing of soil profile (match description)
0-8	A1	10YR 4/2	none observed		med-coarse crumb	
8-14.5	A2	10YR 5/1	7.5YR 4/6		coarse crumb	

Hydric Soil Indicators: (check all that apply)

- ☐ Histosol
☐ Histic Epipedon
☐ Sulfidic Odor
☐ Aquic Moisture Regime
☐ Reducing Conditions
☒ Gleyed or Low-Chroma (=1) matrix
- ☒ Concretions
☐ High Organic Content in Surface Layer of Sandy Soils
☐ Organic Streaking in Sandy Soils
☒ Listed on Local Hydric Soils List
☒ Listed on National Hydric Soils List
☐ Other (explain in remarks)

Hydric soils present?

☒ Yes ☐ No

Rationale for decision/Remarks:

*AMF @ 8" low chroma***Wetland Determination**

Hydrophytic vegetation present?

☐ Yes ☐ No *UNK*

Hydric soils present?

☒ Yes ☐ No

Wetland hydrology present?

☒ Yes ☐ No

Is the sampling point within a wetland?

☒ Yes ☐ No*assumed pending veg*

Rationale/Remarks:

NOTES:*Pit 30' bearing 240° from stake (corrected)**Water seepage @ 9"**Pit depth - 14.5"**root penetration - whole depth**Structure - med-coarse crumb ↑ coarse @ 8" break**8-14" - black-orange + low chroma mottles 50% common - 1-5mm distinct**0-8" - no mottles observed**texture -**ribbon crack @ 1-2" silty clay loam some grit. silty clay**NRCS - pasture veg - conc @ 2"*

DATA FORM 1
Routine Wetland Determination
(WA State Wetland Delineation Manual or
1987 Corps Wetland Delineation Manual)

Project/Site: Qwuloolt Marsh		Date: 12/01/05
Applicant/owner: Tulalip Tribe of Indians		County: Snohomish
Investigator(s): Paul Cereghino & Jo Gardiner, NOAA Restoration Center		State: Washington
		S/T/R: S33-34 T30N R5E

Do normal circumstances exist on the site? ☒ Yes ☐ No Is the site significantly disturbed (atypical situation)? ☒ Yes ☐ No Is the area a potential problem area? ☐ Yes ☒ No Explanation of atypical or problem area: <i>historic pasture mgmt</i>	Community ID: Transect ID: <i>11:36 am</i> Plot ID: <i>#10</i>
---	--

VEGETATION (For *strata, indicate T = tree; S = shrub; H = herb; V = vine)

Dominant Plant Species	*Stratum	Indicator	Dominant Plant Species	*Stratum	Indicator
<i>Phalaris</i>		<i>FACW</i>			
<i>some thistle</i>					
<i>sp?!</i>					

HYDROPHYTIC VEGETATION INDICATORS:

% of dominants OBL, FACW, & FAC:

Check all indicators that apply and explain below:

☐ Regional knowledge of plant communities	☒ Wetland plant list (nat'l or regional)
☐ Physiological or reproductive adaptations	☐ Morphological adaptations
☐ Technical Literature	☐ Wetland plant database
	☐ Other (explain)

Hydrophytic vegetation present? ☒ Yes ☐ No

Rationale for decision/Remarks: *prevalence of spp. hydro.*

HYDROLOGY

Is it the growing season? ☒ Yes ☒ No Based on: <i>obs plant growth</i>	Water Marks: ☐ Yes ☐ No Drift Lines: ☐ Yes ☐ No	Sediment Deposits: ☐ Yes ☐ No Drainage Patterns: ☐ Yes ☐ No
Depth of inundation: <i>0"</i> inches Depth to free water in pit: <i>2"</i> inches Depth to saturated soil: <i>0"</i> inches	Oxidized Root (live roots) Channels <12h.: ☒ Yes ☐ No FAC Neutral: ☐ Yes ☐ No	Local Soil Survey: ☒ Yes ☐ No Water-stained Leaves: ☐ Yes ☐ No
Check all that apply & explain below: ☐ Stream, lake or gage data ☐ Aerial photographs ☐ Other	Other (explain):	

Wetland hydrology present? ☒ Yes ☐ No

Rationale for decision/remarks: *Saturated soils + oxidized root pores*

SOILS

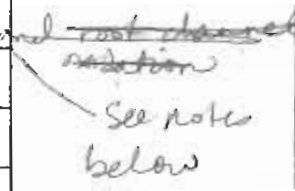
Map Unit Name (Series and Phase) :

Drainage Class

Field observations confirm mapped type? ☐ Yes ☐ No

Taxonomy (subgroup)

Profile Description

Depth (inches)	Horizon	Matrix color (Munsell moist)	Mottle colors (Munsell moist)	Mottle abundance size and contrast	Texture, concretions, structure, etc.	Drawing of soil profile (match description)
0-9		10YR 4/2	10YR 6/1 depletions	1-3 mm 15-20%	roots (lots of) some depletion	
9-16		10YR 4/2	7.5 YR 6/6 concretions			

Hydric Soil Indicators: (check all that apply)

- | | |
|---|---|
| ☐ Histosol | ☒ Concretions |
| ☐ Histic Epipedon | ☐ High Organic Content in Surface Layer of Sandy Soils |
| ☐ Sulfidic Odor | ☐ Organic Streaking in Sandy Soils |
| ☐ Aquic Moisture Regime | ☐ Listed on Local Hydric Soils List |
| ☐ Reducing Conditions | ☐ Listed on National Hydric Soils List |
| ☐ Gleyed or Low-Chroma (=1) matrix | ☐ Other (explain in remarks) |

Hydric soils present?

☒ Yes ☐ No

Rationale for decision/Remarks:

RMFC 9"

Wetland Determination

- | | | |
|---|---|-----------------------------|
| Hydrophytic vegetation present? | ☒ Yes | ☐ No |
| Hydric soils present? | ☒ Yes | ☐ No |
| Wetland hydrology present? | ☒ Yes | ☐ No |
| Is the sampling point within a wetland? | ☒ Yes | ☐ No |

Rationale/Remarks:

NOTES:

0-9 fine crumb structure, roots, no obvious mottling

7.5 YR 6/6 for concretions

9-16 coarse blocky (structure changes)

root pore oxidation

mottling

no smell

NRCS - pasture reg
RMFC 5"

Saturated to surface; water appear 2" below surface

0-9 texture clay loam
9-16 texture clay loam

DATA FORM 1
Routine Wetland Determination
(WA State Wetland Delineation Manual or
1987 Corps Wetland Delineation Manual)

Project/Site: Qwuloolt Marsh		Date: 12/01/05	
Applicant/owner: Tulalip Tribe of Indians		County: Snohomish	
Investigator(s): Paul Cereghino & Jo Gardiner, NOAA Restoration Center <i>Alison</i>		State: Washington	
		S/T/R: S33-34 T30N R5E	

Do normal circumstances exist on the site? ☒ Yes ☐ No	Community ID:
Is the site significantly disturbed (atypical situation)? ☒ Yes ☐ No	Transect ID: 152 pm
Is the area a potential problem area? ☐ Yes ☒ No	Plot ID: #11
Explanation of atypical or problem area: <i>historic pasture mgmt</i>	

VEGETATION (For *strata, indicate T = tree; S = shrub; H = herb; V = vine)

Dominant Plant Species	*Stratum	Indicator	Dominant Plant Species	*Stratum	Indicator
<i>Phalaris!!</i>			<i>As far as the eye can see!</i>		
		<i>FACW</i>			

HYDROPHYTIC VEGETATION INDICATORS:

% of dominants OBL, FACW, & FAC:

Check all indicators that apply and explain below:

☐ Regional knowledge of plant communities	☒ Wetland plant list (nat'l or regional)
☐ Physiological or reproductive adaptations	☐ Morphological adaptations
☐ Technical Literature	☐ Wetland plant database
	☐ Other (explain)

Hydrophytic vegetation present? ☒ Yes ☐ No

Rationale for decision/Remarks: *prevalence of sp. hydroic*

HYDROLOGY

Is it the growing season? ☒ Yes ☒ No	Water Marks: ☐ Yes ☐ No	Sediment Deposits: ☐ Yes ☐ No
Based on: <i>obs plant growth</i>	Drift Lines: ☐ Yes ☐ No	Drainage Patterns: ☐ Yes ☐ No
Depth of inundation: inches	Oxidized Root (live roots)	Local Soil Survey: ☒ Yes ☐ No
	Channels <12 in.: ☐ Yes ☐ No	
Depth to free water in pit: <i>3"</i> inches	FAC Neutral: ☐ Yes ☐ No	Water-stained Leaves: ☐ Yes ☐ No
Depth to saturated soil: <i>0"</i> inches		
Check all that apply & explain below:	Other (explain):	
☐ Stream, lake or gage data		
☐ Aerial photographs		
☐ Other		

Wetland hydrology present? ☒ Yes ☐ No

Rationale for decision/remarks: *saturation + soils + veg*

SOILS

Map Unit Name (Series and Phase):

Drainage Class

Field observations confirm mapped type? ☒ Yes ☐ No

Taxonomy (subgroup)

*perjet***Profile Description**

Depth (inches)	Horizon	Matrix color (Munsell moist)	Mottle colors (Munsell moist)	Mottle abundance size and contrast	Texture, concretions, structure, etc.	Drawing of soil profile (match description)
0-5		10YR 4/2			med-fine crumb	
5-10		see below	see below	25% 75% Red: Grey	medium blocky	
10-15		2.5Y 4/1	2.5YR 3/4 Red	25 Red: 75 Grey	med-fine blocky	

Hydric Soil Indicators: (check all that apply)

- ☐ Histosol
☐ Histic Epipedon
☐ Sulfidic Odor
☐ Aquic Moisture Regime
☐ Reducing Conditions
☒ Gleyed or Low-Chroma (=1) matrix
- ☒ Concretions
☐ High Organic Content in Surface Layer of Sandy Soils
☐ Organic Streaking in Sandy Soils
☒ Listed on Local Hydric Soils List
☒ Listed on National Hydric Soils List
☐ Other (explain in remarks)

Hydric soils present?☒ Yes ☐ No

Rationale for decision/Remarks:

*RMF @ 5" + Soil type***Wetland Determination**

- Hydrophytic vegetation present? ☒ Yes ☐ No
 Hydric soils present? ☒ Yes ☐ No
 Wetland hydrology present? ☒ Yes ☐ No
 Is the sampling point within a wetland? ☒ Yes ☐ No

Rationale/Remarks:

NOTES:*saturated to 25" from surface**water in pit at 3" from surface**Pit depth 15"**Roots throughout ped**clay loam**5-10" ~~matrix colors~~**2.5Y 6/1**5YR 5/6**Hard to tell matrix from Mottles ∴ Identify 2 colors in 5-10"**10-15"**Probably could say 75% = Matrix*

DATA FORM 1
Routine Wetland Determination
(WA State Wetland Delineation Manual or
1987 Corps Wetland Delineation Manual)

09:37
12/01/05 3/16/06

Project/Site: Qwuloolt Marsh	Date: 12/01/05 3/16/06
Applicant/owner: Tulalip Tribe of Indians	County: Snohomish
Investigator(s): Paul Cereghino & Jo Gardiner, NOAA Restoration Center	State: Washington
	S/T/R: S33-34 T30N R5E

Do normal circumstances exist on the site? ☒ Yes ☐ No	Community ID:
Is the site significantly disturbed (atypical situation)? ☒ Yes ☐ No	Transect ID: 13
Is the area a potential problem area? ☐ Yes ☒ No	Plot ID: #13 NRCS
Explanation of atypical or problem area: historic pasture mgmt	

VEGETATION (For *strata, indicate T = tree; S = shrub; H = herb; V = vine)					
Dominant Plant Species	*Stratum	Indicator	Dominant Plant Species	*Stratum	Indicator
unknown grass broad leaf, tufted			oat-like clumping sedge		(5%)
unknown grass narrow leaf, tufted (30%)			oat-like clumping hairy sedge		~10%
Thistle - scattered throughout site			(Trace)		
Phalaris amabilis (20%)		FACW			
AGR STD (30%)	T	FAC+	poa spp (5%)		
Ranunculus repens trace					

HYDROPHYTIC VEGETATION INDICATORS: no native grass stems to attempt ID.

% of dominants OBL, FACW, & FAC:

Check all indicators that apply and explain below:

☐ Regional knowledge of plant communities	☐ Wetland plant list (nat'l or regional)
☐ Physiological or reproductive adaptations	☐ Morphological adaptations
☐ Technical Literature	☐ Wetland plant database
	☐ Other (explain)

Hydrophytic vegetation present? ☒ Yes ☐ No

Rationale for decision/Remarks: named based on PHALARIS + historic atypical

HYDROLOGY

Is it the growing season? ☒ Yes ☒ No	Water Marks: ☐ Yes ☐ No	Sediment Deposits: ☐ Yes ☐ No
Based on: obs. plant growth	Drift Lines: ☐ Yes ☐ No	Drainage Patterns: ☐ Yes ☐ No
Depth of inundation: 1/2 inches	Oxidized Root (live roots) Channels <12 in.: ☒ Yes ☐ No	Local Soil Survey: ☒ Yes ☐ No
Depth to free water in pit: NA inches	FAC Neutral: ☐ Yes ☐ No	Water-stained Leaves: ☐ Yes ☐ No
Depth to saturated soil: NA inches		
Check all that apply & explain below:	Other (explain):	
☐ Stream, lake or gage data		
☐ Aerial photographs		
☐ Other		

Wetland hydrology present? ☒ Yes ☐ No

Rationale for decision/remarks: oxidized root channels - previously obs. hydro.

⊕ Festuca arundinacea (likely) poa side view

SOILS

Map Unit Name (Series and Phase):

Drainage Class

Taxonomy (subgroup)

Field observations confirm mapped type? ☐ Yes ☐ No**Profile Description**

Depth pit = 20"

Depth (inches)	Horizon	Matrix color (Munsell moist)	Mottle colors (Munsell moist)	Mottle abundance size and contrast	Texture, concretions, structure, etc.	Drawing of soil profile (match description)
0-4		10YR 4/2			no relax features Crumb 1-4 mm	
4-10		2.5Y 4/2	2.5Y 5/1	5% low chroma mottles, 2-10 mm*	Crumb structure 1-6 mm	
10-18		2.5Y 5/1			low chroma matrix oxidized root pores***	

Hydric Soil Indicators: (check all that apply)

- ☐ Histosol
☐ Histic Epipedon
☐ Sulfidic Odor
☐ Aquic Moisture Regime
☒ Reducing Conditions
☒ Gleyed or Low-Chroma (=1) matrix

- ☒ Concretions 1 mm
☐ High Organic Content in Surface Layer of Sandy Soils
☐ Organic Streaking in Sandy Soils
☒ Listed on Local Hydric Soils List
☐ Listed on National Hydric Soils List
☐ Other (explain in remarks) oxidized root channels

Hydric soils present?

☒ Yes ☐ No

Rationale for decision/Remarks:

Relax features and clay, mottle soil

Wetland Determination

Hydrophytic vegetation present?

☒ Yes ☐ No

Hydric soils present?

☒ Yes ☐ No

Wetland hydrology present?

☒ Yes ☐ No

Is the sampling point within a wetland?

☒ Yes ☐ No

hydrology flux in early season (edge site)

Rationale/Remarks:

NOTES:

note: on 3/13/06 @ this site water in pit @ 12" no data recorded on that day observational day only

* trace concentrations (of mottles)

** oxid. root pores very prominent

*** 5YR 5/8 = color of oxidized root pores, ^{mottles} ~10% of matrix

4-10 = clay

DATA FORM 1
Routine Wetland Determination
(WA State Wetland Delineation Manual or
1987 Corps Wetland Delineation Manual)

6/2/04

Project/Site: Qwuloolt Marsh	Date: 12/01/05
Applicant/owner: Tulalip Tribe of Indians	County: Snohomish
Investigator(s): Paul Cereghino & John Gardner, NOAA Restoration Center	State: Washington
	S/T/R: S33-34 T30N R5E

Do normal circumstances exist on the site? ☒ Yes ☐ No	Community ID:
Is the site significantly disturbed (atypical situation)? ☐ Yes ☐ No	Transect ID:
Is the area a potential problem area? ☐ Yes ☒ No	Plot ID: 12
Explanation of atypical or problem area: <i>NO</i>	48 03890 122.15894

VEGETATION (For *strata, indicate T = tree; S = shrub; H = herb; V = vine)

Dominant Plant Species	*Stratum	Indicator	Dominant Plant Species	*Stratum	Indicator
<i>SPARGANGLER</i>		<i>FACW</i>			
<i>ALYSSUM</i>		<i>NI</i>			
<i>2005- FACW</i>					
<i>CHICKWEED</i>					
<i>GALLUM</i>					

HYDROPHYTIC VEGETATION INDICATORS:

% of dominants OBL, FACW, & FAC: *80% OBL, 55% OBL, 20% FACW, 20% FAC, 5% OBL*

Check all indicators that apply and explain below:

- | | |
|---|--|
| ☒ Regional knowledge of plant communities | ☒ Wetland plant list (nat'l or regional) |
| ☐ Physiological or reproductive adaptations | ☐ Morphological adaptations |
| ☐ Technical Literature | ☐ Wetland plant database |
| | ☐ Other (explain) |

Hydrophytic vegetation present? ☒ Yes ☐ No

Rationale for decision/Remarks: *prevalence of spp hydro*

HYDROLOGY

Is it the growing season? ☒ Yes ☒ No	Water Marks: ☐ Yes ☒ No	Sediment Deposits: ☐ Yes ☐ No
Based on:	Drift Lines: ☐ Yes ☒ No	Drainage Patterns: ☐ Yes ☐ No
Depth of inundation: 0 inches	Oxidized Root (live roots) Channels <12 in.: ☒ Yes ☐ No	Local Soil Survey: ☒ Yes ☐ No
Depth to free water in pit: 9 inches	FAC Neutral: ☐ Yes ☐ No	Water-stained Leaves: ☐ Yes ☒ No
Depth to saturated soil: 4 inches		
Check all that apply & explain below: ☐ Stream, lake or gage data ☐ Aerial photographs ☐ Other	Other (explain):	

Wetland hydrology present? ☒ Yes ☐ No

Rationale for decision/remarks: *SOIL SURVEY - OBSERVED SATURATION - OXIDIZED ROOT CHANNELS*

SOILS

Map Unit Name (Series and Phase) :

Drainage Class

Field observations confirm mapped type? ☒ Yes ☐ No

Taxonomy (subgroup)

POSSIBLE SALT CLAY LOGAN

Profile Description

Depth (inches)	Horizon	Matrix color (Munsell moist)	Mottle colors (Munsell moist)	Mottle abundance size and contrast	Texture, concretions, structure, etc.	Drawing of soil profile (match description)
0-4	A	2.5YR 3/2			CRUMBLY, STAIN OXID.	
4-11	A	2.5Y 4/2 TO 10YR 4/2	5YR 5/4	< 10%, 1-3 mm	CRUMBLY W/ SPORADIC OF ORANGE, CRUMBLY 1-5 mm	
11-16	A	2.5Y 4/1	5YR 4/10	ON POC FINE ALUM. FIBERS. 5% UP TO 10 mm	BLuish MUDCLAY, POC M. SQUEEZING, LOW CHROMA, ROOT ROTS, REDOX FEATURES	

Hydric Soil Indicators: (check all that apply)

- ☐ Histosol
☐ Histic Epipedon
☐ Sulfidic Odor
☐ Aquic Moisture Regime
☐ Reducing Conditions
☒ Gleyed or Low-Chroma (=1) matrix
- ☒ Concretions
☐ High Organic Content in Surface Layer of Sandy Soils
☐ Organic Streaking in Sandy Soils
☐ Listed on Local Hydric Soils List
☐ Listed on National Hydric Soils List
☐ Other (explain in remarks)

Hydric soils present?

☒ Yes ☐ No

Rationale for decision/Remarks:

REDOX FEATURES @ > 4" DEPTH

Wetland Determination

Hydrophytic vegetation present?

☒ Yes ☐ No

Hydric soils present?

☒ Yes ☐ No ON EDGE

Wetland hydrology present?

☒ Yes ☐ No

Is the sampling point within a wetland?

☒ Yes ☐ No

Rationale/Remarks:

NOTES:

NRCS - ALUMINUM also present
RMF @ 3"

DATA FORM 1
Routine Wetland Determination
(WA State Wetland Delineation Manual or
1987 Corps Wetland Delineation Manual)

Project/Site: Qwuloolt Marsh		Date: 12/01/05 3/16/06
Applicant/owner: Tulalip Tribe of Indians <i>Polly Hicks</i>		County: Snohomish
Investigator(s): Paul Cereghino & Jo Gardner NOAA Restoration Center		State: Washington
		S/T/R: S33-34 T30N R5E

Do normal circumstances exist on the site? ☒ Yes ☐ No Is the site significantly disturbed (atypical situation)? ☒ Yes ☐ No Is the area a potential problem area? ☐ Yes ☒ No Explanation of atypical or problem area: <i>historic pasture mgmt</i>	Community ID: <i>note: state gone</i> Transect ID: Plot ID: <i>#14 NRCS</i>
---	---

VEGETATION (For *strata, indicate T = tree; S = shrub; H = herb; V = vine)

Dominant Plant Species	*Stratum	Indicator	Dominant Plant Species	*Stratum	Indicator
<i>Ursium</i>	<i>Pool</i>	<i>100%</i>	<i>Stalks</i>	<i>10%</i>	
<i>Phalaris arundinacea</i>		<i>10%</i>			
<i>POA</i>		<i>10%</i>			
<i>litter layer</i>		<i>50%</i>			
<i>Broad leaf unknown</i>		<i>(POA ?)</i>			

HYDROPHYTIC VEGETATION INDICATORS:

% of dominants OBL, FACW, & FAC: *> in PHAARU cover*

Check all indicators that apply and explain below:

☒ Regional knowledge of plant communities	☐ Wetland plant list (nat'l or regional)
☐ Physiological or reproductive adaptations	☐ Morphological adaptations
☐ Technical Literature	☐ Wetland plant database
	☐ Other (explain)

Hydrophytic vegetation present? ☒ Yes ☐ No

Rationale for decision/Remarks: *expanding PHAARU + adjacent veg*

HYDROLOGY

Is it the growing season? ☐ Yes ☒ No Based on:	Water Marks: ☐ Yes ☐ No Drift Lines: ☒ Yes ☐ No	Sediment Deposits: ☐ Yes ☐ No Drainage Patterns: ☐ Yes ☐ No
Depth of inundation: inches Depth to free water in pit: inches Depth to saturated soil: inches	Oxidized Root (live roots) Channels <12 in.: ☒ Yes ☐ No FAC Neutral: ☐ Yes ☐ No	Local Soil Survey: ☒ Yes ☐ No Water-stained Leaves: ☒ Yes ☐ No

Check all that apply & explain below:

☐ Stream, lake or gage data ☐ Aerial photographs ☐ Other	Other (explain): <i>rocked litter all around</i>
---	--

Wetland hydrology present? ☒ Yes ☐ No

Rationale for decision/remarks:

SOILS

Map Unit Name (Series and Phase):

Drainage Class

Field observations confirm mapped type? ☐ Yes ☐ No

Taxonomy (subgroup)

Profile Description

total depth 13" didn't get deep due to inundation

Depth (inches)	Horizon	Matrix color (Munsell moist)	Mottle colors (Munsell moist)	Mottle abundance size and contrast	Texture, concretions, structure, etc.	Drawing of soil profile (match description)
0-3		10 YR 3/2			crumb	
3-7		10 YR 3/2			crumb	
7-13		60 40 2.5Y 5/1 2.5Y 5/2	darkest 5YR 4/6	coarse distinct 5-20 mm 10%	subangular blocky	
			5YR 5/8	40%		

Hydric Soil Indicators: (check all that apply)

- ☐ Histosol
☐ Histic Epipedon
☐ Sulfidic Odor
☒ Aquic Moisture Regime
☐ Reducing Conditions
☒ Gleyed or Low-Chroma (=1) matrix
- Mg - concretions
- ☒ Concretions
☐ High Organic Content in Surface Layer of Sandy Soils
☐ Organic Streaking in Sandy Soils
☒ Listed on Local Hydric Soils List
☒ Listed on National Hydric Soils List
☐ Other (explain in remarks)

Hydric soils present?☒ Yes ☐ No

Rationale for decision/Remarks:

RMF @ 7"

Wetland Determination

- Hydrophytic vegetation present? ☒ Yes ☐ No
Hydric soils present? ☒ Yes ☐ No
Wetland hydrology present? ☒ Yes ☐ No
Is the sampling point within a wetland? ☒ Yes ☐ No

Rationale/Remarks:

NOTES:

MCS - KMF @ surface?

DATA FORM 1
Routine Wetland Determination
(WA State Wetland Delineation Manual or
1987 Corps Wetland Delineation Manual)

Project/Site: Qwuloolt Marsh		Date: 12/01/05 3/16/06
Applicant/owner: Tulalip Tribe of Indians <i>Polley Hicks</i>		County: Snohomish
Investigator(s): Paul Cereghino & Jo Gardiner, NOAA Restoration Center		State: Washington
		S/T/R: S33-34 T30N R5E
Do normal circumstances exist on the site?	☒ Yes ☐ No	Community ID: Transect ID: Plot ID: #15 N R C S
Is the site significantly disturbed (atypical situation)?	☒ Yes ☐ No	
Is the area a potential problem area?	☐ Yes ☒ No	
Explanation of atypical or problem area: <i>historic pasture + mowing</i>		
VEGETATION (For *strata, indicate T = tree; S = shrub; H = herb; V = vine)		
Dominant Plant Species	*Stratum	Indicator
<i>Phalaris arundinacea</i>		<i>FACW</i>
HYDROPHYTIC VEGETATION INDICATORS:		
% of dominants OBL, FACW, & FAC:		
Check all indicators that apply and explain below:		
☐ Regional knowledge of plant communities	☒ Wetland plant list (nat'l or regional)	
☐ Physiological or reproductive adaptations	☐ Morphological adaptations	
☐ Technical Literature	☐ Wetland plant database	
	☐ Other (explain)	
Hydrophytic vegetation present? ☒ Yes ☐ No		
Rationale for decision/Remarks: <i>Phalaris arundinacea dominant sp.</i>		
HYDROLOGY		
Is it the growing season? ☒ Yes ☒ No	Water Marks: ☐ Yes ☐ No	Sediment Deposits: ☐ Yes ☐ No
Based on: <i>obs plant growth</i>	Drift Lines: ☐ Yes ☐ No	Drainage Patterns: ☐ Yes ☐ No
Depth of inundation: <i>~1" over surface</i> inches	Oxidized Root (live roots)	Local Soil Survey: ☒ Yes ☐ No
Depth to free water in pit: <i>w/in 4" of surface after 2 minutes</i> inches	Channels <12 in.: ☐ Yes ☐ No	Water-stained Leaves: ☒ Yes ☐ No
Depth to saturated soil: <i>surface</i> inches	FAC Neutral: ☐ Yes ☐ No	
Check all that apply & explain below:	Other (explain):	
☐ Stream, lake or gage data	<i>walking thru drift lines</i>	
☐ Aerial photographs	<i>standing water everywhere</i>	
☐ Other		
Wetland hydrology present? ☒ Yes ☐ No		
Rationale for decision/remarks: <i>standing water all around</i>		

*Note saturated ~1" above surface when stepping in area
thatch layer*

SOILS

Map Unit Name (Series and Phase):

Drainage Class

Field observations confirm mapped type? ☐ Yes ☐ No

Taxonomy (subgroup)

Profile Description

Depth (inches)	Horizon	Matrix color (Munsell moist)	Mottle colors (Munsell moist)	Mottle abundance size and contrast	Texture, concretions, structure, etc.	Drawing of soil profile (match description)
these colors make up the entire matrix		10YR 5/1				
		10YR 5/3	10YR 5/8	trace []s		
			↑			
			this is the predom. mottle color			
~0-6"						

Hydric Soil Indicators: (check all that apply)

- | | |
|--|---|
| ☐ Histosol | ☐ Concretions |
| ☐ Histic Epipedon | ☐ High Organic Content in Surface Layer of Sandy Soils |
| ☒ Sulfidic Odor | ☐ Organic Streaking in Sandy Soils |
| ☐ Aquic Moisture Regime | ☒ Listed on Local Hydric Soils List |
| ☒ Reducing Conditions | ☐ Listed on National Hydric Soils List |
| ☒ Gleyed or Low-Chroma (=1) matrix | ☐ Other (explain in remarks) |

Hydric soils present?

☒ Yes ☐ No

Rationale for decision/Remarks:

RMF @ surface

Wetland Determination

- | | | |
|---|---|-----------------------------|
| Hydrophytic vegetation present? | ☒ Yes | ☐ No |
| Hydric soils present? | ☒ Yes | ☐ No |
| Wetland hydrology present? | ☒ Yes | ☐ No |
| Is the sampling point within a wetland? | ☒ Yes | ☐ No |

Rationale/Remarks:

NOTES:

all soil column mottled

[] = concentration

no oxidized root pores

shallow pit due to inundation

DATA FORM 1
Routine Wetland Determination
 (WA State Wetland Delineation Manual or
 1987 Corps Wetland Delineation Manual)

Wetland = 15.75%
 12/01/05

Project/Site: Qwuloolt Marsh	Date: 12/01/05 3/16/06
Applicant/owner: Tulalip Tribe of Indians	County: Snohomish
Investigator(s): Paul Cereghino & Jo Gardiner, NOAA Restoration Center	State: Washington
	S/T/R: S33-34 T30N R5E
Do normal circumstances exist on the site? ☒ Yes ☐ No	Community ID:
Is the site significantly disturbed (atypical situation)? ☒ Yes ☐ No	Transect ID:
Is the area a potential problem area? ☐ Yes ☒ No	Plot ID: #16 NRCS
Explanation of atypical or problem area: pasture mgt.	

VEGETATION (For *strata, indicate T = tree; S = shrub; H = herb; V = vine)					
Dominant Plant Species	*Stratum	Indicator	Dominant Plant Species	*Stratum	Indicator
Phalaris arundinacea		FACW			

HYDROPHYTIC VEGETATION INDICATORS:

% of dominants OBL, FACW, & FAC:

Check all indicators that apply and explain below:

☐ Regional knowledge of plant communities	☒ Wetland plant list (nat'l or regional)
☐ Physiological or reproductive adaptations	☐ Morphological adaptations
☐ Technical Literature	☐ Wetland plant database
	☐ Other (explain)

Hydrophytic vegetation present? ☒ Yes ☐ No

Rationale for decision/Remarks:

HYDROLOGY

Is it the growing season? ☒ Yes ☒ No	Water Marks: ☐ Yes ☐ No	Sediment Deposits: ☐ Yes ☐ No
Based on: obs. plant growth	Drift Lines: ☐ Yes ☐ No	Drainage Patterns: ☐ Yes ☐ No
Depth of inundation: 5" inches	Oxidized Root (live roots) Channels <12 in.: ☒ Yes ☐ No	Local Soil Survey: ☒ Yes ☐ No
Depth to free water in pit: inches	FAC Neutral: ☐ Yes ☐ No	Water-stained Leaves: ☒ Yes ☐ No
Depth to saturated soil: inches		

Check all that apply & explain below:

☐ Stream, lake or gage data ☐ Aerial photographs ☐ Other	Other (explain): rock mountains - rock material everywhere
---	---

Wetland hydrology present? ☒ Yes ☐ No

Rationale for decision/remarks: standing water

SOILS

Map Unit Name (Series and Phase) :

Drainage Class

Field observations confirm mapped type? ☒ Yes ☐ No

Taxonomy (subgroup)

Profile Description

Red 8" due to inundation puget

Depth (inches)	Horizon	Matrix color (Munsell moist)	Mottle colors (Munsell moist)	Mottle abundance size and contrast	Texture, concretions, structure, etc.	Drawing of soil profile (match description)
0-6		7.5YR 3/4*			no redox features Crumb	
6-8		10YR 4/1	2.5YR 3/4	50% 2-5 cm	redox features mottles oxidized rootpores	
					subangular blocky structure	

Hydric Soil Indicators: (check all that apply)

- | | |
|---|---|
| ☐ Histosol | ☐ Concretions |
| ☐ Histic Epipedon | ☐ High Organic Content in Surface Layer of Sandy Soils |
| ☒ Sulfidic Odor | ☐ Organic Streaking in Sandy Soils |
| ☐ Aquic Moisture Regime | ☒ Listed on Local Hydric Soils List |
| ☐ Reducing Conditions | ☐ Listed on National Hydric Soils List |
| ☐ Gleyed or Low-Chroma (=1) matrix | ☐ Other (explain in remarks) |

Hydric soils present?

☒ Yes ☐ No

Rationale for decision/Remarks:

redox feature low chroma odor

Wetland Determination

- | | | |
|---|---|-----------------------------|
| Hydrophytic vegetation present? | ☒ Yes | ☐ No |
| Hydric soils present? | ☒ Yes | ☐ No |
| Wetland hydrology present? | ☒ Yes | ☐ No |
| Is the sampling point within a wetland? | ☒ Yes | ☐ No |

Rationale/Remarks:

NOTES:

* 7.5YR 3/1 50%

Between the 2 layers goes from crumb like layer to
sub angular blocky structure

DATA FORM 1
Routine Wetland Determination
(WA State Wetland Delineation Manual or
1987 Corps Wetland Delineation Manual)

Project/Site: Qwuloolt Marsh		Date: 12/01/05 3/16/06
Applicant/owner: Tulalip Tribe of Indians <i>Polly Hulse</i>		County: Snohomish
Investigator(s): Paul Cereghino & Jo Gardiner, NOAA Restoration Center		State: Washington
		S/T/R: S33-34 T30N R5E

Do normal circumstances exist on the site?	☒ Yes	☐ No	Community ID:
Is the site significantly disturbed (atypical situation)?	☒ Yes	☐ No	Transect ID:
Is the area a potential problem area?	☐ Yes	☒ No	Plot ID: NRCs # 17
Explanation of atypical or problem area: <i>historic agricult. develop.</i>			

VEGETATION (For *strata, indicate T = tree; S = shrub; H = herb; V = vine)

Dominant Plant Species	*Stratum	Indicator	Dominant Plant Species	*Stratum	Indicator
<i>Phalaris mund.</i>	80% H	FACW			
<i>litter</i>	20%				

HYDROPHYTIC VEGETATION INDICATORS:

% of dominants OBL, FACW, & FAC:

Check all indicators that apply and explain below:

☒ Regional knowledge of plant communities	☒ Wetland plant list (nat'l or regional)
☐ Physiological or reproductive adaptations	☐ Morphological adaptations
☐ Technical Literature	☐ Wetland plant database
	☐ Other (explain)

Hydrophytic vegetation present? ☒ Yes ☐ No *ECG macro culture*

Rationale for decision/Remarks:

HYDROLOGY

Is it the growing season? ☒ Yes ☒ No	Water Marks: ☐ Yes ☐ No	Sediment Deposits: ☐ Yes ☐ No
Based on: <i>obs plant growth</i>	Drift Lines: ☒ Yes ☐ No	Drainage Patterns: ☐ Yes ☐ No
Depth of inundation: <i>0</i> inches	Oxidized Root (live roots) Channels <12 in.: ☒ Yes ☐ No	Local Soil Survey: ☒ Yes ☐ No
Depth to free water in pit: <i>5</i> inches	FAC Neutral: ☐ Yes ☐ No	Water-stained Leaves: ☒ Yes ☐ No
Depth to saturated soil: <i>surface</i> inches		

Check all that apply & explain below:

☐ Stream, lake or gage data	Other (explain):
☐ Aerial photographs	
☐ Other	

Wetland hydrology present? ☒ Yes ☐ No

Rationale for decision/remarks: *depth to water*

SOILS

Map Unit Name (Series and Phase):

Drainage Class

Field observations confirm mapped type? ☒ Yes ☐ No

Taxonomy (subgroup)

*perjet***Profile Description**

Depth (inches)	Horizon	Matrix color (Munsell moist)	Mottle colors (Munsell moist)	Mottle abundance size and contrast	Texture, concretions, structure, etc.	Drawing of soil profile (match description)
0-8		7.5YR 4/1			Crumb	
8-13	<i>matrix →</i>	5Y 5/1	2.5Y 4/1	5YR 2.5/2 7.5YR 5/4 ~50%	crumb → angular blocky	
13-15**		Black.				
15-17*		7.5YR 5/1	2.5YR 3/4		sub angular blocky	

Hydric Soil Indicators: (check all that apply)

- | | |
|--|---|
| ☐ Histosol | ☒ Concretions |
| ☐ Histic Epipedon | ☐ High Organic Content in Surface Layer of Sandy Soils |
| ☐ Sulfidic Odor | ☐ Organic Streaking in Sandy Soils |
| ☐ Aquic Moisture Regime | ☒ Listed on Local Hydric Soils List |
| ☐ Reducing Conditions | ☐ Listed on National Hydric Soils List |
| ☒ Gleyed or Low-Chroma (=1) matrix | ☐ Other (explain in remarks) |

Hydric soils present?

☒ Yes ☐ No

Rationale for decision/Remarks:

*low chroma <10" depth w/ Fe cnc.***Wetland Determination**

- | | | |
|---|---|-----------------------------|
| Hydrophytic vegetation present? | ☒ Yes | ☐ No |
| Hydric soils present? | ☒ Yes | ☐ No |
| Wetland hydrology present? | ☒ Yes | ☐ No |
| Is the sampling point within a wetland? | ☒ Yes | ☐ No |

Rationale/Remarks:

NOTES:

*-x bottom layer. Fe concentration on red surface. ~70%
interior of ped low chroma w/ Fe cnc.
only in foot pores.*

** * low chroma immediately above black*

NRCS - RMFE 4", pasture veg

DATA FORM 1
Routine Wetland Determination
(WA State Wetland Delineation Manual or
1987 Corps Wetland Delineation Manual)

6/2/06

Project/Site: Qwuloolt Marsh Applicant/owner: Tulalip Tribe of Indians <i>Nancy Lau</i> Investigator(s): Paul Cereghino & Jo Gardiner, NOAA Restoration Center	Date: <u>12/04/05</u> County: Snohomish State: Washington S/T/R: S33-34 T30N R5E
Do normal circumstances exist on the site? ☒ Yes ☐ No Is the site significantly disturbed (atypical situation)? ☒ Yes ☐ No Is the area a potential problem area? ☐ Yes ☒ No Explanation of atypical or problem area: <i>pasture mgmt</i>	Community ID: Transect ID: Plot ID: <i>18</i> <i>48.04556</i> <i>172.15422</i>

VEGETATION (For *strata, indicate T = tree; S = shrub; H = herb; V = vine)

Dominant Plant Species	*Stratum	Indicator	Dominant Plant Species	*Stratum	Indicator
<i>8000 PAPA</i>	<i>H</i>	<i>FACW</i>			

HYDROPHYTIC VEGETATION INDICATORS:

% of dominants OBL, FACW, & FAC: *95% OBL, 5% FACW, 0% FAC*

Check all indicators that apply and explain below:

- | | |
|--|--|
| ☐ Regional knowledge of plant communities | ☒ Wetland plant list (nat'l or regional) |
| ☐ Physiological or reproductive adaptations | ☒ Morphological adaptations |
| ☐ Technical Literature | ☐ Wetland plant database |
| | ☐ Other (explain) |

Hydrophytic vegetation present? ☒ Yes ☐ No

Rationale for decision/Remarks: *RCC dominance*

HYDROLOGY

Is it the growing season? ☒ Yes ☒ No

Based on:

Water Marks: ☐ Yes ☐ No	Sediment Deposits: ☐ Yes ☐ No
Drift Lines: ☐ Yes ☐ No	Drainage Patterns: ☐ Yes ☐ No
Oxidized Root (live roots) Channels <12 in.: ☐ Yes ☐ No	Local Soil Survey: ☒ Yes ☐ No
FAC Neutral: ☐ Yes ☐ No	Water-stained Leaves: ☐ Yes ☐ No

Depth of inundation: *18* inches

Depth to free water in pit: inches

Depth to saturated soil: inches

Check all that apply & explain below:

- ☐ Stream, lake or gage data
☐ Aerial photographs
☐ Other

Other (explain):

Wetland hydrology present? ☒ Yes ☐ No

Rationale for decision/remarks:

SOILS

Map Unit Name (Series and Phase) :

Drainage Class

Field observations confirm mapped type? ☐ Yes ☐ No

Taxonomy (subgroup)

Profile Description

Depth (inches)	Horizon	Matrix color (Munsell moist)	Mottle colors (Munsell moist)	Mottle abundance size and contrast	Texture, concretions, structure, etc.	Drawing of soil profile (match description)

Hydric Soil Indicators: (check all that apply)

- | | |
|---|---|
| ☐ Histosol | ☐ Concretions |
| ☐ Histic Epipedon | ☐ High Organic Content in Surface Layer of Sandy Soils |
| ☐ Sulfidic Odor | ☐ Organic Streaking in Sandy Soils |
| ☐ Aquic Moisture Regime | ☐ Listed on Local Hydric Soils List |
| ☐ Reducing Conditions | ☐ Listed on National Hydric Soils List |
| ☐ Gleyed or Low-Chroma (≥ 1) matrix | ☐ Other (explain in remarks) |

Hydric soils present? ☐ Yes ☐ No

Rationale for decision/Remarks:

Wetland Determination

- | | | |
|---|---|-----------------------------|
| Hydrophytic vegetation present? | ☒ Yes | ☐ No |
| Hydric soils present? | ☒ Yes | ☐ No |
| Wetland hydrology present? | ☒ Yes | ☐ No |
| Is the sampling point within a wetland? | ☒ Yes | ☐ No |

18" standing water in June

Rationale/Remarks:

NOTES:

PROB (M) OF SPONTANEOUS INUND. 0.10
INUND. TENDS DECREASE BY PRESENCE OF VEGETATION

DATA FORM 1

Routine Wetland Determination

(WA State Wetland Delineation Manual or
1987 Corps Wetland Delineation Manual)

6/2/06

Project/Site: Qwuloolt Marsh Applicant/owner: Tulalip Tribe of Indians <i>Nancy Lou</i> Investigator(s): Paul Cereghino & Jo Gardiner , NOAA Restoration Center	Date: 12/04/05 County: Snohomish State: Washington S/T/R: S33-34 T30N R5E
Do normal circumstances exist on the site? ☒ Yes ☐ No Is the site significantly disturbed (atypical situation)? ☒ Yes ☐ No Is the area a potential problem area? ☐ Yes ☒ No Explanation of atypical or problem area: <i>pasture mgmt</i>	Community ID: Transect ID: 48.01610 Plot ID: (A) 122.15736

VEGETATION (For *strata, indicate T = tree; S = shrub; H = herb; V = vine)					
Dominant Plant Species	*Stratum	Indicator	Dominant Plant Species	*Stratum	Indicator
<i>FAZU</i>		<i>FAZU</i>			
<i>OBL</i>		<i>OBL</i>			

HYDROPHYTIC VEGETATION INDICATORS: *Don't root form, 10' deep, 10' wide, 10' high, 10' diameter*

% of dominants OBL, FACW, & FAC: *20% OBL, 50% FACW, 30% FAC*

Check all indicators that apply and explain below:

☐ Regional knowledge of plant communities	☒ Wetland plant list (nat'l or regional)
☐ Physiological or reproductive adaptations	☒ Morphological adaptations
☐ Technical Literature	☐ Wetland plant database
	☐ Other (explain)

Hydrophytic vegetation present? ☒ Yes ☐ No

Rationale for decision/Remarks:

HYDROLOGY

Is it the growing season? ☒ Yes ☐ No Based on:	Water Marks: ☐ Yes ☐ No Drift Lines: ☐ Yes ☐ No	Sediment Deposits: ☐ Yes ☐ No Drainage Patterns: ☐ Yes ☐ No
Depth of inundation: <i>19-20</i> inches	Oxidized Root (live roots) Channels <12 in.: ☐ Yes ☐ No	Local Soil Survey: ☒ Yes ☐ No
Depth to free water in pit: _____ inches	FAC Neutral: ☐ Yes ☐ No	Water-stained Leaves: ☐ Yes ☐ No
Depth to saturated soil: _____ inches	Check all that apply & explain below: ☐ Stream, lake or gage data ☐ Aerial photographs ☐ Other	
Other (explain):		

Wetland hydrology present? ☒ Yes ☐ No

Rationale for decision/remarks: *inundation in June*

SOILS

Map Unit Name (Series and Phase) :

Drainage Class

Field observations confirm mapped type? ☐ Yes ☐ No

Taxonomy (subgroup)

Profile Description

Depth (inches)	Horizon	Matrix color (Munsell moist)	Mottle colors (Munsell moist)	Mottle abundance size and contrast	Texture, concretions, structure, etc.	Drawing of soil profile (match description)

Hydric Soil Indicators: (check all that apply)

- | | |
|---|---|
| ☐ Histosol | ☐ Concretions |
| ☐ Histic Epipedon | ☐ High Organic Content in Surface Layer of Sandy Soils |
| ☐ Sulfidic Odor | ☐ Organic Streaking in Sandy Soils |
| ☐ Aquic Moisture Regime | ☐ Listed on Local Hydric Soils List |
| ☐ Reducing Conditions | ☐ Listed on National Hydric Soils List |
| ☐ Gleyed or Low-Chroma (≥ 1) matrix | ☐ Other (explain in remarks) |

Hydric soils present?

☐ Yes☐ No

Rationale for decision/Remarks:

Wetland Determination

Hydrophytic vegetation present?

☒ Yes☐ No

Hydric soils present?

☒ Yes☐ No

Wetland hydrology present?

☒ Yes☐ No

Is the sampling point within a wetland?

☒ Yes☐ NoHID. WETLAND
REMOVED

Rationale/Remarks:

NOTES: LONG-TERM POND ~ 1.5' INUND

SWAMPY & DUCKS

DATA FORM 1

Routine Wetland Determination

(WA State Wetland Delineation Manual or
1987 Corps Wetland Delineation Manual)

6/2/06

Project/Site: Qwuloolt Marsh		Date: 12/01/05
Applicant/owner: Tulalip Tribe of Indians		County: Snohomish
Investigator(s): Paul Cereghino & Jo Gardiner, NOAA Restoration Center		State: Washington
		S/T/R: S33-34 T30N R5E

Do normal circumstances exist on the site? ☒ Yes ☐ No Is the site significantly disturbed (atypical situation)? ☒ Yes ☐ No Is the area a potential problem area? ☐ Yes ☒ No Explanation of atypical or problem area: historic pasture	Community ID: Transect ID: Plot ID: 20 48.04329 122 15780
---	--

VEGETATION (For *strata, indicate T = tree; S = shrub; H = herb; V = vine)

Dominant Plant Species	*Stratum	Indicator	Dominant Plant Species	*Stratum	Indicator
85% dominant species	H	FACW			

HYDROPHYTIC VEGETATION INDICATORS:

% of dominants OBL, FACW, & FAC: 100% FACW

Check all indicators that apply and explain below:

☒ Regional knowledge of plant communities	☐ Wetland plant list (nat'l or regional)
☐ Physiological or reproductive adaptations	☐ Morphological adaptations
☐ Technical Literature	☐ Wetland plant database
	☐ Other (explain)

Hydrophytic vegetation present? ☒ Yes ☐ No

Rationale for decision/Remarks:

HYDROLOGY

Is it the growing season? ☒ Yes ☐ No Based on:	Water Marks: ☐ Yes ☒ No Drift Lines: ☐ Yes ☒ No	Sediment Deposits: ☐ Yes ☒ No Drainage Patterns: ☐ Yes ☒ No
Depth of inundation: 3 inches Depth to free water in pit: 0 inches Depth to saturated soil: N/A inches	Oxidized Root (live roots) Channels <12 in.: ☒ Yes ☐ No FAC Neutral: ☐ Yes ☒ No	Local Soil Survey: ☒ Yes ☐ No Water-stained Leaves: ☐ Yes ☐ No
Check all that apply & explain below: ☐ Stream, lake or gage data ☐ Aerial photographs ☐ Other	Other (explain):	

Wetland hydrology present? ☒ Yes ☐ No

Rationale for decision/remarks:

SOILS

Map Unit Name (Series and Phase):

Drainage Class

Field observations confirm mapped type? ☒ Yes ☐ No

Taxonomy (subgroup)

INUND. POPEL 3"

puget

Profile Description

Depth (inches)	Horizon	Matrix color (Munsell moist)	Mottle colors (Munsell moist)	Mottle abundance size and contrast	Texture, concretions, structure, etc.	Drawing of soil profile (match description)
0-6	A	2.5Y 4/2	NO MOTTLING		CRUMB 1-2mm	
6+	A	6.0Y 5/1 2.5Y 4/2	2.5Y 4/10	CRUMB 1-2mm	SUBANG. BLOCKY	

Hydric Soil Indicators: (check all that apply)

- | | |
|--|---|
| ☐ Histosol | ☒ Concretions |
| ☐ Histic Epipedon | ☐ High Organic Content in Surface Layer of Sandy Soils |
| ☒ Sulfidic Odor | ☐ Organic Streaking in Sandy Soils |
| ☒ Aquic Moisture Regime | ☒ Listed on Local Hydric Soils List |
| ☐ Reducing Conditions | ☐ Listed on National Hydric Soils List |
| ☒ Gleyed or Low-Chroma (=1) matrix | ☐ Other (explain in remarks) |

Hydric soils present?

☒ Yes ☐ No

Rationale for decision/Remarks:

RMF @ 6" + odor

Wetland Determination

- | | | |
|---|---|-----------------------------|
| Hydrophytic vegetation present? | ☒ Yes | ☐ No |
| Hydric soils present? | ☒ Yes | ☐ No |
| Wetland hydrology present? | ☒ Yes | ☐ No |
| Is the sampling point within a wetland? | ☒ Yes | ☐ No |

Rationale/Remarks:

NOTES:

DATA FORM 1

Routine Wetland Determination

(WA State Wetland Delineation Manual or
1987 Corps Wetland Delineation Manual)

Project/Site: Qwuloolt Marsh		Date: 12/01/05 3/16/06	
Applicant/owner: Tulalip Tribe of Indians <i>Jolly Hicks</i>		County: Snohomish	
Investigator(s): Paul Cereghino & Jo Gardiner, NOAA Restoration Center		State: Washington	
		S/T/R: S33-34 T30N R5E	

Do normal circumstances exist on the site? ☒ Yes ☐ No	Community ID:
Is the site significantly disturbed (atypical situation)? ☒ Yes ☐ No	Transect ID:
Is the area a potential problem area? ☐ Yes ☒ No	Plot ID: (21) NRCS
Explanation of atypical or problem area: <i>pasture mgmt.</i>	

VEGETATION (For *strata, indicate T = tree; S = shrub; H = herb; V = vine)

Dominant Plant Species	*Stratum	Indicator	Dominant Plant Species	*Stratum	Indicator
AGR STO	70%				
Barn yard	30%				

HYDROPHYTIC VEGETATION INDICATORS:

% of dominants OBL, FACW, & FAC:

Check all indicators that apply and explain below:

☐ Regional knowledge of plant communities	☐ Wetland plant list (nat'l or regional)
☐ Physiological or reproductive adaptations	☐ Morphological adaptations
☐ Technical Literature	☐ Wetland plant database
	☐ Other (explain)

Hydrophytic vegetation present? ☐ Yes ☒ No

Rationale for decision/Remarks:

HYDROLOGY

Is it the growing season? ☒ Yes ☒ No	Water Marks: ☐ Yes ☒ No	Sediment Deposits: ☐ Yes ☐ No
Based on: <i>obs plant growth</i>	Drift Lines: ☐ Yes ☒ No	Drainage Patterns: ☐ Yes ☐ No
Depth of inundation: <i>0</i> inches	Oxidized Root (live roots) Channels <12 in.: ☐ Yes ☒ No	Local Soil Survey: ☒ Yes ☐ No
Depth to free water in pit: <i>0</i> inches	FAC Neutral: ☐ Yes ☐ No	Water-stained Leaves: ☐ Yes ☐ No
Depth to saturated soil: <i>0</i> inches		
Check all that apply & explain below: ☐ Stream, lake or gage data ☐ Aerial photographs ☐ Other	Other (explain):	

Wetland hydrology present? ☐ Yes ☒ No

Rationale for decision/remarks:

SOILS

Map Unit Name (Series and Phase) :

Drainage Class

Field observations confirm mapped type? ☐ Yes ☐ No

Taxonomy (subgroup)

Profile Description

Depth (inches)	Horizon	Matrix color (Munsell moist)	Mottle colors (Munsell moist)	Mottle abundance size and contrast	Texture, concretions, structure, etc.	Drawing of soil profile (match description)
0-9		10YR 4/3	⊖	⊖	fine crumb, clay, bits of charcoal (~5 mm)	
9-15		10YR 4/6	⊖	⊖	↓ " ↓	
15-16		2.5Y 6/3	⊖	⊖	↓ " ↓	

Hydric Soil Indicators: (check all that apply)

- | | |
|---|---|
| ☐ Histosol | ☐ Concretions |
| ☐ Histic Epipedon | ☐ High Organic Content in Surface Layer of Sandy Soils |
| ☐ Sulfidic Odor | ☐ Organic Streaking in Sandy Soils |
| ☐ Aquic Moisture Regime | ☐ Listed on Local Hydric Soils List |
| ☐ Reducing Conditions | ☐ Listed on National Hydric Soils List |
| ☐ Gleyed or Low-Chroma (=1) matrix | ☐ Other (explain in remarks) |

Hydric soils present? ☐ Yes ☒ No

Rationale for decision/Remarks:

Wetland Determination

Hydrophytic vegetation present?	☐ Yes	☒ No
Hydric soils present?	☐ Yes	☒ No
Wetland hydrology present?	☐ Yes	☒ No
Is the sampling point within a wetland?	☐ Yes	☒ No

Upland site.

Rationale/Remarks:

NOTES:

DATA FORM 1

Routine Wetland Determination

(WA State Wetland Delineation Manual or
1987 Corps Wetland Delineation Manual)

Project/Site: Qwuloolt Marsh		Date: 12/04/05 3/16/06
Applicant/owner: Tulalip Tribe of Indians <i>Polly Hicks</i>		County: Snohomish
Investigator(s): Paul Cereghino & Jo Gardiner, NOAA Restoration Center		State: Washington
		S/T/R: S33-34 T30N R5E

Do normal circumstances exist on the site?	☒ Yes ☐ No	Community ID: Transect ID: Plot ID: #22 NRCS
Is the site significantly disturbed (atypical situation)?	☒ Yes ☐ No	
Is the area a potential problem area?	☐ Yes ☒ No	
Explanation of atypical or problem area: <i>phase 2 mgmt</i>		

VEGETATION (For *strata, indicate T = tree; S = shrub; H = herb; V = vine)

Dominant Plant Species	*Stratum	Indicator	Dominant Plant Species	*Stratum	Indicator
<i>Phalaris</i>	<i>H.</i>	<i>FACW</i>			

HYDROPHYTIC VEGETATION INDICATORS:

% of dominants OBL, FACW, & FAC:

Check all indicators that apply and explain below:

☐ Regional knowledge of plant communities	☒ Wetland plant list (nat'l or regional)
☐ Physiological or reproductive adaptations	☐ Morphological adaptations
☐ Technical Literature	☐ Wetland plant database
	☐ Other (explain)

Hydrophytic vegetation present? ☒ Yes ☐ No

Rationale for decision/Remarks:

HYDROLOGY

Is it the growing season? ☒ Yes ☒ No	Water Marks: ☐ Yes ☐ No	Sediment Deposits: ☐ Yes ☐ No
Based on: <i>obs. plant growth</i>	Drift Lines: ☒ Yes ☐ No	Drainage Patterns: ☐ Yes ☐ No
Depth of inundation: <i>3"</i> inches	Oxidized Root (live roots) Channels <12 in.: ☐ Yes ☐ No	Local Soil Survey: ☒ Yes ☐ No
Depth to free water in pit: <i>NA</i> inches	FAC Neutral: ☐ Yes ☐ No	Water-stained Leaves: ☒ Yes ☐ No
Depth to saturated soil: <i>NA</i> inches		

Check all that apply & explain below:	Other (explain):
☐ Stream, lake or gage data ☐ Aerial photographs ☐ Other	<i>rock material all around - layer -</i>

Wetland hydrology present? ☒ Yes ☐ No

Rationale for decision/remarks: *standing water surrounding site*

SOILS

Map Unit Name (Series and Phase):

Drainage Class

Field observations confirm mapped type? ☐ Yes ☐ No

Taxonomy (subgroup)

Profile Description

11" soil ped due to inundation, low chroma matrix throughout

Depth (inches)	Horizon	Matrix color (Munsell moist)	Mottle colors (Munsell moist)	Mottle abundance size and contrast	Texture, concretions, structure, etc.	Drawing of soil profile (match description)
0-4		5Y 4/1				
4-11		5Y 4/1 5Y 5/1	2.5YR 3/4	20% 1-5mm	lt lighter lower in ped, mottles	
					increase in intensity, frequency abundance and contrast w/ depth	

Hydric Soil Indicators: (check all that apply)

- ☐ Histosol
☐ Histic Epipedon
☒ Sulfidic Odor
☐ Aquic Moisture Regime
☐ Reducing Conditions
☒ Gleyed or Low-Chroma (=1) matrix

- ☐ Concretions
☐ High Organic Content in Surface Layer of Sandy Soils
☐ Organic Streaking in Sandy Soils
☐ Listed on Local Hydric Soils List
☐ Listed on National Hydric Soils List
☒ Other (explain in remarks) mottling, oxidized root pores

Hydric soils present?

☒ Yes☐ No

Rationale for decision/Remarks:

RMF @ 4"

Wetland Determination

Hydrophytic vegetation present?

☒ Yes☐ No

Hydric soils present?

☒ Yes☐ No

Wetland hydrology present?

☒ Yes☐ No

Is the sampling point within a wetland?

☒ Yes☐ No

Rationale/Remarks:

NOTES:

Dig several holes down slope of #21 while heading for #22
 mottlings appear @ 10" water @ 12" in hole nearest ^{nearest} ~~closest~~
 to standing water @ toe of slope
 pockets of saturated soil on slope (saturated to surface)

(21)

C - gleyed soil w/ mottles @ 16"

O - ^{very} high organic content

Standing water

DATA FORM 1
Routine Wetland Determination
(WA State Wetland Delineation Manual or
1987 Corps Wetland Delineation Manual)

Project/Site: Qwuloolt Marsh		Date: 42/04/06 1/27/06	
Applicant/owner: Tulalip Tribe of Indians		County: Snohomish	
Investigator(s): Paul Cereghino & Jo Gardiner, NOAA Restoration Center		State: Washington	
		S/T/R: S33-34 T30N R5E	

Do normal circumstances exist on the site? ☒ Yes ☐ No Is the site significantly disturbed (atypical situation)? ☒ Yes ☐ No Is the area a potential problem area? ☐ Yes ☒ No Explanation of atypical or problem area: <i>pasture mgmt.</i>	Community ID: Transect ID: Plot ID: <i>#23</i>
---	--

VEGETATION (For *strata, indicate T = tree; S = shrub; H = herb; V = vine)

Dominant Plant Species	*Stratum	Indicator	Dominant Plant Species	*Stratum	Indicator
<i>RCG</i>		<i>TALW</i>			
<i>UNK pasture</i>					

HYDROPHYTIC VEGETATION INDICATORS:

% of dominants OBL, FACW, & FAC:

Check all indicators that apply and explain below:

☒ Regional knowledge of plant communities	☒ Wetland plant list (nat'l or regional)
☐ Physiological or reproductive adaptations	☐ Morphological adaptations
☐ Technical Literature	☐ Wetland plant database
	☐ Other (explain)

Hydrophytic vegetation present? ☒ Yes ☐ No

Rationale for decision/Remarks: *increasing RCG dominance*

HYDROLOGY

Is it the growing season? ☐ Yes ☒ No Based on:	Water Marks: ☐ Yes ☐ No Drift Lines: ☐ Yes ☐ No	Sediment Deposits: ☐ Yes ☐ No Drainage Patterns: ☐ Yes ☐ No
Depth of inundation: _____ inches Depth to free water in pit: <i>7</i> inches Depth to saturated soil: _____ inches	Oxidized Root (live roots) Channels <12 in.: ☒ Yes ☐ No FAC Neutral: ☐ Yes ☐ No	Local Soil Survey: ☒ Yes ☐ No Water-stained Leaves: ☐ Yes ☐ No

Check all that apply & explain below:

☐ Stream, lake or gage data ☐ Aerial photographs ☐ Other	Other (explain):
---	------------------

Wetland hydrology present? ☒ Yes ☐ No

Rationale for decision/remarks: *saturation + oxidized root pres*

SOILS

Map Unit Name (Series and Phase) :

Drainage Class

Field observations confirm mapped type? ☐ Yes ☐ No

Taxonomy (subgroup)

Profile Description

Depth (inches)	Horizon	Matrix color (Munsell moist)	Mottle colors (Munsell moist)	Mottle abundance size and contrast	Texture, concretions, structure, etc.	Drawing of soil profile (match description)
0-4		10YR 4/2				
4-7		10YR 5/2				
7-16		2.5Y *see below	7.5YR 4/6	2-5 mm 5-10%	gleyed soil matrix varies * see notes below	

Hydric Soil Indicators: (check all that apply)

- | | |
|---|---|
| ☐ Histosol | ☐ Concretions |
| ☐ Histic Epipedon | ☐ High Organic Content in Surface Layer of Sandy Soils |
| ☐ Sulfidic Odor | ☐ Organic Streaking in Sandy Soils |
| ☐ Aquic Moisture Regime | ☐ Listed on Local Hydric Soils List |
| ☐ Reducing Conditions | ☐ Listed on National Hydric Soils List |
| ☐ Gleyed or Low-Chroma (=1) matrix | ☐ Other (explain in remarks) |

Hydric soils present?

☒ Yes ☐ No

Rationale for decision/Remarks:

oxidized root pores 7-16"

Wetland Determination

- | | | |
|---|---|-----------------------------|
| Hydrophytic vegetation present? | ☒ Yes | ☐ No |
| Hydric soils present? | ☒ Yes | ☐ No |
| Wetland hydrology present? | ☒ Yes | ☐ No |
| Is the sampling point within a wetland? | ☒ Yes | ☐ No |

Rationale/Remarks:

NOTES:

Total depth 16'

* 50% 2.5Y 5/1 and 50% 2.5Y 5/2

matrix mottled mottle

NOTE

40' due West of stake - local high spot - we dug soil pit

standing water in places on all sides

DATA FORM 1
Routine Wetland Determination
 (WA State Wetland Delineation Manual or
 1987 Corps Wetland Delineation Manual)

6/2/06

Project/Site: Qwuloolt Marsh		Date: 12/01/05	
Applicant/owner: Tulalip Tribe of Indians		County: Snohomish	
Investigator(s): Paul Cereghino & Jo Gardner, NOAA Restoration Center		State: Washington	
		S/T/R: S33-34 T30N R5E	

Do normal circumstances exist on the site?	☒ Yes ☐ No	Community ID: Transect ID: Plot ID: N1 48, 04398 122, 116312
Is the site significantly disturbed (atypical situation)?	☒ Yes ☐ No	
Is the area a potential problem area?	☐ Yes ☒ No	
Explanation of atypical or problem area: <i>pasture mgmt.</i>		

VEGETATION (For *strata, indicate T = tree; S = shrub; H = herb; V = vine)

Dominant Plant Species	*Stratum	Indicator	Dominant Plant Species	*Stratum	Indicator
<i>SILVIA MARITIMA</i>					
<i>Urtica dioica</i>					
<i>FOR PLANTENSE</i>		<i>FACU+</i>			
<i>Urtica dioica</i>		<i>FAC</i>			
<i>Urtica dioica</i>					

HYDROPHYTIC VEGETATION INDICATORS:

% of dominants OBL, FACW, & FAC: *OBL 60% FACW 30% FAC 10%*

Check all indicators that apply and explain below:

☐ Regional knowledge of plant communities	☐ Wetland plant list (nat'l or regional)
☐ Physiological or reproductive adaptations	☐ Morphological adaptations
☐ Technical Literature	☐ Wetland plant database
	☐ Other (explain)

LOCAL PLANTED NATIVE VEG
PRACONIS - KENT BLUZZARD (FAC)

Hydrophytic vegetation present? ☐ Yes ☒ No

Rationale for decision/Remarks: *pasture mgmt. suppressed indicators*

HYDROLOGY

Is it the growing season? ☒ Yes ☒ No	Water Marks: ☐ Yes ☒ No	Sediment Deposits: ☐ Yes ☒ No
Based on:	Drift Lines: ☐ Yes ☒ No	Drainage Patterns: ☐ Yes ☒ No
Depth of inundation: <i>8</i> inches	Oxidized Root (live roots)	Local Soil Survey: ☒ Yes ☐ No
Depth to free water in pit: <i>11</i> inches	Channels <12 in: ☐ Yes ☒ No	Water-stained Leaves: ☐ Yes ☒ No
Depth to saturated soil: <i>9</i> inches	FAC Neutral: ☐ Yes ☐ No	

Check all that apply & explain below:

☐ Stream, lake or gage data	Other (explain):
☐ Aerial photographs	
☐ Other	

Wetland hydrology present? ☒ Yes ☐ No

Rationale for decision/remarks: *saturation*

SOILS

Map Unit Name (Series and Phase):

Drainage Class

Field observations confirm mapped type? ☒ Yes ☐ No

Taxonomy (subgroup)

Profile Description

EPA/NOAA/USDA

Depth (inches)	Horizon	Matrix color (Munsell moist)	Mottle colors (Munsell moist)	Mottle abundance size and contrast	Texture, concretions, structure, etc.	Drawing of soil profile (match description)
0-11	A	10YR 4/2			Clumpy 1-4 mm	
11+	A	2.5Y 4/1 to 2.5Y 4/2	5Y 4/6	1 mm CONCRETIONS	2 COLORED MOTTLES, DEEP. ROOT POLES. SUBSANT. BROWN	

Hydric Soil Indicators: (check all that apply)

- | | |
|--|---|
| ☐ Histosol | ☒ Concretions |
| ☐ Histic Epipedon | ☐ High Organic Content in Surface Layer of Sandy Soils |
| ☐ Sulfidic Odor | ☐ Organic Streaking in Sandy Soils |
| ☐ Aquic Moisture Regime | ☐ Listed on Local Hydric Soils List |
| ☐ Reducing Conditions | ☐ Listed on National Hydric Soils List |
| ☒ Gleyed or Low-Chroma (=1) matrix | ☐ Other (explain in remarks) |

Hydric soils present? ☐ Yes ☒ No

Rationale for decision/Remarks:

Wetland Determination

- | | | |
|---|---|--|
| Hydrophytic vegetation present? | ☐ Yes | ☒ No |
| Hydric soils present? | ☐ Yes | ☒ No |
| Wetland hydrology present? | ☒ Yes | ☐ No |
| Is the sampling point within a wetland? | ☒ Yes | ☐ No |

Rationale/Remarks:

NOTES: DEH, HIGHLY DEVELOPED IN OBVIOUS WETLAND MUDRIC 1" HYDRIC SOILS

DATA FORM 1
Routine Wetland Determination
(WA State Wetland Delineation Manual or
1987 Corps Wetland Delineation Manual)

6/2/05

Project/Site: Qwuloolt Marsh	Date: 12/01/05
Applicant/owner: Tulalip Tribe of Indians	County: Snohomish
Investigator(s): Paul Cereghino & Jo Gardiner, NOAA Restoration Center	State: Washington
	S/T/R: S33-34 T30N R5E

Do normal circumstances exist on the site? ☒ Yes ☐ No	Community ID:
Is the site significantly disturbed (atypical situation)? ☐ Yes ☒ No	Transect ID:
Is the area a potential problem area? ☐ Yes ☒ No	Plot ID: 12
Explanation of atypical or problem area:	

VEGETATION (For *strata, indicate T = tree; S = shrub; H = herb; V = vine)

Dominant Plant Species	*Stratum	Indicator	Dominant Plant Species	*Stratum	Indicator
Red 60%					
POA PENTAGON 10%					

HYDROPHYTIC VEGETATION INDICATORS:

% of dominants OBL, FACW, & FAC: FACW 60% FAC 40%

Check all indicators that apply and explain below:

- | | |
|--|---|
| ☐ Regional knowledge of plant communities | ☐ Wetland plant list (nat'l or regional) |
| ☐ Physiological or reproductive adaptations | ☐ Morphological adaptations |
| ☐ Technical Literature | ☐ Wetland plant database |
| | ☐ Other (explain) |

Hydrophytic vegetation present? ☐ Yes ☐ No

Rationale for decision/Remarks:

HYDROLOGY

Is it the growing season? ☒ Yes ☒ No	Water Marks: ☐ Yes ☒ No	Sediment Deposits: ☐ Yes ☒ No
Based on:	Drift Lines: ☐ Yes ☒ No	Drainage Patterns: ☐ Yes ☒ No
Depth of inundation: 4 inches	Oxidized Root (live roots)	Local Soil Survey: ☒ Yes ☐ No
Depth to free water in pit: inches	Channels <12 in.: ☐ Yes ☐ No	
Depth to saturated soil: inches	FAC Neutral: ☐ Yes ☐ No	Water-stained Leaves: ☒ Yes ☐ No
Check all that apply & explain below:	Other (explain):	
☐ Stream, lake or gage data		
☐ Aerial photographs		
☐ Other		

Wetland hydrology present? ☒ Yes ☐ No

Rationale for decision/remarks:

SOILS

Map Unit Name (Series and Phase) :

Drainage Class

Field observations confirm mapped type? ☐ Yes ☐ No

Taxonomy (subgroup)

Profile Description

Depth (inches)	Horizon	Matrix color (Munsell moist)	Mottle colors (Munsell moist)	Mottle abundance size and contrast	Texture, concretions, structure, etc.	Drawing of soil profile (match description)
0-5	A	10YR 4/2			SUBSAND. BLOCKY COMPACT	
5-10	B	10YR 4/2	5YR 5/6	< 10% 1-2mm	BLOCKY, ANISOLIC	

Hydric Soil Indicators: (check all that apply)

- | | |
|--|---|
| ☐ Histosol | ☒ Concretions |
| ☐ Histic Epipedon | ☐ High Organic Content in Surface Layer of Sandy Soils |
| ☒ Sulfidic Odor | ☐ Organic Streaking in Sandy Soils |
| ☐ Aquic Moisture Regime | ☐ Listed on Local Hydric Soils List |
| ☐ Reducing Conditions | ☐ Listed on National Hydric Soils List |
| ☒ Gleyed or Low-Chroma (=1) matrix | ☐ Other (explain in remarks) |

Hydric soils present? ☒ Yes ☐ No

Rationale for decision/Remarks:

Wetland Determination

- | | | |
|---|---|-----------------------------|
| Hydrophytic vegetation present? | ☒ Yes | ☐ No |
| Hydric soils present? | ☒ Yes | ☐ No |
| Wetland hydrology present? | ☒ Yes | ☐ No |
| Is the sampling point within a wetland? | ☒ Yes | ☐ No |

Rationale/Remarks:

NOTES:

low point paired with N1

DATA FORM 1
Routine Wetland Determination
(WA State Wetland Delineation Manual or
1987 Corps Wetland Delineation Manual)

6/2/06

Project/Site: Qwuloolt Marsh	Date: 12/01/05
Applicant/owner: Tulalip Tribe of Indians <i>Namgyle</i>	County: Snohomish
Investigator(s): Paul Cereghino & Jo. Gardiner, NOAA Restoration Center	State: Washington
	S/T/R: S33-34 T30N R5E
Do normal circumstances exist on the site? ☒ Yes ☐ No	Community ID:
Is the site significantly disturbed (atypical situation)? ☒ Yes ☐ No	Transect ID:
Is the area a potential problem area? ☐ Yes ☒ No	Plot ID: NB 48.09626
Explanation of atypical or problem area: <i>PASTURE MGMT.</i>	122.116377

VEGETATION (For *strata, indicate T = tree; S = shrub; H = herb; V = vine)

Dominant Plant Species	*Stratum	Indicator	Dominant Plant Species	*Stratum	Indicator
<i>SIRYIA</i> 50%					
<i>POA PRITENSIS</i> 30%		<i>FACU+</i>			
<i>HOLCUS LANATUS</i> 10%		<i>FAC</i>			
<i>REINOLDSIA RIBBIS</i> 5%		<i>FACW</i>			

HYDROPHYTIC VEGETATION INDICATORS: 90% FAC

% of dominants OBL, FACW, & FAC:

Check all indicators that apply and explain below:

- | | |
|--|--|
| ☐ Regional knowledge of plant communities | ☒ Wetland plant list (nat'l or regional) |
| ☐ Physiological or reproductive adaptations | ☐ Morphological adaptations |
| ☐ Technical Literature | ☐ Wetland plant database |
| | ☐ Other (explain) |

Hydrophytic vegetation present? ☒ Yes ☐ No

Rationale for decision/Remarks:

HYDROLOGY

Is it the growing season? ☒ Yes ☒ No

Based on:

Depth of inundation: 0 inches

Depth to free water in pit: 12 inches

Depth to saturated soil: 10.5 inches

Water Marks: ☐ Yes ☒ No

Drift Lines: ☐ Yes ☒ No

Oxidized Root (live roots)

Channels <12 in.: ☐ Yes ☒ No

FAC Neutral: ☐ Yes ☐ No

Sediment Deposits: ☐ Yes ☒ No

Drainage Patterns: ☐ Yes ☒ No

Local Soil Survey: ☒ Yes ☐ No

Water-stained Leaves:
☐ Yes ☒ No

Check all that apply & explain below:

- ☐ Stream, lake or gage data
☐ Aerial photographs
☐ Other

Other (explain):

Wetland hydrology present? ☒ Yes ☐ No

Rationale for decision/remarks:

*+ soils
depth to saturation late in season*

SOILS

Map Unit Name (Series and Phase):

Drainage Class

Field observations confirm mapped type? ☐ Yes ☐ No

Taxonomy (subgroup)

Profile Description

Depth (inches)	Horizon	Matrix color (Munsell moist)	Mottle colors (Munsell moist)	Mottle abundance size and contrast	Texture, concretions, structure, etc.	Drawing of soil profile (match description)
0-6	A	10.5 Y 4/2			CRUMBLY, 1-5mm	
6-9	A	7.5 Y 4/2 8.0 Y 2.5 Y 5/1	7.5 Y 5/8	1-3mm 40-50%	CRUMBLY, 1-5mm	
9-14	A	2.5 Y 5/1	7.5 Y 5/6	3-15mm 60-80%	W/ 1-2mm CRUMBLED TO S.S. INCL. BLOCKS.	

Hydric Soil Indicators: (check all that apply)

- | | |
|--|---|
| ☐ Histosol | ☒ Concretions (MOTTLES) |
| ☐ Histic Epipedon | ☐ High Organic Content in Surface Layer of Sandy Soils |
| ☐ Sulfidic Odor | ☐ Organic Streaking in Sandy Soils |
| ☐ Aquic Moisture Regime | ☐ Listed on Local Hydric Soils List |
| ☐ Reducing Conditions | ☐ Listed on National Hydric Soils List |
| ☒ Gleyed or Low-Chroma (=1) matrix | ☐ Other (explain in remarks) |

Hydric soils present?

☒ Yes ☐ No

Rationale for decision/Remarks:

RMF @ 6"

Wetland Determination

- | | | |
|---|---|-----------------------------|
| Hydrophytic vegetation present? | ☒ Yes | ☐ No |
| Hydric soils present? | ☒ Yes | ☐ No |
| Wetland hydrology present? | ☒ Yes | ☐ No |
| Is the sampling point within a wetland? | ☒ Yes | ☐ No |

Rationale/Remarks:

NOTES:

Soil - 6" RMF AT BOTTOM, LYS ON, PLOW

Pic - SHOT IN PFT

DATA FORM 1
Routine Wetland Determination
(WA State Wetland Delineation Manual or
1987 Corps Wetland Delineation Manual)

6/2/06

Project/Site: Qwuloolt Marsh Applicant/owner: Tulalip Tribe of Indians Investigator(s): Paul Cereghino & Jo Gardiner, NOAA Restoration Center	Date: 12/01/05 County: Snohomish State: Washington S/T/R: S33-34 T30N R5E
Do normal circumstances exist on the site? ☒ Yes ☐ No Is the site significantly disturbed (atypical situation)? ☒ Yes ☐ No Is the area a potential problem area? ☐ Yes ☒ No Explanation of atypical or problem area: <i>pasture mgt.</i>	Community ID: Transect ID: Plot ID: <i>48.04735</i> <i>122-16390</i>

VEGETATION (For *strata, indicate T = tree; S = shrub; H = herb; V = vine)

Dominant Plant Species	*Stratum	Indicator	Dominant Plant Species	*Stratum	Indicator
<i>POPPON LARIX 80%</i>		<i>FACW</i>			

HYDROPHYTIC VEGETATION INDICATORS:

% of dominants OBL, FACW, & FAC: *100% 80%*

Check all indicators that apply and explain below:

- | | |
|--|--|
| ☐ Regional knowledge of plant communities | ☒ Wetland plant list (nat'l or regional) |
| ☐ Physiological or reproductive adaptations | ☐ Morphological adaptations |
| ☐ Technical Literature | ☐ Wetland plant database |
| | ☐ Other (explain) |

Hydrophytic vegetation present? ☒ Yes ☐ No

Rationale for decision/Remarks: *FCG dom.*

HYDROLOGY

Is it the growing season? ☒ Yes ☒ No

Based on:

Depth of inundation: <i>9</i> inches	Water Marks: ☐ Yes ☐ No	Sediment Deposits: ☐ Yes ☐ No
Depth to free water in pit: _____ inches	Drift Lines: ☐ Yes ☐ No	Drainage Patterns: ☐ Yes ☐ No
Depth to saturated soil: _____ inches	Oxidized Root (live roots) Channels <12 in.: ☐ Yes ☐ No	Local Soil Survey: ☒ Yes ☐ No
	FAC Neutral: ☐ Yes ☐ No	Water-stained Leaves: ☐ Yes ☐ No

Check all that apply & explain below:

- ☐ Stream, lake or gage data
☐ Aerial photographs
☐ Other

Other (explain):

Wetland hydrology present? ☒ Yes ☐ No

Rationale for decision/remarks: *late season inundation*

SOILS

Map Unit Name (Series and Phase) :

Drainage Class

Field observations confirm mapped type? ☐ Yes ☐ No

Taxonomy (subgroup)

Profile Description

Depth (inches)	Horizon	Matrix color (Munsell moist)	Mottle colors (Munsell moist)	Mottle abundance size and contrast	Texture, concretions, structure, etc.	Drawing of soil profile (match description)

Hydric Soil Indicators: (check all that apply)

- | | |
|---|---|
| ☐ Histosol | ☐ Concretions |
| ☐ Histic Epipedon | ☐ High Organic Content in Surface Layer of Sandy Soils |
| ☐ Sulfidic Odor | ☐ Organic Streaking in Sandy Soils |
| ☐ Aquic Moisture Regime | ☐ Listed on Local Hydric Soils List |
| ☐ Reducing Conditions | ☐ Listed on National Hydric Soils List |
| ☐ Gleyed or Low-Chroma (=1) matrix | ☐ Other (explain in remarks) |

Hydric soils present? ☐ Yes ☐ No

Rationale for decision/Remarks:

Wetland Determination

- | | | |
|---|---|-----------------------------|
| Hydrophytic vegetation present? | ☒ Yes | ☐ No |
| Hydric soils present? | ☒ Yes | ☐ No |
| Wetland hydrology present? | ☒ Yes | ☐ No |
| Is the sampling point within a wetland? | ☒ Yes | ☐ No |

Rationale/Remarks:**NOTES:**

w/mc

DATA FORM 1
Routine Wetland Determination
(WA State Wetland Delineation Manual or
1987 Corps Wetland Delineation Manual)

Project/Site: Qwuloolt Marsh Applicant/owner: Tualip Tribe of Indians Investigator(s): Paul Cereghino & Jo Gardiner, NOAA Restoration Center <i>Denise Martin</i>		Date: 12/01/05 County: Snohomish State: Washington S/T/R: S33-34 T30N R5E																														
Do normal circumstances exist on the site? ☒ Yes ☐ No Is the site significantly disturbed (atypical situation)? ☒ Yes ☐ No Is the area a potential problem area? ☐ Yes ☒ No Explanation of atypical or problem area: <i>pasture management</i>		Community ID: Transect ID: Plot ID: 2																														
VEGETATION (For *strata, indicate T = tree; S = shrub; H = herb; V = vine)																																
Dominant Plant Species	*Stratum	Indicator	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 25%;">Dominant Plant Species</th> <th style="width: 10%;">*Stratum</th> <th style="width: 10%;">Indicator</th> <th style="width: 55%;"></th> </tr> </thead> <tbody> <tr> <td><i>Phalaris arundinacea</i></td> <td>H</td> <td>FACW</td> <td></td> </tr> <tr> <td><i>Sium</i></td> <td></td> <td>FACU</td> <td rowspan="4" style="vertical-align: middle; text-align: center;">} trace</td> </tr> <tr> <td><i>Some Urtica</i></td> <td></td> <td>FACU</td> </tr> <tr> <td><i>Some nettle</i></td> <td></td> <td>FACU</td> </tr> <tr> <td><i>Patches tall fescue?</i></td> <td></td> <td>UNK</td> </tr> <tr> <td><i>Some galium</i></td> <td></td> <td>FACU</td> <td></td> </tr> <tr> <td><i>Some thistle</i></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Dominant Plant Species	*Stratum	Indicator		<i>Phalaris arundinacea</i>	H	FACW		<i>Sium</i>		FACU	} trace	<i>Some Urtica</i>		FACU	<i>Some nettle</i>		FACU	<i>Patches tall fescue?</i>		UNK	<i>Some galium</i>		FACU		<i>Some thistle</i>			
Dominant Plant Species	*Stratum	Indicator																														
<i>Phalaris arundinacea</i>	H	FACW																														
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HYDROPHYTIC VEGETATION INDICATORS: % of dominants OBL, FACW, & FAC: Check all indicators that apply and explain below: ☒ Regional knowledge of plant communities ☐ Physiological or reproductive adaptations ☐ Technical Literature ☒ Wetland plant list (nat'l or regional) ☐ Morphological adaptations ☐ Wetland plant database ☐ Other (explain)																																
Hydrophytic vegetation present? ☒ Yes ☐ No Rationale for decision/Remarks: <i>PHACW expanding following neglect of pasture</i>																																
HYDROLOGY																																
Is it the growing season? ☒ Yes ☒ No Based on: <i>obs plant growth</i> Depth of inundation: <i>0"</i> inches Depth to free water in pit: <i>4"</i> inches Depth to saturated soil: <i>0"</i> inches		Water Marks: ☐ Yes ☐ No Drift Lines: ☐ Yes ☐ No Oxidized Root (live roots) Channels <12 in.: ☐ Yes ☐ No FAC Neutral: ☐ Yes ☐ No																														
Check all that apply & explain below: ☐ Stream, lake or gage data ☐ Aerial photographs ☐ Other		Sediment Deposits: ☐ Yes ☐ No Drainage Patterns: ☒ Yes ☐ No Local Soil Survey: ☒ Yes ☐ No Water-stained Leaves: ☐ Yes ☐ No																														
Wetland hydrology present? ☒ Yes ☐ No Rationale for decision/remarks:																																

SOILS

Map Unit Name (Series and Phase):

Drainage Class **P**Taxonomy (subgroup) **Perjet / Snokomish**Field observations confirm mapped type? ☒ Yes ☐ No**Profile Description**

Depth (inches)	Horizon	Matrix color (Munsell moist)	Mottle colors (Munsell moist)	Mottle abundance size and contrast	Texture, concretions, structure, etc.	Drawing of soil profile (match description)
0-8"	A	10YR 3/2			fin clay loam	
8-12"	A		5YR 5/8	~2% ~1mm	"	

Hydric Soil Indicators: (check all that apply)

- ☐ Histosol
☐ Histic Epipedon
☐ Sulfidic Odor
☐ Aquic Moisture Regime
☐ Reducing Conditions
☐ Gleyed or Low-Chroma (=1) matrix
- ☒ Concretions
☐ High Organic Content in Surface Layer of Sandy Soils
☐ Organic Streaking in Sandy Soils
☒ Listed on Local Hydric Soils List
☒ Listed on National Hydric Soils List
☐ Other (explain in remarks)

Hydric soils present? ☒ Yes ☐ NoRationale for decision/Remarks: **Fe concretions @ 8"****Wetland Determination**

- Hydrophytic vegetation present? ☒ Yes ☐ No
 Hydric soils present? ☒ Yes ☐ No
 Wetland hydrology present? ☒ Yes ☐ No
 Is the sampling point within a wetland? ☒ Yes ☐ No

presence of lg wood may indicate
atypical situation due to historic
clearing and leveling

Rationale/Remarks:**NOTES:**

Saturated to surface
Soil has wood chunks, little decomposition

good sized wood
chunks ~ 6+"

10:01

Soil

matrix =
silty clay
loam

10YR 3/2 matrix

faint mottles

8" water seeping into pot

<5 min water @ 4" from surface

manganese concretions
are black

Ped remove ~ 12"

See @ last site

major wood layer ~ 8"

~2% 1mm

5YR 5/8 = mottles

mottles in matrix

mottles @ ~ 8"

NRCS - organic @ 11", CMC @ 2", pasture veg

Appendix E – SEWIP Excerpts

Chapter 5 - Management Plan for Snohomish Estuary

This chapter sets forth the comprehensive Management Plan for the Snohomish Estuary. It identifies the:

- overall management goals;
- restoration and enhancement goals;
- location, type and ranking of proposed restoration for the Snohomish Estuary;
- specific restoration/enhancement "actions" for each restoration site (Table 5.3);
- development footprint; and
- compensation ratios.

The Management Plan is based on the habitat assessment results, field work to characterize the Ecological Management Unit boundaries and input from both SETAC and User Group Committees. This chapter also details the process for selecting the restoration and enhancement sites and the restoration and enhancement actions. Appendix M presents recommendations for implementing SEWIP, including non-regulatory guidance.

5.1 Overall Management Goals for the Estuary

The SETAC adopted the following main goals for the Snohomish Estuary:

Management Goal 1) No net loss of functions and values in the Estuary;

Management Goal 2) Enhancement and restoration of the Snohomish Estuary to the maximum extent feasible;

Management Goal 3) A balance between wetland ecosystem protection, enhancement, restoration and economic development within the Estuary and shoreline areas;

Management Goal 4) An efficient permit review process which promotes consistency among applicable Federal and State laws and regulations, including the Federal Section 404 review process, and provides development and environmental interests with a high degree of certainty as to the level of development permitted and the location, type, amount and cost of required mitigation; and

Management Goal 5) Detailed information provided for resource management and protection including accurate mapping of all wetland complexes, assessment of functions, and review and summary of all available biological, physical and chemical data for the Estuary.

An additional goal has arisen out of work with the User Committee:

Management Goal 6) Protection of existing undeveloped habitat areas within the Estuary.

"Restoration" shall be defined as "return of an ecosystem to a close approximation of its previously existing condition." This may include the breaking of dikes within the Estuary to convert existing palustrine wetland and non-wetland to estuarine wetland within the study area. Wetland restoration that is within the identified SEWIP restoration sites (Table 5.3) and consistent with the restoration goals and actions shall be considered under the COE regional permit for SEWIP.

"Enhancement" shall be defined as "the alteration or active management of a wetland for improvement of a particular function or functions." This may include increasing flooding of diked palustrine wetlands, planting scrub-shrub species in grazed wetlands, or removal of log rafts from tidal mudflats. Wetland enhancement for the purpose of compensating for development impacts will only be permitted under a COE individual permit.

5.2 Restoration and Enhancement Goals

Once the draft SEWIP document was completed (April 14, 1995), the SETAC established the following restoration/enhancement goals for the Estuary:

- Goal 1)** Tidal restoration;
- Goal 2)** Mudflat restoration;
- Goal 3)** Mudflat enhancement; and
- Goal 4)** Waterbird and freshwater marsh habitat enhancement.

5.2.1 Basis for Tidal Wetland and Mudflat Restoration Goal. The primary impact to approximately 12,000 acres of wetlands and mudflats within the Snohomish Estuary has been due to diking and draining for conversion to agricultural production. This has resulted in an estimated 74.4 percent (Pentec, 1992) to 85 percent (Shapiro and Associates, 1979) loss of the original estuarine and freshwater tidal wetland area. Estuarine wetlands are an extremely important component in the marine and terrestrial food chains, providing critical habitat for fish, birds, and other wildlife including species which are commercially important. Studies in the Northwest have demonstrated that estuarine marshes are more productive than any other plant communities. Frenkel measured the productivity in terms of plant biomass of a diked pasture at 1200 grams/meter² relative to 2300 grams/meter² for the same pasture ten years after it was restored to estuarine wetland (Frenkel, 1990).

Given the ecological significance of estuarine wetlands, it is appropriate that this Management Plan strive to restore diked palustrine wetlands to tidal influence. There is limited data, however, to support the assumption that the performance of functions of restored wetlands will be similar to those of natural "undisturbed" wetlands (Zedler and Weller, 1990). In fact, most wetland creations and restorations have been experimental, with the majority not meeting the "goals and criteria" set forth to measure success.

Kusler and Kentula (1990), however, have concluded that the probability of restoration success is greatest for estuarine marshes, followed by marshes of the open coast, freshwater marshes, and least for forested wetlands.

The greater restoration success experienced with estuarine marshes is due to: 1) the assurance of hydrology and the ability to accurately predict and design proper hydrology; 2) a relatively small number of plant species to work with; 3) the availability of seeds and plant stocks; 4) relative ease of establishing these species; and 5) extensive literature on estuarine restoration and experience from numerous estuarine restoration projects.

In the Estuary several previously diked and farmed areas have been returned to tidal influence through lack of maintenance of the dikes. These areas include Mid-Ebey Island (WC 141 and 144) and Mid Spencer Island (WC 138). The dikes on Mid-Ebey Island are believed to have broken in the 1930's or 1940's, and the dike on Mid-Spencer broke in approximately 1966. Both these areas scored as Group I wetlands, indicating a high level of performance for all functions. These restored wetlands have developed dendritic channels and a diverse cover of emergent and scrub-shrub vegetation. Therefore, even without a restoration and monitoring plan, these sites have successfully returned to a "functioning" estuarine marsh ecosystem.

Shreffler and Thom (1993) state that "the chances of successful restoration are higher if the landscape is relatively intact even though the degree of disturbance of the restoration site is high." The proposed restoration wetlands within Ecological Management Units 1 and 2 have been degraded by agriculture, but the large continuous core of adjacent wetlands (Mid-Ebey Island, Otter Island, Mid-Spencer, and South Spencer Island are relatively undisturbed and are ranked as Group 1 wetlands (i.e. high performance of wetland functions). From a landscape perspective, the pattern of wetland rankings suggests that Ecological Management Units 1 and 2 have a high potential for restoration.

Based on previous field work conducted by SETAC members, it was their conclusion that restoration of diked wetlands will provide fish habitat for the full range of Estuary fish species in addition to much needed overwintering and freshwater/saltwater transition habitat for juvenile salmonids. Additionally, the committee members stated there is a great need in the Estuary to provide for continuous migration corridors for juvenile salmonids and other species. Presently, there are long stretches of shoreline in the Estuary that are degraded by rip-rap and cleared constructed dikes. Restoration of this degraded edge habitat to tidal habitat along slough and river edges will reduce predation of juvenile salmonids, increase feeding opportunities for juvenile salmonids, and decrease water temperature while increasing its dissolved oxygen content. All of these factors together will act to decrease the mortality rate of outmigrating salmon.

5.2.2 Basis for Non-tidal Marsh Enhancement Goal. The management objectives for Ecological Management Unit 1 are to protect agriculture and existing forested and scrub-shrub habitat and to enhance agricultural lands to provide habitat for wildlife such as waterfowl and other wetland-dependent species.

On a regional basis the Snohomish Estuary is an important habitat for overwintering and migrating waterfowl and other waterbirds. It provides an alternative refuge site for waterbirds during the winter to escape severe weather present at estuaries in Northern Puget Sound and the Fraser Estuary in Canada. For example, ducks move 15 to 110 km south from the Fraser River Delta to numerous bays and estuaries in Puget Sound to find food sources (Shreffler & Thom, 1993).

Agricultural fields are very important to a large number of waterbirds. Brennan reports that shorebirds and waterfowl feeding intertidally typically roost in adjacent fields at high tide or during storms (Brennan et al., 1985). Shreffler and Thom (1993) state that large intertidal areas without adjacent farmland usually support fewer ducks and do not provide complete wintering habitat. This is due to the fact that *Zostera japonica* is not available in the winter, and surface feeding ducks switch to feeding in freshwater wetlands. Therefore, in Table 5-4 this Plan identifies the enhancement of specific agricultural fields through a combination of flooding and planting of off-season crops in currently plowed fields for forage and encourages grazing or mowing to reduce the height of reed canary grass.

5.3 Identification of Restoration Enhancement Sites

To identify suitable restoration sites meeting each of the overall restoration and enhancement goals or objectives, the following steps were undertaken by SETAC:

1. Identify the appropriate restoration and enhancement goal (objective) and restoration potential for each restoration site in Estuary (Figures 5.1 and 5.2A and B).
2. Rank the potential restoration and enhancement sites (Figure 5.3).
3. Map the final restoration sites (Figure 5.4).
4. Identify the specific restoration actions for each restoration site. This constituted the restoration plans.

For step 1, criteria critical to successful wetland restoration for each restoration goal were identified by SETAC. These criteria included elevation, substrate type, hydrology and landscape location. The criteria were included in a survey questionnaire which was then applied to each of the 367 wetland complexes in the study area. The wetlands with the highest potential for restoration (i.e. meeting the highest number of restoration and enhancement criteria for each goal) were mapped and are depicted in Figure 5.2A and B. Based on Figures 5.2A and B, the predominant restoration goal criteria for a particular site became the selected restoration goal. If a dominant goal for a site could not be determined, then all goals were ranked in the next step.

In step 2, SETAC ranked each of the restoration and enhancement sites and the goals identified in Figure 5.2. The ranking was based on feasibility and social criteria, including: technical feasibility of implementing restoration/enhancement actions; willingness of owner to sell land for restoration/enhancement; and value of type of restoration habitat to society. SETAC found that of the top seven ranked sites, six were for tidal restoration sites. These sites included: the Poortinga property; North Spencer (Biringer Farm); agricultural lands south of Nyman Farm on the East Mainland (Sunnyside); north end of South Ebey (0.7 miles north of Highway 2); and East Smith Island.

Figure 5.1 - Snohomish Estuary Restoration Goals Criteria Questionnaire

1) Natural¹ Tidal Habitat Restoration Objective (Apply to diked wetlands only)			
Includes restoration of fish, bird, invertebrate functions (This objective would result in the complete or partial removal of dikes).			
1A) Vegetated Tidal Marsh			
Criterion 1 - Site <u>does not</u> contain diked area of group 1 wetlands for the bird, mammal and/or herptile functions.			
Criterion 2 - Circulation. Remnant tidal channels and streams present which will facilitate tidal circulation (drainage ditches do not qualify).			
Criterion 3 - Water Access. A site meets this criterion if it is immediately adjacent to a tidal waterway (separated by a dike) or is within 200 feet of a tidal waterway and would be flooded if the <u>dike on the tidal waterway</u> was broken.			
Criterion 4 - Elevation. More than 50% of the site falls within the elevation range of +7' MLLW to +12' MLLW. (Optimal elevation for emergent plant growth is +9.7' to +11.1' MLLW in the Snohomish Estuary).			
Criterion 5 - Presence of Herbicides. The site has <u>not been</u> cultivated and cropped in the last year (herbicides remain latent in soils and impede growth of wetland vegetation in restoration sites)			
Criterion 6 - Substrate. Site does not contain dredge spoils, fill material (including concrete, asphalt, refuse and upland soils), wood waste or presence of toxic substances in soils.			
1B) Intertidal Mudflat Habitat			
Criterion 1 - Site <u>does not</u> contain diked area of group 1 vegetated wetlands for the bird, mammal and/or herptile functions.			
Criterion 2 - Circulation. Remnant tidal channels and streams present which will facilitate tidal circulation (small drainage ditches which do not contain streams do not qualify).			
Criterion 3 - Water Access. A site meets this criterion if it is immediately adjacent to a tidal waterway (separated by a dike) or is within 200 feet of a tidal waterway and would be flooded if the <u>dike on the tidal waterway</u> was broken.			
Criterion 4 - Elevation. More than 50% of the site falls within the elevation range of -3' MLLW to +7' MLLW.			
Criterion 5 - Presence of Herbicides. The site has <u>not been</u> cultivated and cropped in the last year (herbicides remain latent in soils and impede growth of wetland vegetation in restoration sites)			
Criterion 6 - Substrate. Site does not contain dredge spoils, fill material (including concrete, asphalt, refuse and upland soils), wood waste or presence of toxic substances in soils.			
2) Mudflat Enhancement Objective (Apply to tidal sites only)			
Includes restoration of fish, bird, invert and mammal functions			
Criterion 1 - The site is an existing mud or sandflat that is degraded by log rafting and/or bulkheads (e.g. pile sheeting and pilings)			
3) Wildlife Habitat Enhancement Objective (On Existing Agricultural Land)			
Includes Restoration of Overwintering, Migrating & Breeding Bird Habitat			
Criterion 1 - Site <u>does not</u> contain area of Group 1 vegetated wetlands for the bird, fish and mammal functions.			
Criterion 2 - Normal Flooding Regime During Winter and Spring Months. The percent of seasonal open water is less than or equal to 10% of the total site and the site is currently ditched and drained (i.e. This criterion measures the potential for increasing flooding on a site which provides predator control but does not remove all food sources for overwintering birds - 25% areal coverage of open water is best according to Baldwin & Lovvorn - and this range of open water also benefits breeding and migratory birds)			

Criterion 3 - The site is part of at least a 50 acre agricultural complex (fallow or actively farmed). (Because portions of farm land can be restored to scrub-shrub and forested habitat, breeding and migrating bird objectives would also be met.)		
4) Freshwater and Managed² Tidal Habitat Restoration Objective (Apply to Diked Wetlands only)		
Includes restoration of the fish and migrating, overwintering & breeding bird functions (Note - the primary intent of this Restoration Objective is to allow for the continuation of agriculture by maintaining dikes).		
Criterion 1 - Diked site contains fish or upstream reaches of stream or creek has fish and flows into the subject site.		
Criterion 2 - Water Quality. Year round flowing streams are present on the diked site.		
Criterion 3 - Circulation. Remnant tidal channels and streams present within the diked site which will facilitate tidal circulation (small drainage ditches do not qualify) & comprise 25% of complex perimeter.		
Criterion 4 - Habitat Complexity. Diked site contains or is immediately adjacent to diked Group 1 wetlands for the overall Water Quality and Wildlife Habitat Attribute (Figure 4.3 - e.g. these sites typically contained scrub-scrub or forested habitat which would provide needed shading, terrestrial insects and nutrient input for fish habitat).		
1 - "Natural" means that a restoration site will be open to the full range of tidal influence through breaks in an existing dike and tidal influence shall not be conveyed through culverts or other similar structures including dikes of lower elevation allowing tidal inundation at higher tides but retaining water behind these dikes at lower tides. 2 - "Managed" means that tidal influence on a restoration site will be conveyed through a culvert or other similar structure including dikes which allow tidal inundation at higher tides but retain water behind these dikes at lower tides.		

For Step 4, SETAC mapped the top ranked restoration sites, which were all tidal restoration sites, and determined that enhancement sites should only be used on a "non-regulatory" or volunteer basis. If the enhancement sites were to be used for compensation as part of a regulatory action, they would be reviewed under the COE individual permit process.

For Step 5, SETAC visited each of the top ranked restoration and enhancement sites and developed restoration actions (plans) for them.

5.3.1 Basis for Selecting Restoration/Enhancement Sites for Evaluation. One of the principal objectives of this Management Plan is to restore and enhance the Estuary to a stable, self-sustaining ecosystem. A stable ecosystem will not:

- "collapse" when subjected to the range of possible natural environmental variations such as flooding, erosion and debris flows; or
- require constant human intervention to achieve that stability.

The structure of the restored/enhanced Estuary is critical in creating a stable, self-sustaining ecosystem. Structure consists of "patches" of habitat, their shape and location in the Estuary, and the corridors connecting these patches. Without all of these elements, restoration and enhancement efforts have little chance of success (Shreffler & Thom, 1993). In general, tidal marshes of at least 250 to 300 acres appear to be stable and functional ecosystems (Collins et al., 1987). Patches of larger size tend to support more species, unless they are widely

SEWIP Complexes with Highest Potential for Tidal Restoration

Criteria Established in
August, 1995

Legend

- High Tidal Veg. Marsh Obj.
- High Mudflat Rest. Obj.
- Lower Tidal & Mudflat
Restoration Potential
- No Restoration Potential

NOTE: The final restoration sites &
objectives are shown on Figure 5.4 .

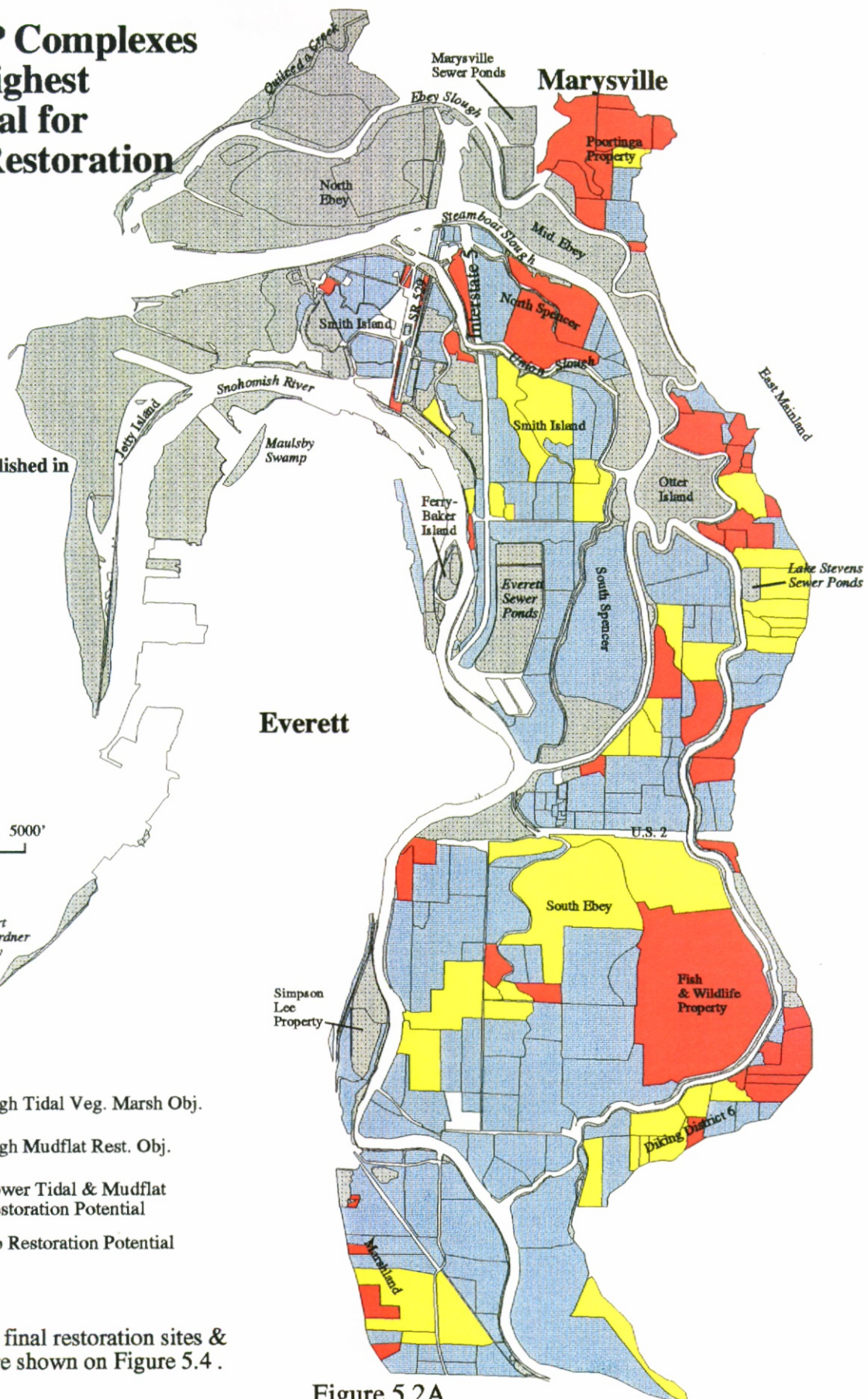
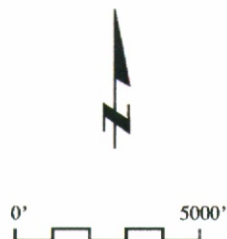


Figure 5.2A

SEWIP Complexes with Highest Potential for Non-Tidal Enhancement

Criteria Established in
August, 1995



Legend

-  High Wildlife Habitat Enhancement Potential
-  Lower Wildlife Habitat Enhancement Potential
-  No Enhancement Potential

NOTE: The final restoration sites & objectives are shown on Figure 5.4 .

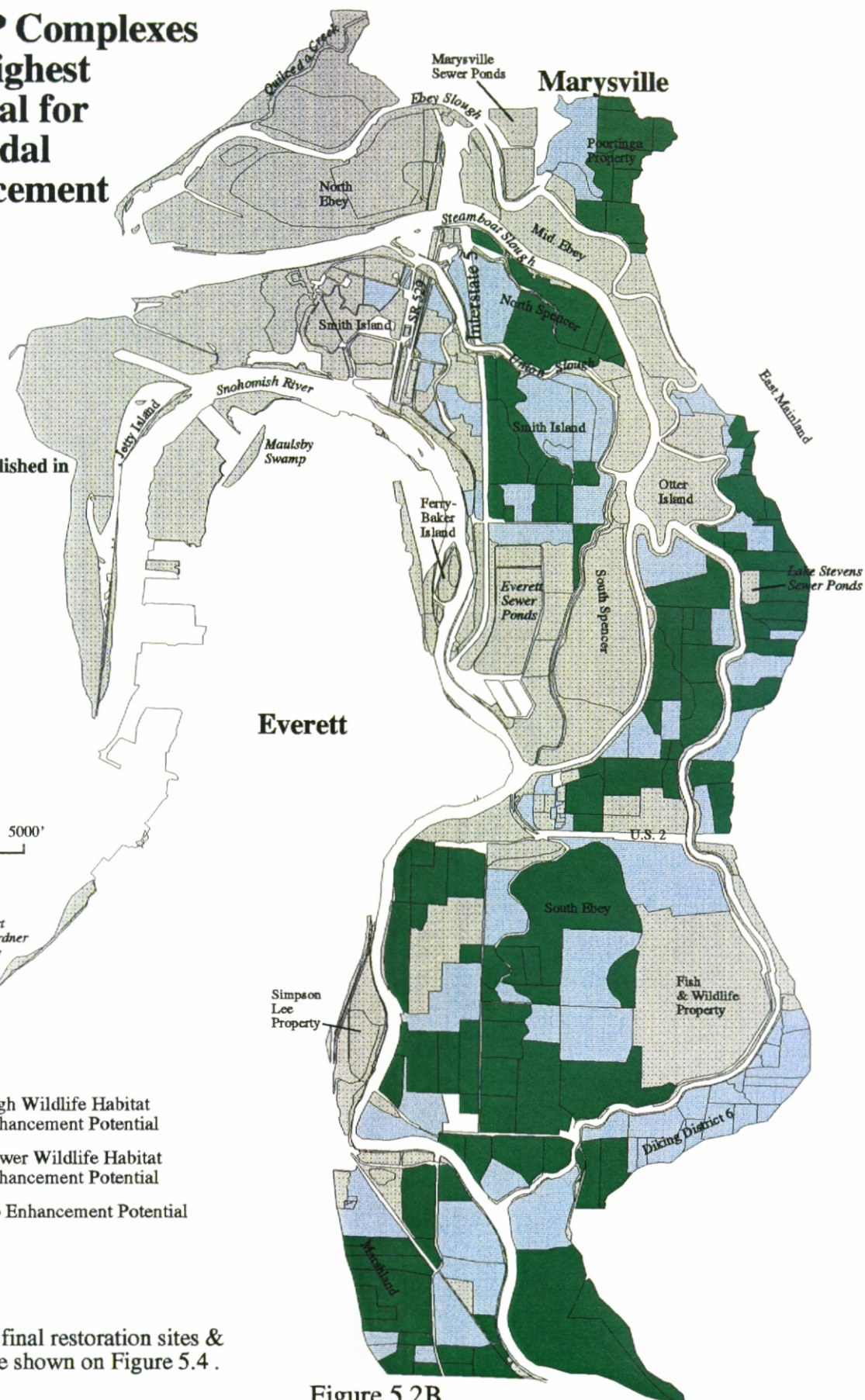


Figure 5.2B

separated small patches whose isolation results in increased speciation through the "island effect" (Shreffler & Thom, 1993). Patches should be connected in a manner that promotes export of primary productivity, movement of fish and animals, and a high diversity of "non-opportunistic" native species. Shreffler and Thom concluded that "unconnected habitats are not preferable and that restoration of systems supporting large and small habitats, with maximum connectance, is a more appropriate restoration concept."

To implement these principles for vegetated wetlands, the restoration sites considered for evaluation are large areas of habitat that are adjacent to the "core" of Group 1 wetlands which are relatively undisturbed. These tidal restoration areas are depicted in Figure 5.4A and include the Poortinga Property on the east mainland, North Spencer Island and Drainage District 6. To increase habitat connectivity the Plan is recommending enhancement of scrub-shrub corridors along ditches at the edge of agricultural fields, particularly between the forested habitat on South Ebey and along the "water-edge" units.

5.3.2 Effect of Elevation on Restoration Goal. Elevation is a primary control on most tidal marsh processes because it determines the frequency and period of daily and seasonal tidal inundation (Frenkel 1990). Therefore, elevation was one of the primary criteria in evaluating the appropriate type of restoration for the selected restoration sites.

Based on City of Everett and Snohomish County review of 1973 Corps of Engineers elevation maps and soil surveys, it was determined that considerable subsidence appears to have occurred in the Estuary as the result of diking, draining and farming activities. The 1973 COE elevation maps were based on air photo interpretation. Subsidence has been well documented in the San Francisco Bay area delta farmlands due to degradation (oxidation and collapse) of the peat soils and compaction of the clay-peat soils by farming activities (Josselyn et al, 1989). The Snohomish silt loams within the Estuary are underlain by peat and would be subject to the same process of oxidation and compaction once they were drained and farmed.

Estuary subsidence can be observed in the area that incorporates Otter Island and the East Mainland farmlands, directly to the southeast across Ebey Slough by the Lake Stevens Sewer Plant (WC 213 & 229). The same soil type, Puget Silt Clay Loam, underlies this entire area and should have been within the same elevation range prior to diking in the 1800's. Because Otter Island has never been diked, it is assumed that its present elevation reflects the historical elevation for adjacent areas with the same soil type. The elevation of the East Mainland wetland complexes within the same soil unit, however, is approximately five to six feet lower (+7 to +8 ft MLLW) than that of Otter Island (+13 ft MLLW). Much of the farmed diked wetland complexes within the Estuary have a ground surface elevation of +7 to +8 ft MLLW.

Predicting vegetation types based on elevation is difficult because a variety of interacting factors (salinity, elevation, velocity of tidal waters, length of inundation) constantly change in relationship to each other as one moves from the mouth of the Estuary to areas upstream. General predictions can be made based on previous research and on SEWIP vegetation inventories and elevation data, as provided in Table 5.1.

Figure 5.3 Technical & Social Ranking Criteria for Restoration/Enhancement Sites

Technical Feasibility Criteria (Includes Consideration of Cost of Implementing Project)

Technical measures for project sites were ranked high if they were found to present no major technical obstacles to the implementation of proposed general restoration/enhancement objectives established from Figure 5.1 and depicted in Figure 5.2 for the site. For example, a site recommended for tidal restoration would rank high under the "technical feasibility criterion" if it was easy to flood and offered existing natural and human-made features that would reduce the need for extensive cross-diking, and did not present major technical obstacles such as the need to relocate major public utilities (large water and electrical lines and facilities). If the technical costs were judged to be excessive, the project was ranked low.

Very High	5	No technical difficulties
High	4	Minor technical difficulties
Medium High	3	Moderate to minor technical difficulties
Medium	2	Moderate technical difficulties
Low	1	Significant technical difficulties

Land Status Criteria

Very High	5	Land(s) privately owned – owner(s) has expressed willingness to sell all of property being considered for restoration/enhancement.
High	4	Land(s) privately owned. Some land owners have indicated willingness to sell.
Medium High	3	Portion in public ownership. Other owners either willing to sell or status unknown.
Medium	2	Significant portion of the land publicly owned or voluntary "non-regulatory restoration/enhancement" measure proposed.
Low	1	Owner(s) unwilling to sell or status unknown.

Position in Landscape Criteria

Very High	5	Restoration/enhancement will be a "saltmarsh or mudflat".
High	4	Restoration/enhancement will be a "brackish" tidal marsh.
Medium High	3	Restoration/enhancement will be a fresh water tidal marsh.
Medium	2	Restoration/enhancement will be a fresh water diked marsh.
Low	1	Restoration/enhancement will be creation of habitat corridors or enhancing flooding regime of agricultural wetlands, or planting edges of field with wetland and buffer species.

Wetland researchers have found that most intertidal vascular emergent species occur primarily between Mean Lower High Water (+9.39 ft. in Snohomish Estuary) and Mean Higher High Water (11.11 ft. in Snohomish Estuary) (Lewis 1982).

Table 5.1 indicates that mudflats are generally found below +6 feet MLLW; emergent wetlands generally above +7 feet MLLW; and scrub-shrub, forested marshes above +12 feet MLLW.

In terms of plant species diversity, a restored tidal marsh at +7 feet MLLW may have only one dominant species, two dominant species at + 8 feet MLLW, and three dominant species at +9 feet MLLW. Plant species diversity generally increases above +12 MLLW where a combination of emergent, scrub-shrub and forested wetland classes were found. It should be cautioned that plant diversity alone is not a good indicator of the overall performance of functions for tidal marshes. These marshes typically have low plant diversity but high performance for the primary productivity and fishery functions.

Table 5.1
Selected Species and Observed Elevations in Estuary

Elevation Above MLLW in Feet	Dominant Plant Species	Habitat Type	Wetland Complex Number
+ 5.9 MLLW	Marine Algae, Diatoms (Mudflat)	Intertidal Mudflat	19, 171 Entrance Mudflats
+ 6.9 MLLW	<i>Carex lyngbyei</i>	Emergent Intertidal Salt Marsh	133, 134, 135, 18 Quilceda, N. Ebey, W. Smith
+ 9.9 MLLW	<i>Carex lyngbyei</i>	Emergent Brackish Intertidal Marsh	144, 138 Mid Ebey and Spencer
+ 8.8 MLLW	<i>Scirpus acutus</i>	Emergent Intertidal Salt Marsh	132 Quilceda
+ 7.9 MLLW	<i>Scirpus acutus</i>	Emergent Intertidal Brackish Marsh	148 Mid Ebey
+ 8.9 MLLW	<i>Typha latifolia</i>	Emergent Intertidal Brackish Marsh	144 Mid Ebey
+ 11.9 MLLW	<i>Typha latifolia</i>	Emerg/SS/Forest Intertidal Brackish & Freshwater Marsh	105 Otter Island
+ 11.9 MLLW	<i>Lonicera involucrata</i>	Scrub-shrub Intertidal Brackish Marsh	141 Mid Ebey
+ 12.9	<i>Lonicera involucrata</i>	Scrub-shrub Intertidal Brackish Marsh	137 South Spencer

Source: SEWIP Wetland Complex Inventories and COE 1973 Flooding Map for Snohomish Estuary

Table 5.2 Restoration Site Ranking Scores and Prioritization
(Sites # 1, 2, 2A, 3, 4, 4A are full-tidal restoration, and # 5 is partial tidal)

Restoration Site Rank and WC #	Technical Criteria	Land Status Criteria	Position in Landscape Criteria	Total Points for Three Criteria
1) Poortinga, WC 146, 147, 339-343, 360-363	3	5	4	12
2) North Spencer (Biringer Farm) WC 268, 295-301, 303-306	5	2	4	11
2A) Agricultural Lands South of Nyman. Diking District 4. WC 124, 130, 178, 210-213, 215, 217-220, 221-226, 229, 326, 327, 337, 338, 333-335, 358	4	4	3	11
3) South Ebey north of Hwy 2, Alter 2, WC 102, 103, 104, 106-108, 110-115, 348.	4	3	3	10
3A) South Ebey WC 60, 61, 63, 66, 69	5	3	2	10
4) South Ebey north of Hwy 2, Alter 1. WC 103 and 104.	4	2	3	9
4A) East Smith Island. WC 31, 32, 32.1, 34-40, 42, 42.1, 43, 98, 99, 345.	4	1	4	9
5) Nyman Farm. WC 139	3 (Engineering for culverts difficult due to partial tidal regime)	2	3.5	8.5
6) South Ebey, South of Hwy 2, WC 81	5	1(2)	2	8 (9-Non regulatory)
6A) South Ebey, WC 84	5	1(2)	2	8 (9-Non Regulatory)
6B) Drainage District 6, South of city of Everett Water Line, WC 96, 242, 243, 246-249.	5	1(2)	2	8 (9-Non Regulatory)
6C) Marshland. WC 193, 195-197, 198-205, 207, 208, 209, 262-265, 318-321, 322-325, 329, 330	5	1(2)	2	8 (9-Non Regulatory)
6D) Southwest portion of S. Ebey, WC 206	4	1(2)	3	8 (9-Non Regulatory)
6) Swan Slough WC 251-252	5	1 (2)	2	8 (9-Non Regulatory)
7) Drainage District 6 North of City of Everett Water Line. WC 230-233, 235-241, 245, 331, 332	2	2	3	7
7A) Southwest portion of S. Ebey. WC 64-65	5	1 (2)	1	7 (8-Non Regulatory)
8) Swan Slough WC 253	3	1 (2)	2.5	6.5 (7.5-Non Regulatory)
9) South Ebey WC 83, Fish & Wildlife Property - Manage Site as is	NA	NA	NA	NA

"Non-regulatory score" reflects the implementation of voluntary measures at site.

SEWIP Top Ranked Restoration & Enhancement Sites and Development Footprint

(See Table 5.3)

**SETAC
Alternative
(Not COE
Approved)**

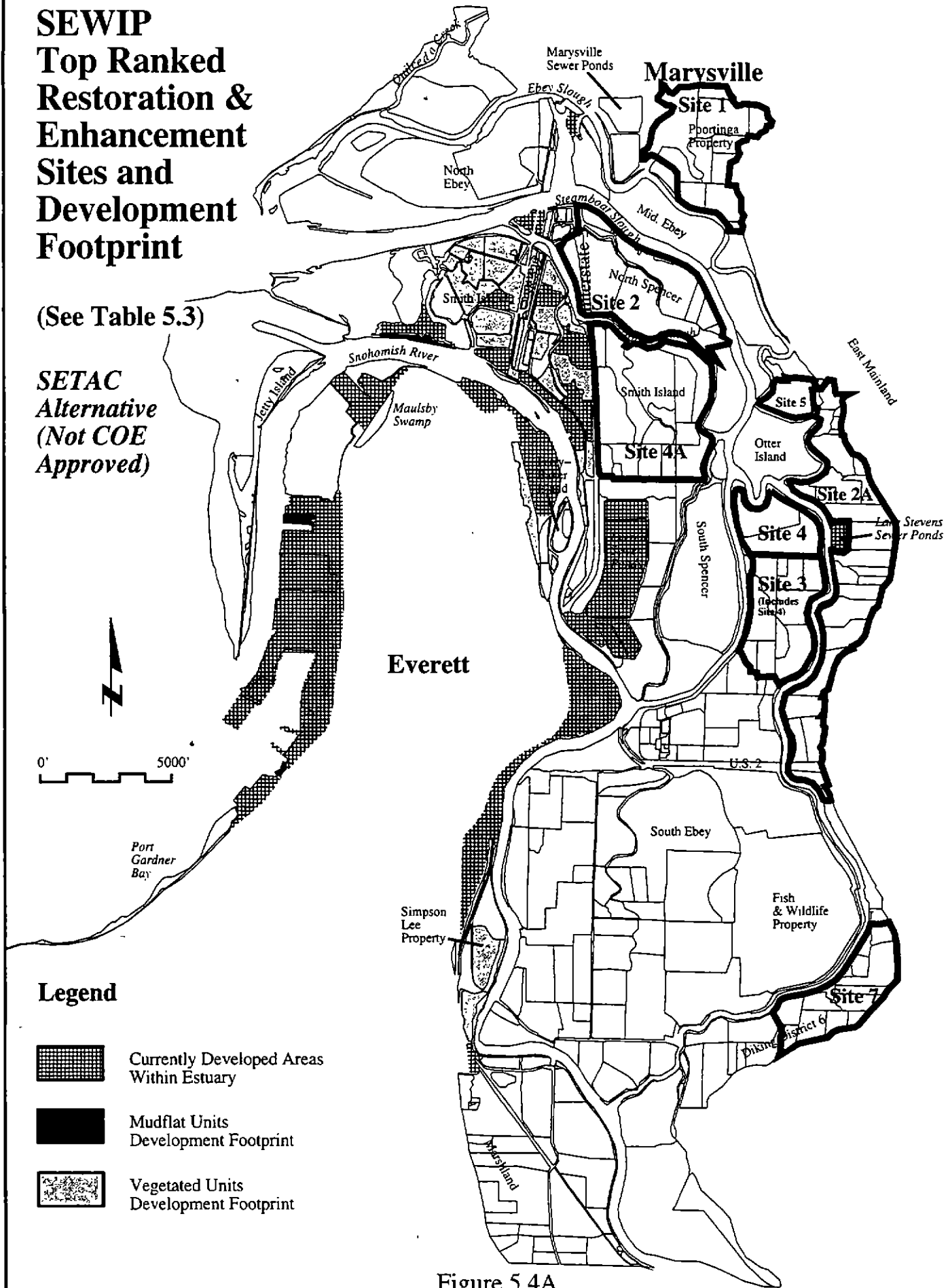


Figure 5.4A

SEWIP Top Ranked Restoration & Enhancement Sites and Development Footprint

(See Table 5.3)

*City of Everett
Alternative
(Not COE
Approved)*

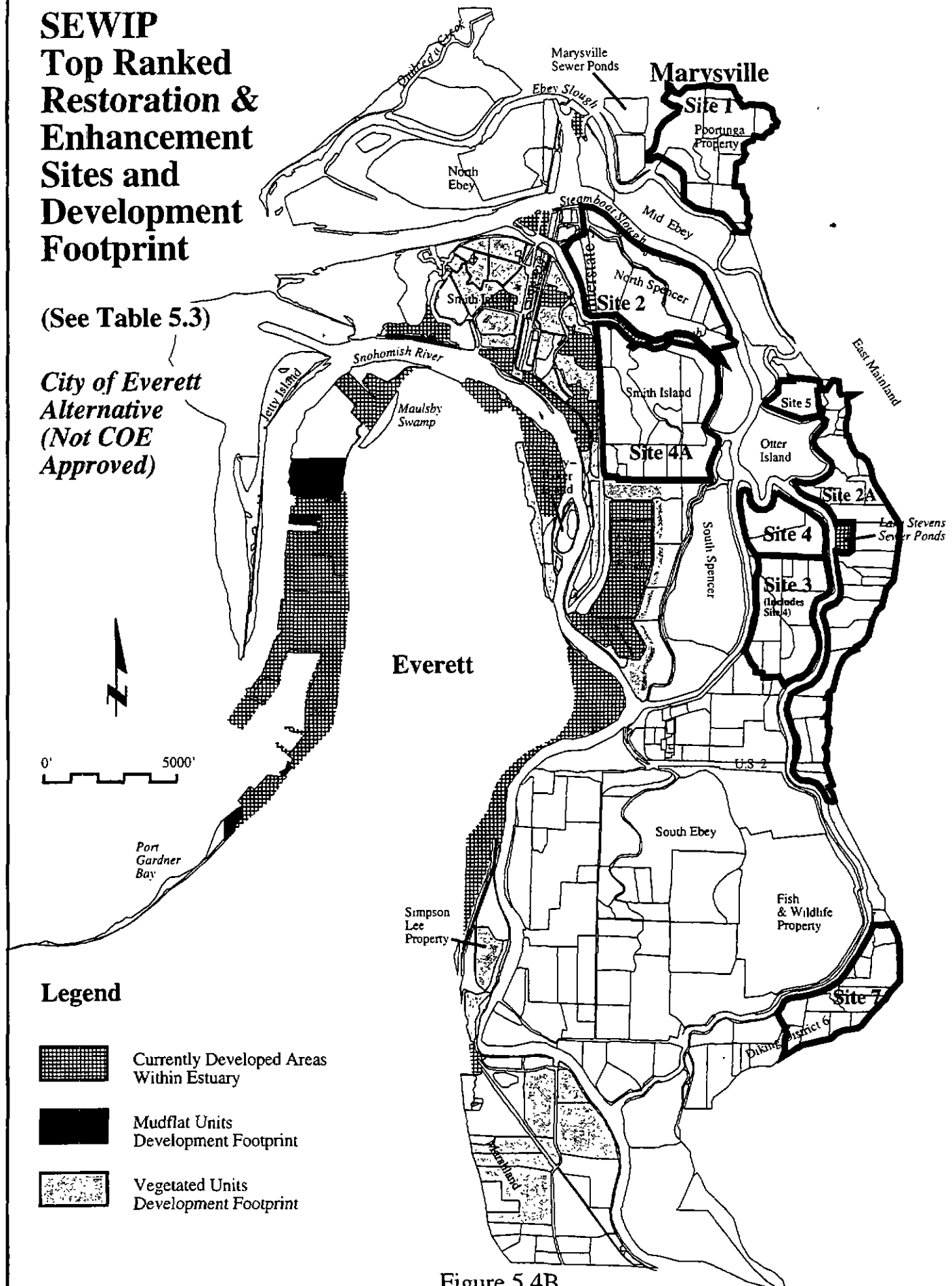


Figure 5.4B

Therefore, the lower limit for vegetated tidal marshes in the Estuary appears to approximately be +7 to +8 MLLW. For the Restoration Objectives Criteria Questionnaire, restoration sites above +7 MLLW were considered to be potential vegetated wetlands, and restoration sites below +7 MLLW were considered potential mudflat habitat.

Because a large portion of the Estuary has subsided to elevations ranging from +5.9 feet MLLW to +8.9 feet MLLW, SETAC was concerned that return to full tidal influence may result in large areas of unvegetated habitat and homogenous emergent communities without the establishment of the historical forested and scrub-shrub communities. Northwest researchers have documented that sediment accretion ranges from very slow to rapid in restored estuarine wetlands. The mean sediment accretion, for example, in a restored Salmon Creek Estuary tidal marsh was 3.6 cm (1.4 inches) with a maximum of only 7.7 cm (3 inches) over a 10-year period (Frenkel 1990). This sediment accretion measurement included the effects of soil "rebound" caused by the buoyancy effect of water on the soil column. Therefore, if a diked agricultural field at elevation +8 MLLW were restored to tidal circulation, elevations suitable for a forested, scrub-shrub swamp may not be attained for more than 160 years based on the maximum accretion rate for the Salmon Creek Estuary.

Sediment accretion for the Gog-Le-Hi-Te estuarine wetland restoration in the Puyallup River Estuary, however, was an average of 4.8 cm per year (2 inches) with a maximum accretion rate of 25 cm per year (10 inches) (Simenstad, 1995). Applying these erosion rates to the previously diked +8 MLLW agricultural field, elevations suitable for a forested, scrub-shrub swamp would be reached within 4.8 to 24 years. Given this range of accretion rates and the fact that any restoration would be a permanent long-term project, it was decided that the potential initial homogeneity of the emergent or mudflat habitat would not negatively impact the wetland functions over the long term.

5.4 Restoration/Enhancement Plans and Actions

Based on September 22 and October 16, 1995 field visits to each restoration and enhancement site, the Technical Committee identified appropriate "restoration actions" for each site. These actions are listed in Table 5.3 and include:

Tidal Restoration Actions:

- Restore to full tidal regime;
- Restore tidal emergent habitat;
- Remove maximum dike area to maximize tidal exchange and facilitate the sediment accretion process;
- Grade dike down to provide natural shelf transition from river slough to wetland and create islands out of remaining dike areas;

- Reconnect tidal streams and sloughs;
- Excavate channels to “pre-dike depths;”
- Facilitate natural dendritic channel formation. Circulation design should be based on hydrological analysis and may include filling in of existing ditches;
- Restore and enhance minimum 25-foot inland edge of buffer for tidal wetland;
- Restore scrub-shrub and forested habitat;
- Restore to partial tidal in order to protect existing significant non-tidal palustrine habitat. Site culverts at higher elevations rather than breach dike. Culverts should be designed to allow fish access and minimize fish stranding;

Non-Tidal Restoration Actions

- Maintain existing significant area of scrub-shrub and forested habitat;
- Restore and enhance minimum 25-foot “edge-of-field” areas and stream buffers with scrub-shrub buffer habitat – concentrate on areas where such buffer scrub-shrub habitat would reconnect larger Group 1 wetlands;
- Maintain and/or enhance existing palustrine emergent habitat including existing areas of open water; and
- Manage as non-tidal palustrine wetland, with seasonal flooding increased to a minimum of 25% of the wetland area.

The identified actions for each restoration and enhancement site constitute the basic restoration and enhancement plans. Any changes to these plans beyond those actions identified must be approved by the Snohomish Estuary Technical Oversight Committee (see Compensation Policy G.6).

Because elevation will be critical to the type of plant community and whether plant communities will establish in tidal restoration sites, it is important that exact elevation surveys be performed in proposed tidal restoration sites and adjacent functioning tidal wetlands. This survey should include soil salinity and soil texture data. Hydrological modeling of the restoration site must also be performed to ensure that full tidal exchange is attained.

5.4.1 Basis for Selecting Restoration Actions. Particular attention was paid to the potential sediment accretion rate for the Estuary when developing the restoration actions, because it affects elevation, which controls the type of estuarine habitat that will be present. Frenkel and Morlan (1990) found that sediment accretion was highest in those areas that had the greatest

degree of tidal exchange. This typically occurred around tidal creeks. The least amount of sediment increase occurred in areas which still had dikes in place. Frenkel and Morlan also found that tidal creeks were a major determinant in marsh hydrology (Frenkel 1990). Their study also demonstrated that sediment accretion was the slowest in areas located behind long portions of remnant dike.

On the basis of this work, the restoration actions recommend that the maximum practicable length of dike be removed for tidal restoration and that old sloughs and tidal creeks be re-connected with the main tidal channel by over-excavating where the old sloughs and tidal creeks cross the former dike location. Complete removal of the dike, or a large breach, will also allow for the accumulation of large woody debris, which will increase wetland elevation in severely subsided areas and allow for the formation of a more diverse wetland plant community.

Other actions for facilitating dendritic channel formation are based on work demonstrating that fish and macroinvertebrate use is a function of marsh edge to area, and general observations that these channels increase fish access to intertidal marshes (Simenstad 1995).

Actions providing for the creation of scrub-shrub and forested habitat are designed to reduce habitat fragmentation and patchiness and increase buffering adjacent to high- and medium-value habitat areas. Overall, implementation of these measures would provide a complete link from the mouth of the Estuary to the southernmost portion of the study area.

Restoration and enhancement actions for waterbird habitat (increase flooding to 25% of site area) were based on work by Brennan (1985) and Shreffler and Thom (1993) demonstrating that agricultural fields provided important feeding and resting habitat for overwintering waterfowl (see section 5.2.2).

5.5 Development Footprint

The process for identifying the development footprint involved three steps. The User Group first identified the "draft" footprint based on results of the IVA model (wetland and mudflat habitat assessment), including assessment of social significance functions. The second step was calculation of the development "debits" from the IVA scores and comparison of those debits to the "credits" that would be gained from the restoration and enhancement actions. Because the restoration and enhancement credits were greater than the "debits" generated by the development footprint, the development footprint selected by the User Group (June 15, 1995 meeting) was then known to be feasible. As a final step the SETAC reviewed the development footprint during May 1995 and excluded Maulsby Mudflat based on extensive use of the area by migrating shorebirds, waterfowl and piscivorous birds (e.g. bald eagle, osprey and great blue heron). Appendix M contains a more detailed description of the wildlife usage of Maulsby Mudflat. The final footprint is presented in Figures 5.4A and 5.4B.

Table 5.3 SEWIP Restoration Plans for Each Restoration Site															
	Dike Areas			Tidal Streams and Sloughs			Buffer & Habitat Structure					Hydrological Regime			
	Removal of maximum area of dike	Grade dike down to provide natural shelf transitions from river-slough to wetland	Create islands out of remaining dike areas	Reconnect remnant tidal streams and sloughs	Excavate channels to "pre dike depths"	Facilitate natural dendritic channel formation - fill interior drainage ditches, leave larger peripheral ones	Restore and enhance minimum 25 foot inland edge of dike buffer for tidal wetland	Restore and enhance minimum 25 foot "edge of field" and exist. streams with scrub-shrub buffer habitat for agricultural wetlands in order to connect larger habitat "patches"	Restore scrub-shrub and forested habitat	Maintain existing significant areas of scrub-shrub and forested habitat (non-tidal)	Restore tidal emergent habitat	Maintain and/or enhance existing non-tidal palustrine emergent habitat including existing areas of open water	Restore to full tidal regime	Restore to partial tidal in order to protect existing signif. non-tidal palustrine habitat. Site culverts at higher elevations rather than use dike break. Culverts should be designed to allow some fish passage.	Manage as Non-Tidal Palustrine Wetland with seasonal flooding increased to a minimum of 25% of wetland
Site Location	Yes	Yes	Yes	Yes	Yes	Yes	Yes	-	-	-	Yes	-	Yes	-	-
	Yes	Yes	Yes	Yes	Yes	Yes	Yes	-	-	-	Yes	-	Yes	-	-
	Yes	Yes	Yes	Yes	Yes	Yes	Yes	-	-	-	Yes	-	Yes	-	Yes
	Yes	Yes	Yes ²	Yes-	Yes	Yes	Yes	-	-	See Footnote # 3.	Yes	-	Yes	-	-
	Yes	Yes	Yes ²	Yes-	Yes	Yes	Yes	-	-	- See Footnote # 3.	Yes	-	Yes	-	-
4A) East Smith Island. WC 31, 32, 32.1, 34-40, 42, 42.1 43, 98, 99, 345.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	-	-	-	Yes	-	Yes	-	-
5) Nyman Farm . WC 139			-	Yes - Limited connection thru culverts	-	Yes	Yes	-	-	Yes	Yes	Yes - Some exist emerg. in Forested area	-	Yes	-
7) Drainage District 6 North of City of Everett water line. WC 230-233, 235-241, 245, 331, 332	Yes	Yes ⁴	Yes	Yes	Yes	Yes	Yes	-	-	See Footnote #5	Yes	-	Yes	-	-

1 - Note: group did not agree on how far south tidal inundation should occur, so two alternatives were selected which will be run through Tech & Economic Criteria/

2 - Additional islands would be created in the interior from ditch sidecasting etc. to create new Sitka Spruce habitat that would be lost from tidal flooding.

3 - It was decided that this would be very difficult to design and maintain existing forested habitat. Thus snags will be created and new scrub/shrub & forested habitat created on islands and sidecasting from ditches.

4 - Limited to areas where dike is removed because dike will be used for pedestrian access.

5 - Existing scrub-shrub habitat will be inundated & will die off (snags will be created) on WC 232, 245, & 332..

Table 5.4 SEWIP Enhancement Plans (Non Regulatory)

Site Location	Dike Areas				Tidal Streams and Sloughs				Buffer & Habitat Structure				Hydrological Regime		
	Removal of maximum area of dike	Grade dike down to provide natural shelf transition from river-slough to wetland	Create islands out of remaining dike areas	Reconnect remnant tidal streams and sloughs	Excavate channels to "pre-dike depths"	Facilitate natural dendritic channel formation - fill interior drainage ditches, leave larger peripheral ones	Restore and enhance minimum 25 foot inland edge of buffer for tidal wetland	Restore and enhance minimum 25 foot "edge of field" and exist. streams with scrub-shrub buffer habitat for agricultural wetlands in order to connect larger habitat "patches"	Restore scrub-shrub and forested habitat	Maintain existing significant areas of scrub-shrub and forested habitat (non-tidal)	Restore tidal emergent habitat	Maintain and/or enhance existing non-tidal palustrine emergent habitat including existing areas of open water	Restore to full tidal regime	Restore to partial tidal in order to protect existing signif. non-tidal palustrine habitat. Site culverts at higher elevations rather than use dike break Culverts should be designed to allow some fish passage.	Manage as Non-Tidal Palustrine Wetland with seasonal flooding increased to a minimum of 25% of wetland
3A) South Ebey WC 60,61 63, 66, 69								Yes	Yes	Yes		Yes			Yes
6) South Ebey, S. of Hwy 2, WC 81,	-	-	-	See Footnote #1	-	-	-	Yes	-	Yes	-	Yes	-	See Footnote 1.	Yes
6A) South Ebey, S. of Hwy 2, WC 81	-	-	-	See Footnote #1	-	-	-	Yes	Yes ²	Not on site. Present to south on WC 83		Yes		See Footnote 1.	Yes
6C) Swan Slough Agric. WC 251, 252	-	-	-	-	-	-	-	Yes	-	- None	-	Yes	-	-	Yes
8) Swan Slough WC 253	-	-	-	-	-	-	Yes	-	? May be possible		Yes	-	Yes	-	-
9) South Ebey WC 83, Fish & Wildlife Prop. - <i>Manage site as is</i>	-	-	-	-	-	-	-	Yes ³	-	Yes	-	Yes	-	-	-
10) Diking Dist 6, South of City of Everett water line. WC 96, 242, 243, 246-249	-	-	-	-	-	-	-	Yes	Yes	Yes ⁴	-	Yes	-	-	Yes
11) Southern half of S. Ebey. WC 57, 58, 64, 65, 72, 73, 75, 76, 78-80, 82, 85-95, 97, 100, 346	-	-	-	-	-	-	-	Yes	-	Yes	-	Yes	-	-	Yes
12) Southwest portion of S. Ebey. WC 64-65	-	-	-	-	-	-	-	Yes	Yes ⁵	Yes	-	-	-	-	Yes
13) Southwest portion of S. Ebey, WC 206	-	-	-	Yes ⁶	-	-	-	Yes ⁷	-	-	-	-	-	Yes ⁸	-
14) Marshland. WC 193, 195-197, 198-205, 207, 208, 209, 262-265, 318-321, 322-325, 329, 330	-	-	-	-	-	-	-	Yes	-	Yes - limited to WC 193, 196, 199, 202	-	Yes	-	-	Yes

1 - Depending on feasibility consideration of limited fish passage in old tidal sloughs should be considered.

2 - Would be limited to no more than 10% of site (on higher lands located on the eastern and southern edges).

3 - The edges of agricultural lands to west, north and south can be restored to scrub/shrub habitat (implementation of this action is dependent on cooperation of these adjacent owners).

4 - The scrub-shrub vegetation. is limited to north-east corner of WC 96 & 242.

5 - Western upland edge would be expanded significantly (+100 feet) to provide wildlife corridor.

6 - An existing ditch with a tide gate could be reconnected to the wetland on WC 206.

7 - Would require cooperation of owner on WC 67 which is agricultural land.

8 - Existing scrub-shrub habitat dominated by Pacific willow would not be negatively impacted by tidal flooding because tidal waters are essentially fresh water at this location.

5.6 Restoration/Enhancement Credits

The restoration and enhancement sites with the identified "restoration/enhancement actions" were re-scored with the IVA model. The restoration/enhancement credits were calculated by subtracting the existing IVA score for the specific wetland complex from the new restoration/enhancement score. By comparing these credits to the total possible debits from filling the development footprint, SETAC determined that there were adequate restoration/enhancement credits (compensation) to offset the impacts or debits of the development footprint. For example, Table 5.5 demonstrates that the restoration/enhancement credits for the number one priority restoration site, the Poortinga property, are sufficient to offset all of the development footprint impact debits.

Table 5.5 Development Debits and Restoration Credits for Vegetated Wetlands				
Site	Impacts to Water Quality Functions in Acre Points	Restoration Credits for Water Quality Functions in Acre Points	Impacts to Wildlife Functions in Acre Points	Restoration Credits for Wildlife Functions in Acre Points
Development Footprint for Vegetated Wetlands	10,761	None	4500	None
Priority #1 Restoration Site, Poortinga Property	None	16,350	None	18,326

The credits for both the restoration and enhancement of mudflats were also found to offset potential development impacts. For the enhancement of mudflats, however, the SETAC concluded that the benefit derived from removing log-rafts could not offset the loss of mudflat habitat through filling because: (1) the mudflat habitat was already present in the system and provided some functions because rafting was cyclical; and (2) mudflat habitat is more limited in the Estuary, and there is less potential for restoration than for vegetated wetlands. Therefore, SETAC developed a policy which required a 1:1 restoration or creation of mudflat habitat within the Estuary.

5.7 Compensation Ratios

With adequate compensation credits available in the Estuary, SETAC turned next to calculating the appropriate compensation ratios. By examining the average increase for the Water Quality Improvement and Wildlife Functions for each restoration and enhancement site, and comparing that increase to the impact debits for the corresponding functions in the Development Footprint, the overall compensation ratio was determined.

Table 5.6 presents the calculated replacement ratio based on the Chapter 2 compensation policies for the top-ranked restoration sites for vegetated wetlands.

The compensation ratios in Table 5.6, based on the actual IVA scores and compensation policy G.3A, were less than 1:1. In these circumstances, SETAC required that a minimum 1:1 replacement acreage be provided. This ratio is based on existing state and federal policies of no net loss of function and acreage. Table 5.7 lists the actual IVA scores for the development footprint and restoration sites that were used to calculate the compensation ratios in Table 5.6. More detailed examples of the actual IVA scores for the development footprint and restoration sites and the calculated compensation ratios are provided at the end of Chapter 2 and in the meeting staff reports and minutes (Appendix A, available separately).

Table 5.6 Summary of Calculated Compensation Ratios for Snohomish Estuary Vegetated Wetlands (Policy G.3A) Based on One Acre of Impacted Wetland in Development Footprint	
Restoration Priority and Location	Final Compensation Ratio Required Based on General Compensation Policies (based on 1:1 minimum and 25% increase to account for temporal loss)
Priority 1 – Poortinga	1:1
Priority 2 – N. Spencer (Biringer)	1:1
Priority 3 – E. Smith Island	1.2:1
Priority 4 & 4A – East Mainland	1.5:1

**Table 5.7 Calculated Compensation Ratios for
Snohomish Estuary Vegetated Wetlands (Policy G.3A)**

Based on 1 Acre of Impacted Wetland in Development Footprint

Restoration Priority and Location	Wetland Function	Average Performance of Functions for Develop- ment Footprint (per acre)	Average Increase in Performance for Restoration/ Enhance- ment Area. (per acre)	Acres Required to Offset Develop- ment Impacts Based on Column 3 divided by Column 4	Acres Required to Offset Development Impacts Based on Chapter 2 Compensation Policies	Final Compensation Ratio Required Based on General Compensation Policies in Chapter 2. Calculated by dividing column 3 by column 4 for the limiting functions and increasing product by 25% to account for temporal habitat loss. Minimum Compensation Ratio must be 1:1.
Priority 1 - Poortinga	Wildlife	13	57	0.2 acres	not the limiting function	not the limiting function
Priority 1 - Poortinga	Water Quality	31	51	0.6 acres	1 acre	1:1
Priority 2 - N. Spencer (Biringer)	Wildlife	13	54.5	0.2 acres	not the limiting function	not the limiting function
Priority 2 - N. Spencer (Biringer)	Water Quality	31	41.8	0.7 acres	1 acre	1:1
Priority 3 - E. Smith Island	Wildlife	13	51.2	0.3 acres	not the limiting function	not the limiting function
Priority 3 - E. Smith Island	Water Quality	31	32.8	1.2 acres	1.2 acre	1.2:1
Priority 4 & 4A - East Mainland	Wildlife	13	53.4	0.2 acres	not the limiting function	not the limiting function
Priority 4 & 4A - East Mainland	Water Quality	31	26.6	1.2 acres	1.5 acre	1.5:1

SEWIP Wetland Complex Wildlife Scores

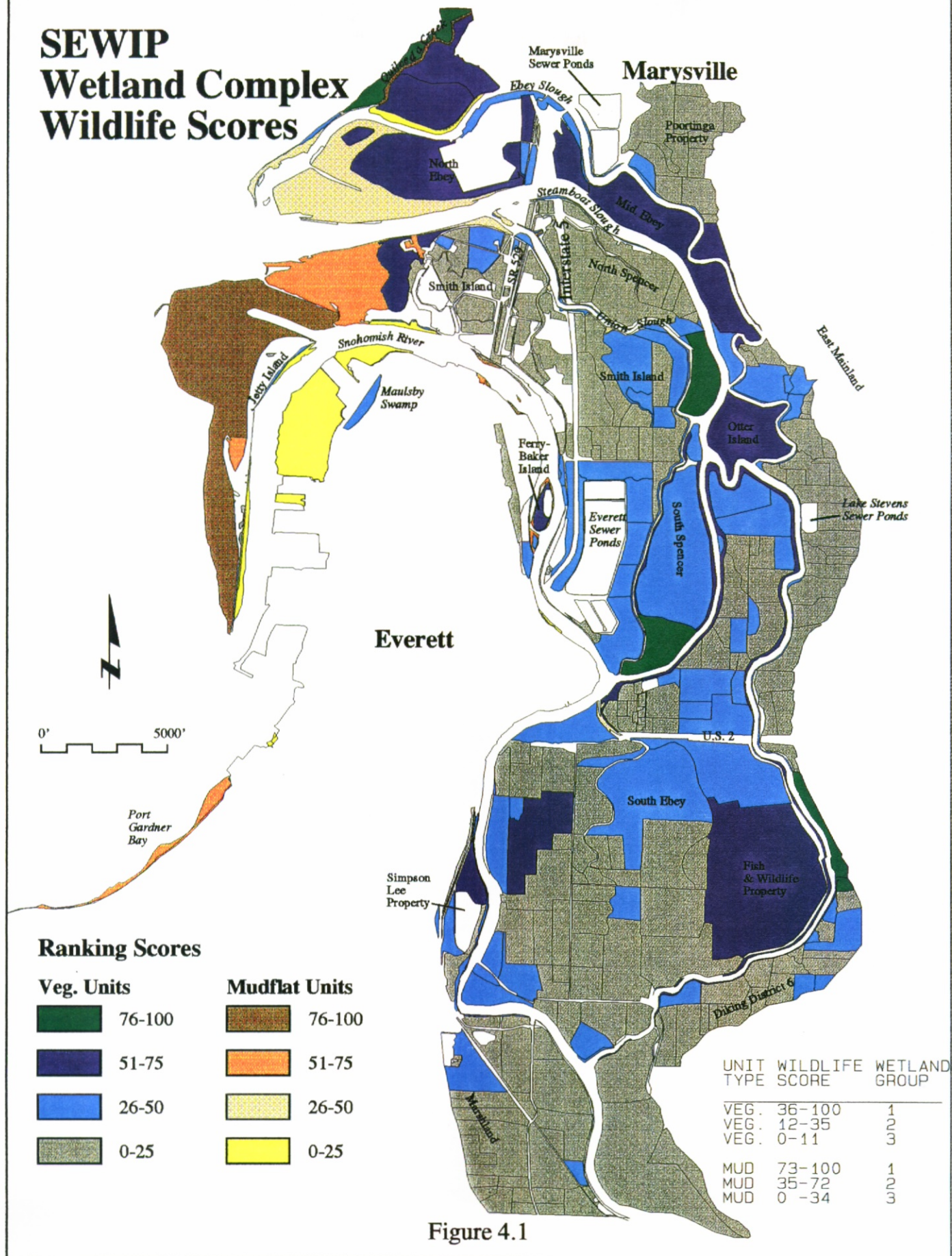


Figure 4.1

SEWIP Wetland Complex Water Quality Scores

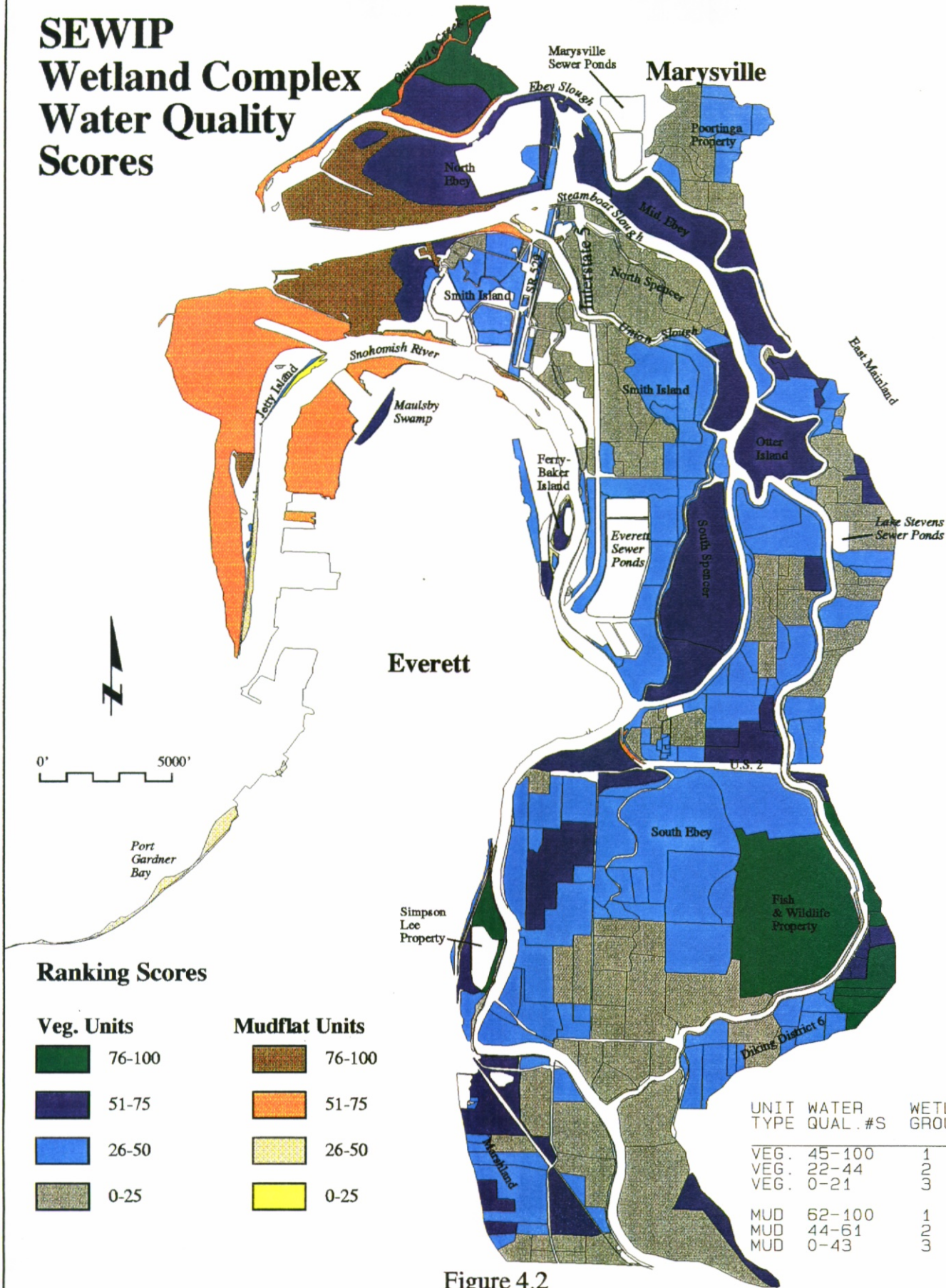


Figure 4.2

Appendix F – Wetland Rating Worksheet

WETLAND RATING FORM – WESTERN WASHINGTON

Name of wetland (if known): GWULOOT MARSH

Location: SEC: ___ TOWNSHIP: ___ RANGE: ___ (attach map with outline of wetland to rating form)

Person(s) Rating Wetland: _____ Affiliation: _____ Date of site visit: _____

SUMMARY OF RATING

Category based on FUNCTIONS provided by wetland

I ___ II ___ III ___ IV ___

Category I = Score ≥ 70
Category II = Score 51-69
Category III = Score 30-50
Category IV = Score < 30

Score for Water Quality Functions

26

Score for Hydrologic Functions

10

Score for Habitat Functions

26

TOTAL score for functions

62

Category based on SPECIAL CHARACTERISTICS of wetland

I ___ II ___ Does not Apply X

Final Category (choose the “highest” category from above)

II

Check the appropriate type and class of wetland being rated.

Wetland Type		Wetland Class	
Estuarine		Depressional	<u>X</u>
Natural Heritage Wetland		Riverine	<u>X</u>
Bog		Lake-fringe	
Mature Forest		Slope	
Old Growth Forest		Flats	
Coastal Lagoon		Freshwater Tidal	
Interdunal			
None of the above	<u>X</u>		

for rating

Does the wetland being rated meet any of the criteria below?

If you answer YES to any of the questions below you will need to protect the wetland according to the regulations regarding the special characteristics found in the wetland.

Check List for Wetlands That Need Special Protection, and That Are Not Included in the Rating	YES	NO
SP1. <i>Has the wetland been documented as a habitat for any Federally listed Threatened or Endangered plant or animal species (T/E species)?</i> For the purposes of this rating system, "documented" means the wetland is on the appropriate state or federal database.	✓	
SP2. <i>Has the wetland been documented as habitat for any State listed Threatened or Endangered plant or animal species?</i> For the purposes of this rating system, "documented" means the wetland is on the appropriate state database.	✓	
SP3. <i>Does the wetland contain individuals of Priority species listed by the WDFW for the state?</i>	✓	
SP4. <i>Does the wetland have a local significance in addition to its functions?</i> For example, the wetland has been identified in the Shoreline Master Program, the Critical Areas Ordinance, or in a local management plan as having special significance.	✓	

To complete the next part of the data sheet you will need to determine the Hydrogeomorphic Class of the wetland being rated.

The hydrogeomorphic classification groups wetlands into those that function in similar ways. This simplifies the questions needed to answer how well the wetland functions. The Hydrogeomorphic Class of a wetland can be determined using the key below. See p. 24 for more detailed instructions on classifying wetlands.

Classification of Vegetated Wetlands for Western Washington

Wetland Name:

QWULODLT

Date:

6/5/06

1. Are the water levels in the wetland usually controlled by tides (i.e. except during floods)?

☒ NO - go to 2

☐ YES - the wetland class is **Tidal Fringe**

If yes, is the salinity of the water during periods of annual low flow below 0.5 ppt (parts per thousand)? **YES - Freshwater Tidal Fringe** **NO - Saltwater Tidal Fringe (Estuarine)**

*If your wetland can be classified as a Freshwater Tidal Fringe use the forms for **Riverine** wetlands. If it is Saltwater Tidal Fringe it is rated as an **Estuarine** wetland. Wetlands that were called estuarine in the first and second editions of the rating system are called Salt Water Tidal Fringe in the Hydrogeomorphic Classification. Estuarine wetlands were categorized separately in the earlier editions, and this separation is being kept in this revision. To maintain consistency between editions, the term "Estuarine" wetland is kept. Please note, however, that the characteristics that define Category I and II estuarine wetlands have changed (see p.).*

2. Is the topography within the wetland flat and precipitation is only source (>90%) of water to it.

☒ NO - go to 3

☐ YES - The wetland class is **Flats**

If your wetland can be classified as a "Flats" wetland, use the form for **Depressional** wetlands.

3. Does the wetland **meet both** of the following criteria?

☐ The vegetated part of the wetland is on the shores of a body of open water (without any vegetation on the surface) where at least 20 acres (8 ha) are permanently inundated (ponded or flooded);

☒ At least 30% of the open water area is deeper than 6.6 ft (2 m)?

☒ NO - go to 4

☐ YES - The wetland class is **Lake-fringe (Lacustrine Fringe)**

4. Does the wetland **meet all** of the following criteria?

☐ The wetland is on a slope (*slope can be very gradual*),

☐ The water flows through the wetland in one direction (unidirectional) and usually comes from seeps. It may flow subsurface, as sheetflow, or in a swale without distinct banks.

☐ The water leaves the wetland **without being impounded**?

NOTE: Surface water does not pond in these type of wetlands except occasionally in very small and shallow depressions or behind hummocks(depressions are usually <3ft diameter and less than 1 foot deep).

☒ NO - go to 5

☐ YES - The wetland class is **Slope**

5. Is the wetland in a valley, or stream channel, where it gets inundated by overbank flooding from that stream or river? The flooding should occur at least once every two years, on the average, to answer "yes." *The wetland can contain depressions that are filled with water when the river is not flooding.*

NO - go to 6

☒ YES The wetland class is **Riverine**

6. Is the wetland in a topographic depression in which water ponds, or is saturated to the surface, at some time of the year. *This means that any outlet, if present, is higher than the interior of the wetland.*

NO – go to 7

YES – The wetland class is **Depressional**

7. Is the wetland located in a very flat area with no obvious depression and no stream or river running through it and providing water. The wetland seems to be maintained by high groundwater in the area. The wetland may be ditched, but has no obvious natural outlet.

NO – go to 8

YES – The wetland class is **Depressional**

8. Your wetland seems to be difficult to classify. For example, seeps at the base of a slope may grade into a riverine floodplain, or a small stream within a depressional wetland has a zone of flooding along its sides. Sometimes we find characteristics of several different hydrogeomorphic classes within one wetland boundary. Use the following table to identify the appropriate class to use for the rating system if you have several HGM classes present within your wetland. NOTE: Use this table only if the class that is recommended in the second column represents 10% or more of the total area of the wetland being rated. If the area of the second class is less than 10% classify the wetland using the first class.

<i>HGM Classes Within a Delineated Wetland Boundary</i>	<i>Class to Use in Rating</i>
Slope + Riverine	Riverine
Slope + Depressional	Depressional
Slope + Lake-fringe	Lake-fringe
Depressional + Riverine along stream within boundary	Depressional
Depressional + Lake-fringe	Depressional
Salt Water Tidal Fringe and any other class of freshwater wetland	Treat as ESTUARINE under wetlands with special characteristics

If you are unable still to determine which of the above criteria apply to your wetland, or you have more than 2 HGM classes within a wetland boundary, classify the wetland as **Depressional** for the rating.

D Depressional and Flats Wetlands		Points
WATER QUALITY FUNCTIONS - Indicators that wetland functions to improve water quality		
D	D 1. Does the wetland have the <u>potential</u> to improve water quality? (see p. 38)	
D	D 1.1 Characteristics of surface water flows out of the wetland: Wetland is a depression with no surface water outlet points = 3 Wetland has an intermittently flowing, or highly constricted, outlet points = 2 Wetland has an unconstricted surface outlet points = 1 Wetland is flat and has no obvious outlet and/or outlet is a ditch points = 1	2
D	D 1.2 The soil 2 inches below the surface is clay, organic, or smells anoxic (hydrogen sulfide or rotten eggs). YES points = 4 NO points = 0	4
D	D 1.3 Characteristics of persistent vegetation (emergent, shrub, and/or forest class): Wetland has persistent, ungrazed, vegetation $\geq 95\%$ of area points = 5 Wetland has persistent, ungrazed, vegetation $\geq 1/2$ of area points = 3 Wetland has persistent, ungrazed vegetation $\geq 1/10$ of area points = 1 Wetland has persistent, ungrazed vegetation $< 1/10$ of area points = 0	5
D	D1.4 Characteristics of seasonal ponding or inundation. <i>This is the area of the wetland that is ponded for at least 2 months, but dries out sometime during the year. Do not count the area that is permanently ponded. Estimate area as the average condition 5 out of 10 yrs.</i> Area seasonally ponded is $> 1/2$ total area of wetland points = 4 Area seasonally ponded is $> 1/4$ total area of wetland points = 2 Area seasonally ponded is $< 1/4$ total area of wetland points = 0 NOTE: See text for indicators of seasonal and permanent inundation..	2
D	Total for D 1 Add the points in the boxes above	13
D	D 2. Does the wetland have the <u>opportunity</u> to improve water quality? (see p. 44) Answer YES if you know or believe there are pollutants in groundwater or surface water coming into the wetland that would otherwise reduce water quality in streams, lakes or groundwater downgradient from the wetland? Note which of the following conditions provide the sources of pollutants. ☒ Grazing in the wetland or within 150 ft ☒ Untreated stormwater discharges to wetland ☒ Tilled fields or orchards within 150 ft of wetland ☒ A stream or culvert discharges into wetland that drains developed areas, residential areas, farmed fields, roads, or clear-cut logging ☒ Residential, urban areas, golf courses are within 150 ft of wetland ☐ Wetland is fed by groundwater high in phosphorus or nitrogen ☐ Other _____ YES multiplier is 2 NO multiplier is 1	multiplier 2
D	TOTAL - Water Quality Functions Multiply the score from D1 by D2 Add score to table on p. 1	26

D Depressional and Flats Wetlands		Points
HYDROLOGIC FUNCTIONS - Indicators that wetland functions to reduce flooding and stream degradation		
	D 3. Does the wetland have the <u>potential</u> to reduce flooding and erosion? (see p. 46)	
D	D 3.1 Characteristics of surface water flows out of the wetland Wetland has no surface water outlet points = 4 Wetland has an intermittently flowing, or highly constricted, outlet points = 2 Wetland is flat and has no obvious outlet and/or outlet is a small ditch points = 1 Wetland has an unconstricted surface outlet points = 0	2
D	D 3.2 Depth of storage during wet periods <i>Estimate the height of ponding above the bottom of the outlet</i> Marks of ponding are 3 ft or more above the surface points = 7 The wetland is a "headwater" wetland points = 5 Marks of ponding between 2 ft to < 3 ft from surface points = 5 Marks are at least 0.5 ft to < 2 ft from surface points = 3 Wetland is flat but has small depressions on the surface that trap water points = 1 Marks of ponding less than 0.5 ft points = 0	5
D	D 3.3 Contribution of wetland to storage in the watershed <i>Estimate the ratio of the area of upstream basin contributing surface water to the wetland to the area of the wetland itself.</i> The area of the basin is less than 10 times the area of wetland points = 5 The area of the basin is 10 to 100 times the area of the wetland points = 3 The area of the basin is more than 100 times the area of the wetland points = 0 Wetland is in the FLATS class (basin = the wetland, by definition) points = 5	3
D	Total for D 3 <i>Add the points in the boxes above</i>	10
D	D 4. Does the wetland have the <u>opportunity</u> to reduce flooding and erosion? (see p. 49) Answer YES if the wetland is in a location in the watershed where the flood storage, or reduction in water velocity, it provides helps protect downstream property and aquatic resources from flooding or excessive and/or erosive flows. Answer NO if the water coming into the wetland is controlled by a structure such as flood gate, tide gate, flap valve, reservoir etc. OR you estimate that more than 90% of the water in the wetland is from groundwater. <i>Note which of the following indicators of opportunity apply.</i> — Wetland is in a headwater of a river or stream that has flooding problems — Wetland drains to a river or stream that has flooding problems — Wetland has no outlet and impounds surface runoff water that might otherwise flow into a river or stream that has flooding problems — Other _____ YES multiplier is 2 NO multiplier is 1	multiplier 1
D	TOTAL - Hydrologic Functions Multiply the score from D 3 by D 4 <i>Add score to table on p. 1</i>	10

These questions apply to wetlands of all HGM classes.

Points

HABITAT FUNCTIONS - Indicators that wetland functions to provide important habitat

H 1. Does the wetland have the potential to provide habitat for many species?

H 1.1 Vegetation structure (see p. 72)

Check the types of vegetation classes present (as defined by Cowardin) if the class covers more than 10% of the area of the wetland or 1/4 acre.

- ☐ Aquatic bed
☒ Emergent plants
☒ Scrub/shrub (areas where shrubs have >30% cover)
☐ Forested (areas where trees have >30% cover)
☐ Forested areas have 3 out of 5 strata (canopy, sub-canopy, shrubs, herbaceous, moss/ground-cover)

Add the number of vegetation types that qualify. If you have:

- | | |
|-----------------|------------|
| 4 types or more | points = 4 |
| 3 types | points = 2 |
| 2 types | points = 1 |
| 1 type | points = 0 |

1

H 1.2. Hydroperiods (see p. 73)

Check the types of water regimes (hydroperiods) present within the wetland. The water regime has to cover more than 10% of the wetland or 1/4 acre to count. (see text for descriptions of hydroperiods)

- | | | |
|---|-------------------------|------------|
| ☐ Permanently flooded or inundated | 4 or more types present | points = 3 |
| ☒ Seasonally flooded or inundated | 3 types present | points = 2 |
| ☒ Occasionally flooded or inundated | 2 types present | point = 1 |
| ☒ Saturated only | | |
| ☒ Permanently flowing stream or river in, or adjacent to, the wetland | | |
| ☐ Seasonally flowing stream in, or adjacent to, the wetland | | |
| ☐ Lake-fringe wetland = 2 points | | |
| ☐ Freshwater tidal wetland = 2 points | | |

3

H 1.3. Richness of Plant Species (see p. 75)

Count the number of plant species in the wetland that cover at least 10 ft². (different patches of the same species can be combined to meet the size threshold)

You do not have to name the species.

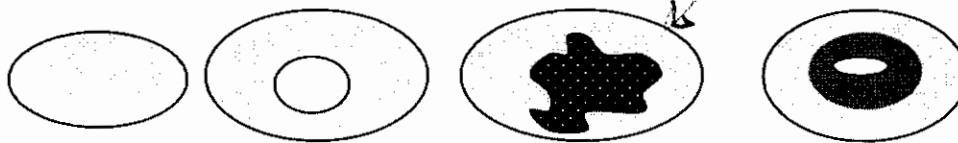
Do not include Eurasian Milfoil, reed canarygrass, purple loosestrife, Canadian Thistle

- | | | | |
|---|-----------------|----------------|------------|
| <i>List species below if you want to:</i> | If you counted: | > 19 species | points = 2 |
| | | 5 - 19 species | points = 1 |
| | | < 5 species | points = 0 |

2

H 1.4. Interspersion of habitats (see p. 76)

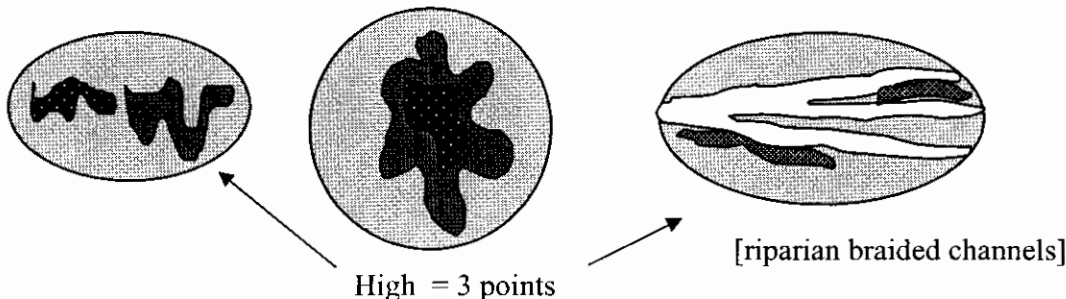
Decide from the diagrams below whether interspersion between types of vegetation (described in H 1.1), or vegetation types and unvegetated areas (can include open water or mudflats) is high, medium, low, or none.



None = 0 points

Low = 1 point

Moderate = 2 points



High = 3 points

NOTE: If you have four or more vegetation types or three vegetation types and open water the rating is always "high".

2

H 1.5. Special Habitat Features: (see p. 77)

Check the habitat features that are present in the wetland. The number of checks is the number of points you put into the next column.

- ☒ Large, downed, woody debris within the wetland (>4in. diameter and 6 ft long).
- ☒ Standing snags (diameter at the bottom > 4 inches) in the wetland
- ☒ Undercut banks are present for at least 6.6 ft (2m) and/or overhanging vegetation extends at least 3.3 ft (1m) over a stream for at least 33 ft (10m)
- ☒ Stable steep banks of fine material that might be used by beaver or muskrat for denning (>30degree slope) OR signs of recent beaver activity are present
- ☒ At least ¼ acre of thin-stemmed persistent vegetation or woody branches are present in areas that are permanently or seasonally inundated. (structures for egg-laying by amphibians)
- ☐ Invasive plants cover less than 25% of the wetland area in each stratum of plants

5

H 1. TOTAL Score - potential for providing habitat
Add the scores in the column above

13

Comments

H 2. Does the wetland have the opportunity to provide habitat for many species?	
H 2.1 Buffers (see p. 80) Choose the description that best represents condition of buffer of wetland. The highest scoring criterion that applies to the wetland is to be used in the rating. See text for definition of "undisturbed." — 100 m (330ft) of relatively undisturbed vegetated areas, rocky areas, or open water >95% of circumference. No developed areas within undisturbed part of buffer. (relatively undisturbed also means no-grazing) Points = 5 — 100 m (330 ft) of relatively undisturbed vegetated areas, rocky areas, or open water > 50% circumference. Points = 4 — 50 m (170ft) of relatively undisturbed vegetated areas, rocky areas, or open water >95% circumference. Points = 4 — 100 m (330ft) of relatively undisturbed vegetated areas, rocky areas, or open water > 25% circumference, . Points = 3 — 50 m (170ft) of relatively undisturbed vegetated areas, rocky areas, or open water for > 50% circumference. Points = 3 If buffer does not meet any of the criteria above — No paved areas (except paved trails) or buildings within 25 m (80ft) of wetland > 95% circumference. Light to moderate grazing, or lawns are OK. Points = 2 — No paved areas or buildings within 50m of wetland for >50% circumference. Light to moderate grazing, or lawns are OK. Points = 2 — Heavy grazing in buffer. Points = 1 — Vegetated buffers are <2m wide (6.6ft) for more than 95% of the circumference (e.g. tilled fields, paving, basalt bedrock extend to edge of wetland Points = 0. — Buffer does not meet any of the criteria above. Points = 1	/
H 2.2 Corridors and Connections (see p. 81) H 2.2.1 Is the wetland part of a relatively undisturbed and unbroken vegetated corridor (either riparian or upland) that is at least 150 ft wide, has at least 30% cover of shrubs, forest or native undisturbed prairie, that connects to estuaries, other wetlands or undisturbed uplands that are at least 250 acres in size? (dams in riparian corridors, heavily used gravel roads, paved roads, are considered breaks in the corridor). <i>Shoshonish estuary.</i> YES = 4 points (go to H 2.3) NO = go to H 2.2.2 H 2.2.2 Is the wetland part of a relatively undisturbed and unbroken vegetated corridor (either riparian or upland) that is at least 50ft wide, has at least 30% cover of shrubs or forest, and connects to estuaries, other wetlands or undisturbed uplands that are at least 25 acres in size? OR a Lake-fringe wetland, if it does not have an undisturbed corridor as in the question above? YES = 2 points (go to H 2.3) NO = H 2.2.3 H 2.2.3 Is the wetland: within 5 mi (8km) of a brackish or salt water estuary OR within 3 mi of a large field or pasture (>40 acres) OR within 1 mi of a lake greater than 20 acres? YES = 1 point NO = 0 points	4

H 2.3 Near or adjacent to other priority habitats listed by WDFW (see p. 82)

Which of the following priority habitats are within 330ft (100m) of the wetland?

(see text for a more detailed description of these priority habitats)

☒ **Riparian:** The area adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other.

☐ **Aspen Stands:** Pure or mixed stands of aspen greater than 0.8 ha (2 acres).

☐ **Cliffs:** Greater than 7.6 m (25 ft) high and occurring below 5000 ft.

☐ **Old-growth forests:** (Old-growth west of Cascade crest) Stands of at least 2 tree species, forming a multi-layered canopy with occasional small openings; with at least 20 trees/ha (8 trees/acre) > 81 cm (32 in) dbh or > 200 years of age.

☐ **Mature forests:** Stands with average diameters exceeding 53 cm (21 in) dbh; crown cover may be less than 100%; crown cover may be less than 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth; 80 - 200 years old west of the Cascade crest.

☐ **Prairies:** Relatively undisturbed areas (as indicated by dominance of native plants) where grasses and/or forbs form the natural climax plant community.

☐ **Talus:** Homogenous areas of rock rubble ranging in average size 0.15 - 2.0 m (0.5 - 6.5 ft), composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine tailings. May be associated with cliffs.

☐ **Caves:** A naturally occurring cavity, recess, void, or system of interconnected passages

☐ **Oregon white Oak:** Woodlands Stands of pure oak or oak/conifer associations where canopy coverage of the oak component of the stand is 25%.

☒ **Urban Natural Open Space:** A priority species resides within or is adjacent to the open space and uses it for breeding and/or regular feeding; and/or the open space functions as a corridor connecting other *priority habitats*, especially those that would otherwise be isolated; and/or the open space is an isolated remnant of natural habitat larger than 4 ha (10 acres) and is surrounded by urban development.

☒ **Estuary/Estuary-like:** Deepwater tidal habitats and adjacent tidal wetlands, usually semi-enclosed by land but with open, partly obstructed or sporadic access to the open ocean, and in which ocean water is at least occasionally diluted by freshwater runoff from the land. The salinity may be periodically increased above that of the open ocean by evaporation. Along some low-energy coastlines there is appreciable dilution of sea water. Estuarine habitat extends upstream and landward to where ocean-derived salts measure less than 0.5ppt. during the period of average annual low flow. Includes both estuaries and lagoons.

☐ **Marine/Estuarine Shorelines:** Shorelines include the intertidal and subtidal zones of beaches, and may also include the backshore and adjacent components of the terrestrial landscape (e.g., cliffs, snags, mature trees, dunes, meadows) that are important to shoreline associated fish and wildlife and that contribute to shoreline function (e.g., sand/rock/log recruitment, nutrient contribution, erosion control).

If wetland has **3 or more** priority habitats = **4 points**

If wetland has **2** priority habitats = **3 points**

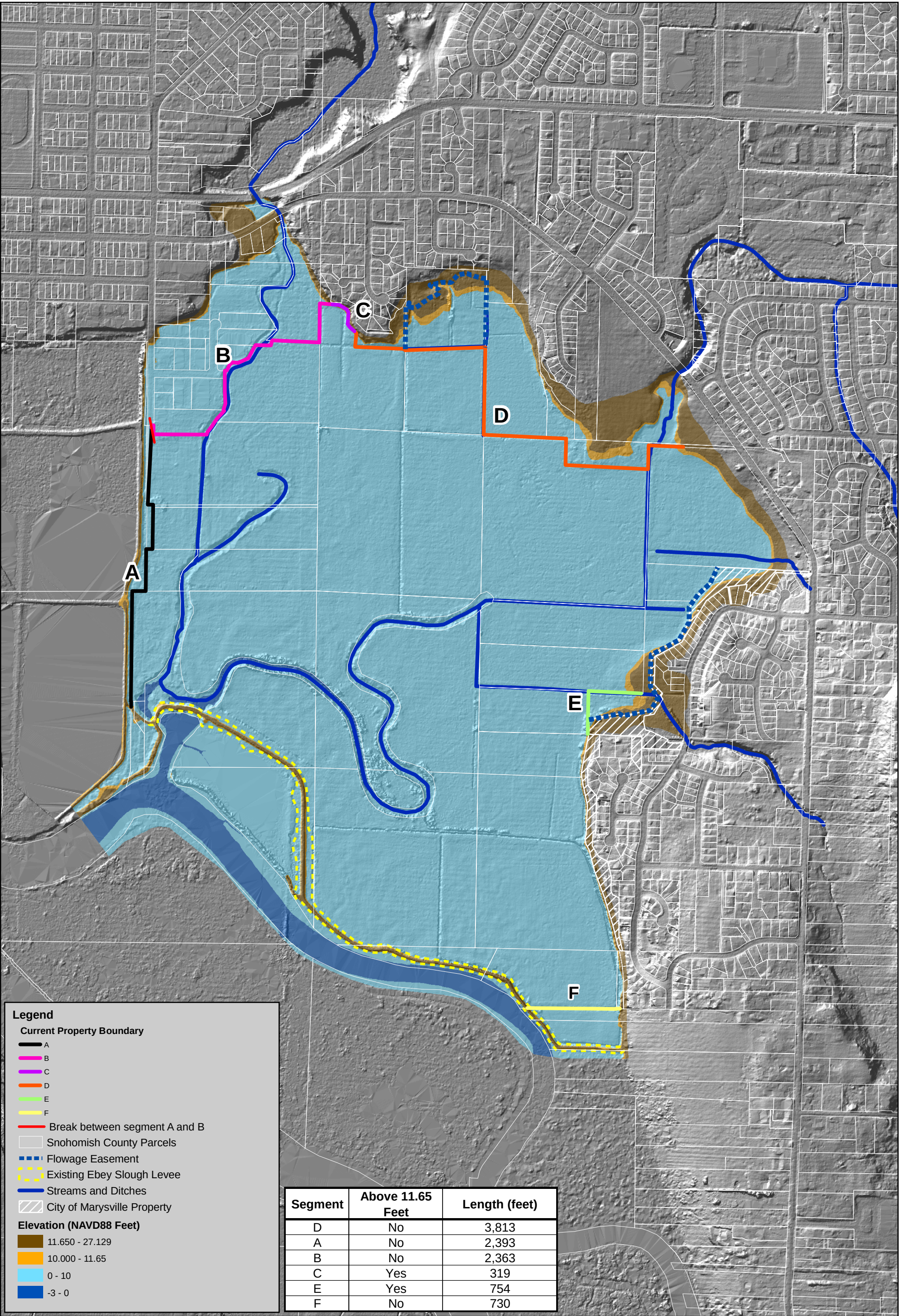
If wetland has **1** priority habitat = **1 point**

No habitats = 0 points

3

H 2.4 Wetland Landscape (<i>choose the one description of the landscape around the wetland that best fits</i>) (<i>see p. 84</i>) There are at least 3 other wetlands within ½ mile, and the connections between them are relatively undisturbed (light grazing between wetlands OK, as is lake shore with some boating, but connections should NOT be bisected by paved roads, fill, fields, or other development. points = 5 The wetland is Lake-fringe on a lake with little disturbance and there are 3 other lake-fringe wetlands within ½ mile points = 5 There are at least 3 other wetlands within ½ mile, BUT the connections between them are disturbed points = 3 The wetland is Lake-fringe on a lake with disturbance and there are 3 other lake-fringe wetland within ½ mile points = 3 There is at least 1 wetland within ½ mile. points = 2 There are no wetlands within ½ mile. points = 0	5
H 2. TOTAL Score - opportunity for providing habitat <i>Add the scores in the column above</i>	13
Total Score for Habitat Functions – add the points for H 1, H 2 and record the result on p. 1	26

Appendix G – DRAFT Setback Levee Design



File name: Fig10.pdf
Created/last edited by: DNE
Date last updated: 10/12/06



0 350 700 Feet
1:8,400

Map data are the property of the sources listed below.
Inaccuracies may exist, and Adolfson Associates, Inc. implies no
warranties or guarantees regarding any aspect of data depiction.
SOURCE: Digital Terrain Model (NAVD88 Feet), DHA survey, 2005;
Snohomish County GIS, 2005

FIGURE 10

POTENTIAL INTERIOR LEVEE LOCATIONS
QWULOOLT RESTORATION PROJECT
MARYSVILLE, WASHINGTON