Wetlands and Other Waters Delineation Report

Dairy Creek Restoration Project
Multnomah County, Oregon

Township 3 North, Range 1 West, Sections 34 and 35

Prepared for:

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July 2013

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A: Landscape Setting and Land Use

This wetland delineation report has been prepared for the Dairy Creek Restoration Project. The project proponent is the U.S. Army Corps of Engineers (USACE) who proposes improvements to the Dairy Creek channel, constructed in 1989 to connect the Columbia River to Sturgeon Lake, to improve hydraulic conditions in Sturgeon Lake.

The project involves restoring Dairy Creek between the Columbia River and Sturgeon Lake within its current alignment. The existing channel will be modified within its existing limits by excavating a low flow channel in the currently flat-bottomed channel and creating a two-stage channel configuration. Surrounding the low flow channel, the high flow channel will be improved with minor grading and native plantings. Plantings will generally occur in the high flow channel, up the bank and set back from the bank to a distance of 50 feet. Areas in and near the channel would be designated for sand collection, which would be designed to allow for periodic maintenance. The connection with the historic Dairy Creek channel would be modified to help maintain velocities in the main channel and providing refuge for fish. The materials used to roughen the connection point will be porous, likely a combination of large wood and ballast boulders. The project also involves the replacement of two 12-foot diameter culverts beneath NW Reeder Road.

The project will also include work at the connection between Dairy Creek and the Columbia River. An existing debris boom would be replaced or reconfigured at the mouth of the Creek. In addition, eddy control structures would be constructed, using rock positioned parallel to Dairy Creek flow within the mouth of Dairy Creek. The intent of the structures is to prevent eddies and focus currents to efficiently move flow and prevent sand accumulation.

A.1 Site Description

The proposed project study area is located within the United States Geological Survey (USGS) Sauvie Island Quadrangle Map, Township 3 North, Range 1 West, Sections 34 and 35. This area occurs in the northwestern portion of unincorporated Multnomah County, Oregon (Figure 1, Appendix A) near the southern boundary of Columbia County. The project study area generally follows the constructed Dairy Creek channel, extending from its connection to the Columbia River west and north to its crossing of NW Reeder Road, and then continuing northwest to Sturgeon Lake. Other portions of the study area include proposed construction access routes and staging areas; these areas include a connection from NW Gillihan Road to Dairy Creek and a connection from NW Reeder Road to the creek through existing gravel driveways. An additional component of the project study area extends northwest from NW Reeder Road through Oregon Department of Fish and Wildlife (ODFW) managed agricultural lands. The project study area is shown in Figure 2 (Appendix A).

The project study area lies outside of any urban growth boundaries (UGB). The majority of the area surrounding the project study area is agricultural land and rural residences. Since the early 1900s, dominant disturbances in the project study area include land clearing for agriculture, construction of local roads, utility installation, and construction of the 1989 Dairy Creek Channel.

Elevations throughout the project study area generally range between approximately 18 and 20 feet. The lowest elevations are located below ordinary high water (OHW) of the constructed Dairy Creek channel.

The study area generally follows Dairy Creek from its connection with the Columbia River to its entrance into Sturgeon Lake. An unmanaged, narrow riparian corridor follows the course of Dairy Creek through the study area. Portions of the study area outside of the riparian corridor are disturbed by mowing and agricultural practices (croplands and cattle grazing). NW Reeder Road bisects the study area where Dairy Creek crosses beneath the road through two 12-foot corrugated metal pipe (CMP) culverts. Additional disturbance includes an ODFW-owned gravel parking lot on the west side of Reeder Road and a privately-owned bridge over Dairy Creek east of NW Reeder Road.

A.2 Landscape Setting

The project study area is located within the Level III Willamette Valley Ecoregion, which is defined by the Willamette River and consists of broad alluvial flats and low basalt hills, with soils of deep alluvial silts from river deposits and dense, heavy clays from fluvial deposits. The Willamette Valley Ecoregion is relatively low gradient and historically the Willamette River was extensively braided. These factors contributed to the current hydrology of the valley characterized by numerous oxbow lakes, ponds and wetlands as well as sluggish, meandering streams and rivers (EPA, 2011). The project study area occurs near the mouth of the Willamette River, within the more specific Level IV ecoregion Willamette Valley Portland/Vancouver Basin. This ecoregion is a depression at the base of the Portland Hills fault block and contains the confluence of the Columbia and Willamette Rivers. Soils are composed of deltaic sands and gravels deposited by Pleistocene floods. Historically, prairie, oak woodland, Douglas-fir, and Oregon ash grew on terraces and wetland margins. Today, many wetlands, oxbow lakes, and ponds still occur, but, overall, the Portland/Vancouver Basin is dominated by urban and suburban development, pastures, and nurseries.

The project is located within Hydrological Unit Code (HUC) 17090012 (Lower Willamette Basin) in the northernmost portion of the Willamette Basin and is drained by the Willamette River, Multnomah Channel, and numerous tributaries. The subbasin extends from the divides shared with the Sandy and Clackamas subbasins in Cascade foothills on the east, across the Willamette River to the Tualatin divide on the west, north to the town of St. Helens, and south to Willamette Falls at river mile 26.6. Hydrology in the study area is influenced by tidal fluctuations in the Lower Columbia River. The constructed Dairy Creek channel is located in the study area, connecting the Columbia River to Sturgeon Lake.

Natural drainage networks in the surrounding area have been significantly altered by ditching, piping, and rerouting. These factors have reduced groundwater recharge and subsurface flows which have altered wetland connectivity within the project study area. In addition, by creating surface drainage features, wetland areas in the vicinity have likely decreased.

A.3 Current and Past Land Use

Throughout the Willamette Valley Ecoregion over the past 150 years, the prairies have been largely converted to farmland, as have most of the riparian forests and wetlands. The rivers have been dammed and channelized to reduce flooding. Open oak savannas and oak-conifer woodlands have been logged and replanted to become closed canopy forests. A growing urban population has replaced agriculture in many areas, and rural and urban residential development continues to encroach on remaining woodlands. Due to the pattern of development, the Willamette Valley is the most altered ecoregion in Oregon, with the most significant natural processes, fire and flooding, almost entirely excluded.

Historically, Sauvie Island was a complex of sloughs, wetlands, and creeks. Agricultural development on the island resulted in the draining of some of these wetlands, although historical aerial photography indicates wetlands or open water were not present in the project study area, with the exception of Dairy Creek, Sturgeon Lake, and fringe wetlands.

Within the project study area and adjacent areas, natural lands have been converted for residential and agricultural development. Utility service infrastructure has been built and an extensive roadway system has been incorporated into the development.

According to Metro, the majority of the project study area is currently zoned as Multiple Use Agriculture (MUA20) (Metro, 2013). The southern section of the study area is zoned as Exclusive Farm Use (EFU) (Metro, 2013). Development in the study area includes NW Reeder Road and a gravel parking lot owned and maintained by ODFW.

B: Site Alterations

The project study area and surrounding vicinity have undergone substantial change in recent history. The Gilbert River originally drained the interior of Sauvie Island, beginning as a spring-fed stream in the southern extents of the island, flowing into Sturgeon Lake, and then discharging into the Multnomah Channel. The USACE constructed a Federal levee in 1942 around the southern portion of Sauvie Island, resulting in the Gilbert River being diverted from Sturgeon Lake into the interior drainage canal and pumped into the Multnomah Channel. Construction of this levee reduced the influence that Willamette and Columbia Rivers and island interior wetland drainage had on Sturgeon Lake. The northern portion of the Gilbert River was left to convey Multnomah Channel flows into and out of Sturgeon Lake as a result of tidal action and changes in river discharge.

Historically, Dairy Creek was approximately 3 miles long and connected Sturgeon Lake to the Columbia River. The Lake side outlet was almost directly across the Gilbert River outlet, separated by some open water and the Columbia River outlet is similar to its current location. Dairy Creek was partially fed by a drained lacustrine wetland complex on the southeast portion of the island. In the 1960s and 1970s dredge material from the Federal Navigation channel was placed in Dairy Creek. In 1986, the USACE removed dredge material at the mouth of Dairy Creek and placed rock along the banks at the entrance under the USACE's Navigation Operation and Maintenance program.

Following the USACE dredging, the channel was shortened in 1989 to 1 mile in order to convey more water to Sturgeon Lake and improve sediment outflow and water quality. This effort included filling in a portion of the historic channel near NW Reeder Road; constructing about 0.5 mile of new channel from NW Reeder Road to Sturgeon Lake and installation of culverts at NW Reeder Road. By 1994, sand shoaling in the mouth of Dairy Creek had advanced and a flood event occurring in February 1996 transported hundreds of logs and other debris into the channel, raising the elevation of the sand and debris plug by 6 feet higher than the 1989 construction elevation. A majority of the debris was removed after the flood receded; however, a large wood debris pile remains. There has not been on-going removal of the sand at the mouth of Dairy Creek. Currently, water from the Columbia River can enter Dairy Creek only during high flow events. The constructed channel and portions of the historic channel presently remain, partially within the project study area.

Disconnecting Gilbert River and Dairy Creek, construction of the Federal levee, and reduced flooding from Columbia River Power System Operations has led to decreased circulation in Sturgeon Lake and related watercourses. This in turn has led to reduced fish access to the Lake, increased sedimentation, and reduced Lake depth, all of which contributes to loss of open water and floodplain habitat.

In addition to the hydrologic site alterations, much of the proposed project study area has transformed to a rural/agricultural area in recent history. Agricultural and rural development activities, such as land clearing and grading, have altered vegetative communities and structure as well as decreased species biodiversity. Construction activities, utility placement, road network installation, and construction of a gravel parking lot west of NW Reeder Road have resulted in extensive earthwork. These actions have increased impervious surface area, altered infiltration and runoff patterns, decreased wetland vegetation, altered flow regimes, and affected the natural hydrology within the project study area. As a result, wetland areas in the project vicinity have decreased.

Vegetation surrounding the project study area has been modified due to agricultural and low-density residential development in the area. Many native species have been removed and invasive species such as reed canarygrass (*Phalaris arundinacea*), false indigo-bush (*Amorpha fruiticosa*), and Himalayan blackberry (*Rubus armeniacus*) have colonized disturbed areas and the Dairy Creek riparian corridor.

C: Precipitation Data and Analysis

C.1 Climate and Growing Season

The project study area lies within unincorporated Multnomah County which is situated within US Climate Division 2 (Oregon, Willamette Valley) according to the National Climatic Data Center. The Oregon Climate Service describes this division similar to a Mediterranean climate with warm, dry summers and cool, wet winters (Taylor, 2013). The Willamette Valley has a long growing season due to rainfall events taking place most of the year. The growing season begins February 23 and ends November 26 (277 days) (NRCS 2002; Appendix G). Annual average precipitation recorded at the closest WETS station in St. Helens, Oregon (approximately 9 miles north of the project study area) is 44.46 inches.

Average annual temperatures recorded at the same WETS station range from 43.9˚F to 64.3˚F (NRCS, 2002). The cooler months are the wettest, with the majority of annual rainfall occurring between November and March. Conversely, the warmer months are driest; average rainfall is less than 4 inches per month between April and September.

C.2 Precipitation Data and Analysis

Field surveys were conducted within the project study area on May 30 and June 6, 2013. Total precipitation for the water year up to the day of the first site visit (October 1, 2012 to May 29, 201) was approximately 36.78 inches; 95.4% of average (Table 1) (NRCS, 2002; Weather Underground, 2013). Recorded precipitation in March and April was below average and monthly normal. Precipitation recorded in May was above average and monthly normal. The precipitation recorded for the water year up to May 29, 2013 was slightly below average but within the normal range (NRCS, 2002). The area received 3.29 inches of precipitation (approximately 97.9% of average) in the two weeks leading up to the initial site visit (May 16-29, 2013) as measured in Portland, Oregon (Weather Underground, 2013). On the first day of the site visit on May 30, 0.21 inch of precipitation was received, and no precipitation was recorded on the day of the June 6 site visit.

Table 1. Summary of Recorded, Average and Normal Precipitation between March and May 2013, and water year from October 1, 2012 to May 29, 2013 in the Vicinity of the Project Study Area

Category	March	April	May	Total Water Year to Date
Recorded Precipitation (inches)	2.59	2.19	3.68	36.78
Precipitation Average (inches)	4.53	3.47	2.94	38.56
% of Average Recorded	57.2%	63.1%	125.2%	95.4%
Monthly Normal (inches)				
30% Chance Less Than	3.36	2.50	1.68	25.55
30% Chance More Than	5.31	4.09	3.58	46.12

Sources: NRCS WETS Table St. Helens, Oregon, 2002; Weather Underground, Scappoose Oregon 2012-2013, Western Regional Climate Center, Portland, Oregon, 2013

Hydrologic conditions observed during the site visits were typical and the recorded maximum and minimum temperatures were 62˚F and 49˚F on May 30, respectively, and 83˚F and 55˚F on June 6. The maximum recorded temperature was below average and the minimum recorded temperature was near

average on the days of both site visits (Weather Underground, 2013). Hydrological conditions were within normal ranges at the time of the site visit and wetland hydrology indicators were present.

D: Methods

D.1 Review of Existing Materials

A review of existing literature, maps, and other materials was conducted to identify wetlands and Waters of the US and state, including:

- USGS Topographical, Sauvie Island Quadrangle (USGS, 2013)
- National Wetland Inventory (NWI), Oregon State (USFWS, 2013)
- Local Wetland Inventories (Oregon Department of State Lands [DSL], 2013)
- Soil Survey of Multnomah County, Oregon (Green, 1983)
- Hydric Soils List, Multnomah County, Oregon (NRCS, 2007)
- Precipitation data for Scappoose, Oregon and Portland, Oregon (Weather Underground, 2013)
- Precipitation data from Climate Analysis for Wetlands (WETS) OR7466, St. Helens, Oregon (NRCS, 2002)

D.2 Field Methods

Wetland areas were delineated using the methods described in the USACE Wetlands Delineation Manual (Environmental Laboratory, 1987) and using the Regional Supplement to the USACE Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (Environmental Laboratory, 2010).

Plots were selected during the site visit by initial observation of topographic depressions, wetland characteristics (including the presence of hydrophytic vegetation), visual evidence of hydrology, and examination of soil samples. At sites exhibiting positive indicators of wetland characteristics, multiple soil pits were dug, in conjunction with evaluation of vegetative and hydrologic indicators, to aid in the determination of wetland boundaries and location of plots. Once a plot site was selected, a soil pit was dug and soils, hydrology, and vegetation were investigated, and results recorded. In addition to the plots associated with each wetland, sample plots and photo points were recorded.

Sample plots (labeled as SP on figures and photos) were taken in areas to confirm the characteristics and presence of uplands. Data forms associated with sample plots are included in Appendix B and locations are shown on Figure 5 (Appendix A). Representative site photographs from data plots are included in Appendix C. Methods used to determine the presence of hydric soil, hydrology, and hydrophytic vegetation are discussed below. Variations to the standard methodology, if necessary, are indicated on the data forms.

Field investigations of the project study area were conducted by HDR on May 30 and June 6, 2013.

D.2.1 Soils

Soils at each representative wetland and upland sample plot were typically inspected to a depth of at least 16 inches to determine the presence or absence of hydric soil indicators based on the Natural Resource Conservation Service (NRCS) Indicators of Hydric Soils Version 7.0 (NRCS, 2011). Soil samples were

moistened when necessary to aid in the determination of soil matrix and redoximorphic features (if present), hue, value, and chroma (Munsell Color Services, 2009). Soil texture was evaluated using field methods described by the USACE and NRCS. See Appendix D and Figure 4 in Appendix A for additional soils information.

In addition to the formal data plots that were recorded, various auger samples were taken throughout the wetlands and along the wetland boundaries to provide an accurate delineation. The results of these auger samples were not formally documented, but rather used to confirm the results of the formal data plots throughout the wetland.

D.2.2 Hydrology

To evaluate wetland hydrology characteristics, primary and secondary indicators were investigated at each of the sample plots. These indicators included the presence of saturation, water stained leaves, high water table, or the FAC neutral test.

Because the site investigation was conducted during the spring under relatively normal climatic conditions and rainfall was within normal ranges, the presence of primary indicators such as inundation and soil saturation were assumed to be accurate representations of hydric conditions during the growing season.

D.2.3 Vegetation

At each plot, the percent cover for each species was visually estimated and recorded. Herb coverage was assessed within a 6 foot radius circular plot, and trees, shrubs and woody vines were estimated within a 30 foot radius from each sample plot (Environmental Laboratory 1987, 2010). In accordance with USACE methodology, greater than 50 percent of the dominant plant species must be classified as hydrophytic or have a prevalence index of less than 3.00 for a site to display a positive wetland vegetation indicator.

The dominant plant species were identified using standard taxonomic references (Cooke, 1997; Guard, 1995; and Hitchcock and Cronquist, 1973). The wetland indicator status for each species was determined in accordance with the National Wetland Plant List (Lichvar, 2012). Vegetation was recorded as obligate (OBL), facultative-wetland (FACW), facultative (FAC), facultative-upland (FACU) or upland (UPL).

D.2.4 Wetland Functional Assessment

Functional assessments are not typically included in wetland delineation reports; however, a functional assessment was prepared as part of this delineation report to understand and describe potential effects to wetland functions as a result of the project. The functions of wetlands that may be directly impacted by the project were assessed using the Oregon Rapid Wetland Assessment Protocol (ORWAP, Adamus et al., 2010). This rating system assigns wetlands scores ranging from 0 to 10 based on their ability to perform eight broad “Grouped Services” of commonly recognized wetland functions and values: hydrologic support, water quality treatment, carbon sequestration, fish support, aquatic support, terrestrial support, public use & recognition, and provisioning services. Provisioning services are the passive and sustainable provisions of tangible natural items of potential commercial value such as hay, timber, other wild plants, fish and wildlife. The ORWAP function scores rate the relative effectiveness of the wetland in performing each function (DSL et al., 2010). The ORWAP value scores rate the importance or worth of a wetland based on public attitudes and the wetland’s opportunity to provide a given function based on its location. In addition, the ORWAP scores a wetland’s condition (integrity or health), stressors (degree of internal

alteration or exposure to external alterations), and sensitivity (resistance and resilience to human and natural stressors).

D.2.5 Ordinary High Water Mark

The ordinary high water (OHW) line for waterways in the project study area were determined in the field using the methodology outlined in the USACE Regulatory Guidance Letter 05-05 (USACE, 2005). The USACE's guidance is consistent with the definition of OHW put forth by the Oregon Department of State Lands (DSL). For purposes of the Clean Water Act, OHW is "that line on the shore established by the fluctuation of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas" (USACE, 2005). These indicators were observed in the field and used to determine the location of the OHW.

E: Description of All Wetlands and Other Non-Wetland Waters

E.1 Delineated Wetlands

One wetland, the 1989 constructed Dairy Creek Channel, and the historic Dairy Creek were delineated within the project study area (Appendix A, Figure 5).

Section E.1.1 below provides a summary of the delineated wetland area, the preliminary category of USACE, and preliminary DSL jurisdiction. Two upland plots (SP1 and SP2; see Photos 1, 2, and 3 in Appendix C) were sampled in various locations within the project study area where hydrophytic vegetation was observed. Characteristics of the delineated wetland are detailed in Section E.1.1. Table 2 summarizes elements of the delineated wetland.

Table 2. Summary of Wetland Delineation Results

Wetland	Size	Cowardin Class[1]	HGM Class[2]	Vegetation Community	General Description	Preliminary Category of the US[3]	Preliminary DSL Jurisdiction[4]
Wetland A	0.36 acres Wetland extends outside of study area	PFO1R[5]	Lacustrine Fringe	Forested vegetation consisting predominantly of willow (*Salix* spp.) and red osier (*Cornus alba*) and an understory of reed canarygrass (*Phalaris arundinacea*). High percentage of noxious and invasive species in the area.	Forested wetland located along fringe of Sturgeon Lake, straddling the connection to the constructed Dairy Creek channel. Wetland A hydrology is provided by surface water interaction with Sturgeon Lake. Lake levels are tidally influenced; therefore, hydrology of Wetland A experiences tidal fluctuations.	7	4

[1] *Cowardin et al., 1979*
[2] *Adamus, 2001*
[3] *33 CFR Part 328*
[4] *OAR 141-085-0515*
[5] *Palustrine Forested Broad-Leaved Deciduous Seasonal Tidal*

E.1.1 Wetland A

Cowardin:	PFO1R
HGM:	Lacustrine Fringe
Size:	0.36 acres in study area
Vegetation Dominance:	*Salix lasiandra* (FACW), *Fraxinus latifolia* (FACW), *Cornus alba* (FACW), *Phalaris arundinacea* (FACW)
Hydrology Indicators:	• High water table • Saturated soils • Water stained leaves
Soils:	• Hydric soil indicators present • Redox dark surface (F6)

Wetland Description (Figure 5, Appendix A; see Photos7-14, Appendix C)

Wetland A is a palustrine forested wetland at the northwestern end of the project study area. Wetland A receives hydrology inputs primarily from Sturgeon Lake. It is located where the constructed Dairy Creek channel enters Sturgeon Lake and is separated from the channel by a berm. The high water table in Wetland A is due mostly to its proximity to Sturgeon Lake, and forms anaerobic conditions within the soil. Wetland A is part of a larger wetland complex that continues offsite to the north, east, and west. The wetland is located near, and downslope of agricultural lands.

10 plots (SP3 to SP12) were taken at this site to determine the wetland boundary (See data sheets in Appendix B).

Vegetation

The vegetation recorded at the wetland sample plots was predominantly *Salix lasiandra* (FACW) and *Phalaris arundinacea* (FACW) (SP3, SP5, SP7, SP9, and SP11), *Cornus alba* (FACW; SP5, SP7, and SP9), and *Fraxinus latifolia* (FACW; SP9).

The upland plots (SP4, SP6, SP8, SP10, and SP12) along the boundary of Wetland A also contained hydrophytes (e.g. *Salix lasiandra*, *Phalaris arundinacea*, *Cornus alba*, and *Amorpha fruiticosa*); vegetation was not a defining indicator of the wetland boundary. Vegetation in the upland plots was predominantly hydrophytic; however, soil and hydrologic conditions did not indicate that the upland plots were located in a wetland.

Hydrology

Wetland hydrology was confirmed by the presence of primary indicators including high water table, saturated soils, and water stained leaves. The FAC Neutral Test, a secondary indicator, passed at every wetland plot. Wetland A receives hydrology primarily from Sturgeon Lake. The water surface elevation is influenced by Willamette River flows via the Gilbert River, and Dairy Creek high flows; Columbia River at high flows and tidal cycles. High groundwater associated with Sturgeon Lake also influences Wetland A hydrology. Evidence of historic beaver activity was observed in the formed of old, gnawed twigs, although current influence of beavers was not observed.

Soils
Soils observed within the wetland plots were silty loams with redox features. The hydric soil indicator observed at all of the wetland plots was Redox Dark Surface (F6). The soils in the area are made up of Sauvie and Rafton silt loams, both of which are on the Multnomah County list of hydric soils. Area soils may have been highly manipulated through agricultural practices (e.g. plowing), and contouring and channeling of the constructed Dairy Creek channel.
Wetland Boundary Determination
The wetland boundary was generally determined by a break in slope and indicators of hydric soils and wetland hydrology. Because *Phalaris arundinacea* was dominant in both wetland and upland sample plots, subsurface explorations assisted greatly in the determination of the wetland boundary. A break in vegetation was not determined to be an effective indicator of the wetland boundary. Using a soil auger and formal sample plots, a topographic break with presence of soil and hydrology indicators was identified that accurately divided wetlands from uplands. This break was followed to map the boundary to the edge of both sides of the constructed Dairy Creek channel. Sample plots were recorded in appropriate locations to confirm the presence of this topographic break along the wetland boundary.

E.2 Waters of the State/US

Two surface water resources are located within the project study area: the constructed Dairy Creek Channel and the historic Dairy Creek channel. See Appendix C for photographs of waterways within the project study area (Photos 4, 5, and 6). The OHW determination for waters of the state/US is described in Table 3.

E.2.1 Historic Dairy Creek Channel

The historic Dairy Creek channel conveys flows between the constructed Dairy Creek channel and Sturgeon Lake. It extends north of the project after passing through a culvert under a private driveway and generally parallels NW Reeder Road for approximately 0.85 mile before crossing the road and continuing another 1.65 miles to Sturgeon Lake. Riparian vegetation is present in the form of a narrow corridor surrounded by NW Reeder Road and agricultural land, yet provides good adequate shade and cover.

Within the study area, the historic Dairy Creek channel ranges from 25 to 35 feet wide. The channel drains both directions depending on water levels in the Columbia River. High Columbia River flows result in the channel draining to Sturgeon Lake and lower river flows cause the channel to drain to the constructed Dairy Creek channel. The OHW was delineated by a clear, natural line impressed on the bank, indications of scour, vegetation and topographic break, and disturbed and washed away leaf litter. This creek is fish bearing due to its direct connection to the constructed Dairy Creek channel and Sturgeon Lake, both fish-bearing waters.

E.2.2 Constructed Dairy Creek Channel

South and east of NW Reeder Road, the constructed channel generally follows the historic path through agricultural land to its connection with the Columbia River. The constructed channel flows through two 12-foot CMP culverts beneath NW Reeder Road and continues northwest to its connection with Sturgeon Lake. In all, the channel is approximately 0.75 miles long and contained entirely within the project study area. Sand and debris has plugged an area of the channel near the Columbia River resulting in bed

elevations 6 feet higher than the 1989 constructed elevation. A private bridge is located approximately 0.2 miles from the connection with the Columbia River. Velocities are typically low, and water can flow from the Columbia River toward Sturgeon Lake only during high flow events.

The channel ranges from 75 to 90 feet wide. An approximately 0.3 acre backwater area is located 775 feet from the connection to the Columbia River; this area was historically used to connect to a tide gate, which is no longer functional. The OHW was delineated by a clear, natural line impressed on the bank, indications of scour, vegetation and topographic break, shelving, and disturbed and washed away leaf litter. Fish are present in the constructed channel due to its connectivity to Sturgeon Lake and the Columbia River.

Table 3. Waters of the State/US Determinations

Map ID (Name)	Type	OHW Width[1]	OHW Features/ Determination	Receiving Water Body	Preliminary Category of Water of US[2]	Preliminary DSL Jurisdiction[3]
Constructed Dairy Creek						
	Perennial	75 to 90 feet	A clear, natural line impressed on the bank; scour; vegetation and topographic break; shelving; and disturbed and washed away leaf litter.	Columbia River / Sturgeon Lake	5	3(f)
Historic Dairy Creek						
	Perennial	25 to 35 feet	A clear, natural line impressed on the bank; scour; vegetation and topographic break; and disturbed and washed away leaf litter.	Columbia River / Sturgeon Lake	5	3(f)

[1] *Widths of all waterways are approximate and may vary +/- 3 feet in sections of OHW*
[2] *33 CFR Part 328*
[3] *OAR 141-085-0515*

E.3 Oregon Rapid Wetland Assessment Protocol (ORWAP) Scores

Wetland A was assessed for functions and values using ORWAP based on likely project impacts to these resources. The hydrologic and carbon sequestration functions and values of Wetland A are relatively low, partially because hydrology is provided by Sturgeon Lake rather than by sources higher in the watershed. Water quality functions and values are moderate, whereas the habitat functions and values are high as a result of habitat diversity and use by a variety of fish and wildlife. The ORWAP scores are summarized in Table 4, and the complete ORWAP assessment is provided in Appendix H.

Table 4. ORWAP Grouped Services for Wetland A

Grouped Services[1]		Wetland A
Hydrologic	Function	0.72
	Value	2.00
Water Quality Support	Function	4.17
	Value	7.50
Fish Support	Function	7.02
	Value	10.00
Aquatic Support	Function	7.89
	Value	10.00
Terrestrial Support	Function	7.28
	Value	8.00
Carbon Sequestration	Function	2.81
Public Use and Recognition	Value	2.22
Provisioning	Value	0.00
Condition[2]		2.00
Stressors[3]		4.78
Sensitivity[4]		5.00

[1] Grouped Services scores reflect the maximum score of specific functions and values within each service group. The range of possible scores for each grouped service varies, but can be no less than 0 and no more than 10. Refer to Appendix A of Oregon DSL et al. (2010) for a detailed summary of minimum, maximum, median and mean scores for the grouped services, conditions, stressors, and sensitivity outputs. Scores are preliminary and have not been reviewed by Oregon DSL.

[2] Condition: The integrity or health of a wetland based primarily on its vegetation. Often referred to as "naturalness" (Oregon DSL et al. 2010). A lower score reflects a wetland with less integrity and health.

[3] Stressors: The degree to which the wetland has recently been altered by, or exposed to risk from, human and natural factors. A lower score reflects less internal and external stressors on the wetland.

[4] Sensitivity: The resistance and resilience of a wetland to human and natural stressors. A lower score reflects that the wetland has higher resistance and resilience to stressors.

F: Deviation from LWI or NWI

F.1 National Wetland Inventory (NWI)

The US Fish and Wildlife Service (USFWS) NWI identified seven wetlands in the project study area: a Palustrine Emergent Temporarily Flooded (PEMA) and Palustrine Forested Seasonally Flooded (PFOC) wetland located where the constructed Dairy Creek channel enters Sturgeon Lake; a Palustrine Forested Temporarily Flooded (PFOA) wetland located on the agricultural field west of NW Reeder Road and south of the constructed Dairy Creek channel; a PEMA wetland located east of NW Reeder Road and south of the constructed Dairy Creek channel; a Palustrine Emergent Regularly Flooded(PEMN) wetland located within the constructed Dairy Creek channel east of NW Reeder Road; and Riverine Tidal Unconsolidated Shore Seasonal Tidal (R1USR) and Riverine Tidal Unconsolidated Shore Regularly Flooded (R1USN) wetlands located where Dairy Creek enters the Columbia River. These wetlands and their classifications are shown on Figure 3 (Appendix A).

Of the seven wetlands inventoried by the NWI, only three of them were confirmed during the site investigations. The two riverine (R1USR and R1USN) NWI wetlands located at the Dairy Creek/Columbia River confluence are within the OHW of Dairy Creek. The PFOC wetland located where the constructed Dairy Creek channel enters Sturgeon Lake is Wetland A, as discussed in Section E.1.1.

The remainder of the NWI wetlands were investigated, but not confirmed during the site visits. Modifications of the historical landscape for agricultural uses, and potentially the infilling of Sturgeon Lake with sediment, may have altered the historic conditions of these mapped wetlands.

F.2 Local Wetland Inventory (LWI)

After a review of the LWI online database provided by DSL, no local wetlands were identified within the project study area.

G: Mapping Methods

Data plot locations and boundaries of wetlands and other waters were flagged in the field and professionally land surveyed. Survey data was converted to Geographic Information Systems (GIS) files and imported to project maps, resulting in a projected precision to +/-3 feet. The project study area was determined by pre-determined survey locations marked in the field that indicates areas of impact with a precision of +/-1 foot.

H: Additional Information

The USACE and DSL will assert jurisdiction over water and wetland features if they meet regulatory authority they defined by the following,

- The USACE will assert jurisdiction over traditional navigable waters, which includes all the waters described in 33 C.F.R. § 328.3(a)(1), and 40 C.F.R. § 230.3 (s)(1). The agency will assert jurisdiction over wetlands adjacent to traditional navigable waters, including adjacent wetlands that do not have a continuous surface connection to traditional navigable waters.

- The DSL regulates "waters" (including rivers and wetlands) for the State of Oregon. DSL regulates waters using volume amounts of materials (i.e., sediments) removed or filled into a regulated water resource and location of activity. Waters of the state regulated under the Removal/Fill Law (Oregon Revised Statue [ORS] 196.795 – .990) are defined under OAR 141-085-0515 and include:

  "Waters of this state means natural waterways[1] including all tidal and non-tidal bays, intermittent streams, constantly flowing streams, lakes, wetlands and other bodies of water in this state, navigable and non-navigable, including that portion of the Pacific Ocean which is in the boundaries of this state."

Additional information pertaining to jurisdictional authority is provided in Appendix D.

H.1 DSL Preliminary Jurisdictional Determination

Based on observations made at the site of surface or clear subsurface connections to regulated waters and best professional judgment, Wetland A, the constructed Dairy Creek channel, and the historic Dairy Creek Channel would be considered jurisdictional and regulated by the DSL (Table 5). The delineated wetland meets jurisdictional definition of a wetland as defined in OAR 141-085-0515(4). Both the constructed and historical Dairy Creek channels meet DSL jurisdictional definition of a water as defined by OAR 141-085-0515(3).

Final jurisdictional findings for wetlands and waters will be determined by DSL.

H.2 USACE Preliminary Jurisdictional Determination

Based on observations made at the site of surface or clear subsurface connections to regulated waters and best professional judgment, Wetland A, the constructed Dairy Creek channel, and the historic Dairy Creek Channel would be considered jurisdictional and regulated by the USACE. Delineated Wetland A meets the jurisdictional definition of a wetland as defined in 33 C.F.R. § 328.3(7). The constructed and historic Dairy Creek channels both meet the USACE jurisdictional definition of a water as defined by 33 C.F.R. § 328.3(5).

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[1] *"Natural Waterways," as used in ORS 196.800(14), means waterways created naturally by geological and hydrological processes, waterways that would be natural but for human-caused disturbances (i.e., channelized or culverted streams, impounded waters, partially drained wetlands or ponds created in wetlands) and that otherwise meet the definition of waters of the state, and certain artificially created waterways as described in "other bodies of water" (OAR 141-085-0015 [2][e]).*

Final jurisdictional findings for wetlands and waters will be determined by USACE. The wetlands and waters may be jurisdictional if USACE determines there is a significant nexus.

Table 5. Characteristics of Wetland and Water Resources Identified Within Project Study Area

Wetland/Water	Type	Associated/ Receiving Water Body	More than 10 feet Channel Width	Fish Presence[1]	Contiguous with Wetlands (Wetland Name)	Jurisdictional by DSL[2]	Jurisdictional to USACE[3]
Wetlands							
A	PFO1R Lacustrine Fringe	Sturgeon Lake	N/A	Yes	N/A	Yes (4)	Yes(7)
Waters							
Constructed Dairy Creek Channel	Perennial	Columbia River / Sturgeon Lake	Yes	Yes	Wetland A	Yes (3)	Yes (5)
Historic Dairy Creek Channel	Perennial	Columbia River	Yes	Yes	No	Yes (3)	Yes (5)

[1] *Fish presence based on observation and documented data*
[2] *33 CFR Part 328*
[3] *OAR 141-085-0515*

I: Results and Conclusions

One jurisdictional wetland and two jurisdictional streams, totaling 0.36 acres of wetlands and 9.41 acres of waters of the state/U.S, were observed and delineated within the project study area (Table 6). Wetland A was only mapped within the project study area, but extends outside to form a large wetland complex along the shoreline of Sturgeon Lake. The historic Dairy Creek channel also extends outside of the study area to the north. The table below provides a summary of the jurisdictional wetlands and waters discussed in this report that are identified.

Table 6. Project Study Area Wetland and Water Summary

Resource	Size (Acres)
Wetlands	
A	0.36
Subtotal	*0.36*
Waters	
Constructed Dairy Creek Channel	8.95
Historic Dairy Creek Channel	0.10
Subtotal	*9.15*
Total Waters & Wetlands	9.41

J: Disclaimer

This report documents the investigation, best professional judgment and conclusions of the investigator. It is correct and complete to the best of my knowledge. It should be considered a Preliminary Jurisdictional Determination of wetlands and other waters and used at your own risk unless it has been reviewed and approved in writing by the Oregon Department of State Lands in accordance with OAR 141-090-0005 through 141-090-0055.

Appendix A

Figures

Appendix B

Data Sheets

Appendix C

Ground Level Color Photographs

Photographer: HDR	Photo 1: PP (photo point) 1 facing soils at SP (sample plot) 2, an upland plot. Soils do not meet the criteria for hydric soils. Note the presence of *Phalaris arundinacea*, a facultative wetland species.
Date: 30 May 2013	
USACE Dairy Creek Restoration Project	

Photographer: HDR	Photo 2: PP1 facing north at vegetation in the plot. *Phalaris arundinacea* and *Amorpha fruiticosa* are the dominant species (both FACW).
Date: 30 May 2013	
USACE Dairy Creek Restoration Project	

Photographer: HDR Date: 30 May 2013 USACE Dairy Creek Restoration Project	Photo 3: PP2 facing northwest at SP1. Note the prevalence of *Holcus lanatus* in the plot. Vegetation was predominantly facultative; however, hydric soil and wetland hydrology indicators were not observed.

Photographer: HDR Date: 30 May 2013 USACE Dairy Creek Restoration Project	Photo 4: PP3 facing west from log jam in constructed Dairy Creek.

Photographer: HDR	Photo 5: PP4 facing southwest at the constructed Dairy Creek channel from a private bridge.
Date: 30 May 2013	
USACE Dairy Creek Restoration Project	

Photographer: HDR	Photo 6: PP5 facing north at backwater area of the constructed Dairy Creek channel near the non-functioning tide gate.
Date: 30 May 2013	
USACE Dairy Creek Restoration Project	

Photographer: HDR	Photo 7: PP6 facing SP3 soil pit. Soils have hydric indicators (F6) and high water table can be seen in the pit. SP3 meets the wetland criteria.
Date: 30 May 2013	
USACE Dairy Creek Restoration Project	

Photographer: HDR	Photo 8: PP6 facing northwest at Wetland A. Note *Salix lasiandra* and *Phalaris arundinacea* predominance (both FACW).
Date: 30 May 2013	
USACE Dairy Creek Restoration Project	

Photographer: HDR Date: 30 May 2013 USACE Dairy Creek Restoration Project	Photo 9: PP6 facing soils in SP4. Soils did not meet hydric soil criteria and wetland hydrology was not observed.

Photographer: HDR Date: 30 May 2013 USACE Dairy Creek Restoration Project	Photo 10: PP6 facing southeast at vegetation upslope of the wetland boundary. Note the prevalence of *Phalaris arundinacea* (FACW). Hydrophytic vegetation is dominant on the upland side of the boundary.

Photographer: HDR	Photo 11: PP7 facing northwest from the boundary of Wetland A. Note the prevalence of *Phalaris arundinacea* and *Amorpha fruiticosa* (both FACW).
Date: 6 June 2013	
USACE Dairy Creek Restoration Project	

Photographer: HDR	Photo 12: PP7 facing east at vegetation associated with SP12. SP12 is an upland plot, although it met the criteria for hydrophytic vegetation. Soils and hydrology did not meet the criteria.
Date: 6 June 2013	
USACE Dairy Creek Restoration Project	

Photographer: HDR	Photo 13: PP8 facing east at SP10, an upland plot. Hydric soils and wetland hydrology were not observed. Vegetation was predominantly FACW plants (*Salix lasiandra*, *Cornus alba*, *Phalaris arundinacea*); however, hydric soils and wetland hydrology were not present.
Date: 6 June 2013	
USACE Dairy Creek Restoration Project	

Photographer: HDR	Photo 14: PP8 facing west Wetland A near SP9. Standing water is present and vegetation is predominantly *Salix lasiandra*.
Date: 6 June 2013	
USACE Dairy Creek Restoration Project	

Appendix D

Additional Information

DSL Jurisdiction Discussion

The DSL regulates "waters" (including rivers and wetlands) for the State of Oregon. DSL regulates waters using volume amounts of materials (i.e., sediments) removed or filled into a regulated water resource and location of activity. Waters of the state regulated under the Removal/Fill Law (Oregon Revised Statue [ORS] 196.795 – .990) are defined under OAR 141-085-0515 and include:

> *"Waters of this state means natural waterways[2] including all tidal and non-tidal bays, intermittent streams, constantly flowing streams, lakes, wetlands and other bodies of water in this state, navigable and non-navigable, including that portion of the Pacific Ocean which is in the boundaries of this state."*

"Other Bodies of Water" include the following:

- Wetlands and ponds artificially created from uplands, unless specified in OAR 141-085-0515(4) or (5) that are, equal to or greater than one acre in size; or identified in a removal-fill authorization as a compensatory mitigation site.
- Except as described in OAR 141-085-0515(3) and (6), channels or ditches that are artificially created from upland that contain food and game fish; and have free and open connection to waters of the state.

"Other Bodies of Water" do not include the following:

- Existing irrigation canals and ditches that are operated and maintained for the primary purpose of conveying water for irrigation; and are dewatered during the non-irrigation season except for water incidentally retained in isolated low areas of the canal/ditch or for stock water runs, provision of water for fire services or storm water runoff (OAR 141-085-0515[3]).
- Wetlands artificially created from uplands of up to one acre in size for the purpose of controlling, storing, or maintaining stormwater (ORS 196.687) (OAR 141-085-0515[4]).
- Channels, wetlands, or ponds of any size artificially created from uplands for the purpose of wastewater treatment; farm or stock watering (including crop irrigation); settling of sediment; fire suppression; cooling water; surface mining, where the site is managed for interim wetlands use or not protected as a significant wetland in the comprehensive plan (pursuant to ORS 196.672[10]); log storage; or aesthetic purposes, including golf course features (OAR 141-085-0515[5]).
- Drainage ditches alongside roads and railroads where the ditch is (a) 10 feet wide or less at the OHW; (b) artificially created from upland or from wetlands (e.g., in mapped hydric soils); (c) not adjacent and connected or contiguous with other wetlands; and (d) do not contain food or game fish (OAR 141-085-0515[6]).

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[2] *"Natural Waterways," as used in ORS 196.800(14), means waterways created naturally by geological and hydrological processes, waterways that would be natural but for human-caused disturbances (i.e., channelized or culverted streams, impounded waters, partially drained wetlands or ponds created in wetlands) and that otherwise meet the definition of waters of the state, and certain artificially created waterways as described in "other bodies of water" (OAR 141-085-0015 [2][e]).*

USACE Jurisdiction Discussion

On June 5, 2007, EPA and USACE issued two memorandums providing guidance for implementing the Supreme Court's decision in the consolidated cases Rapanos v. United States and Carabell v. United States 126 S. Ct. 2208 (2006) (herein referred to as "Rapanos") and Solid Waste Agency of Northern Cook County v. US Army Corps of Engineers, 531 US 159 (2001) (herein referred to as SWANCC) which addressed the jurisdiction over waters of the US under the CWA. The procedures included in the memorandums replaced the coordination procedures contained in the January 2003 EPA/Army guidance implementing the SWANCC decision (but leaves the remainder of that guidance unaffected) and articulated new coordination procedures for jurisdictional determinations affected by Rapanos. Under these memorandums, case-by-case evaluations are required to determine if there is a "significant nexus" to navigable waters for jurisdictional determinations involving the classes of waters listed in subparagraph 4.a.(2)[3] of the *Memorandum for Director of Civil Works and US EPA Regional Administration* issued June 5, 2007. Documentation for jurisdictional determinations shall be made using the Approved Jurisdictional Determination Form developed by USACE headquarters (HQ) in consultation with EPA. The information on the jurisdictional form shall identify the rationale for asserting or not asserting jurisdiction.

The agencies will assert jurisdiction over the following waters:

- Traditional navigable waters
- Wetlands adjacent to traditional navigable waters
- Non-navigable tributaries of traditional navigable waters that are relatively permanent where the tributaries typically flow year-round or have continuous flow at least seasonally (e.g., typically three months)
- Wetlands that directly abut such tributaries

The agencies will decide jurisdiction over the following waters based on a fact-specific analysis to determine whether they have a significant nexus with traditional navigable water:

- Non-navigable tributaries that are not relatively permanent
- Wetlands adjacent to non-navigable tributaries that are not relatively permanent
- Wetlands adjacent to but that do not directly abut a relatively permanent non-navigable tributary

The agencies generally will not assert jurisdiction over the following features:

- Swales or erosional features (e.g., gullies, small washes characterized by low volume, infrequent, or short duration flow)
- Ditches (including roadside ditches) excavated wholly in and draining only uplands and that do not carry a relatively permanent flow of water.

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[3] *4. Coordination Requirements. (a) Interagency Coordination Required. The EPA and the USACE will follow the coordination procedures in paragraph (5) for the following jurisdictional determinations: (1) Determinations for intra-state, non-navigable, isolated waters potentially covered solely under 33 C.F.R. §328.3(a)(3), where jurisdiction is asserted or not asserted based on interstate commerce factors. (2) Determinations based on a finding of a "significant nexus" with traditional navigable waters, which are required for the following waters: (i) non-navigable tributaries that do not typically flow year–round or have continuous flow at least seasonally (e.g., typically at least 3 months each year); (ii) wetlands that are adjacent to such tributaries; and (iii) wetlands that are adjacent to but that do not directly abut a relatively permanent non-navigable tributary. (b) Interagency Coordination Not Required. Interagency coordination following the procedures below is not required for JDs involving traditional navigable waters, including their adjacent wetlands, and for relatively permanent non-navigable tributaries of traditional navigable waters, including wetlands with a continuous surface connection with such relatively permanent tributaries (USACE, 2007).*

The agencies will apply the significant nexus standard as follows:

- A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by all wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical and biological integrity of downstream traditional navigable waters
- Significant nexus includes consideration of hydrologic and ecologic factors

Final jurisdictional findings for wetlands and waters will be determined by USACE. The wetlands and waters may be jurisdictional if USACE determines there is a significant nexus.

Soils Information

A review of the Soil Survey of Multnomah County (Green, 1983) indicated that the entire project study area has been surveyed by the NRCS. The soil survey indicated three types of soil occur within the project study area, all of which are hydric (See table below) (NRCS, 2006).

Soil Series Present in the Project Study Area.

Soil Phase (Map Unit)	Hydric/Hydric Inclusions*	Comments
Rafton silt loam (39)	Hydric	Very poorly drained soil formed in recent alluvium with some mixing of volcanic ash (elevation 10 to 20 feet). Slopes are 0 to 2 percent and available water capacity is 11 to 13 inches.
Sauvie silt loam (44)	Hydric	Poorly drained soil formed in recent alluvium with some mixing of volcanic ash (elevation 10 to 20 feet). Slopes are 0 to 2 percent and available water capacity is 11 to 13 inches.
Sauvie silt loam, protected (45)	Hydric	Poorly drained soil formed in recent alluvium with some mixing of volcanic ash (elevation 10 to 20 feet). Slopes are 0 to 2 percent and available water capacity is 11 to 13 inches.

*Sources: Soil Survey of Multnomah County Area, Oregon, 1983; *Natural Resource Conservation Service, Multnomah County Hydric Soils List, 2007.*

Appendix E

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Appendix F

Tax Lots

USACE Dairy Creek Restoration Project Affected Taxlots	
3N1W34 -00100	3N1W35C -00100
3N1W35 -00200	3N1W35C -00200
3N1W35B -00300	3N1W35C -00300
3N1W35B -00400	3N1W35C -00400
3N1W35B -00500	3N1W35C -00500
3N1W35B -00600	2N1W -0010

Appendix G

WETS Table

Appendix H

Oregon Rapid Wetland Assessment Protocol (ORWAP) Score Sheets