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Mitigation Monitoring Annual Report Template

Mitigation Monitoring Report Cover Sheet

1: Muddy Creek Mitigation Bank Identifiers:

DSL Permit # unknown/**Corps Permit #**NWP-2005-714 **Permittee:** Muddy Creek Mitigation Bank
County: Benton **Report Date:** 5/15/15 **Monitoring Year:** Seven
Date Removal-Fill Activity Completed: Not Applicable
Date mitigation was completed: Grading Ongoing Planting Ongoing
Dates of data collection: Vegetation in June 2014/Hydrology in March and April 2015
Report prepared by: Turnstone Environmental Consultants, Inc.

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2: Monitoring Report Purpose:
This monitoring report is for a project that includes: (check all that apply):

Mitigation Bank Report

3: Results:

Phase 1 Vegetation Standards Assessment:

Standard	Results	Met
Wetgrass Prairie Habitat Standards		
At least 60% relative plant cover is comprised of native spp	84.80	yes
Tufted hair grass at least 25% relative plant cover.	26.47%	yes
At least 5 native species with 5% relative plant cover each*	6 species > 5%	yes
No more than 15% relative cover comprised of invasive spp**.	0.47%	yes
Wetgrass prairie vegetation moisture index is between 2 and 3.	1.81%	yes
No more than 5% relative plant cover by trees or shrubs.	0%	yes
At least 10 wet prairie cohort species	12 species	yes
Emergent Wetland Habitat Standards		
A minimum of 55% relative plant cover is comprised of native spp	89.20%	yes
At least 25% relative cover of native grass or grass-like species	49.60%	yes
A minimum of 5 native herbaceous species	10 native herbs	yes
Less than 15% relative plant cover is comprised of invasive spp**	0.63%	yes
Vegetation moisture index is less than 3.0	1.39	yes
Planted Wetland Forest Habitat Standards		
Min. 2 native tree species at 200 stems/acre	8 spp; 413 s/a	yes
A minimum of 55% relative plant cover is comprised of native spp	74.30%	yes
Min. 3 native shrub species at 240 stems per acre.	7 spp; 467 s/a	yes
Less than 15% relative plant cover is comprised of invasive spp**	4.16%	yes
Vegetation moisture index is less than 3.0	2.69	yes
Enhanced Wetland Forest Habitat Standards		
Min. 2 native shrub species at 240 stems per acre.	3 spp; 377 s/a	yes
Min 20% relative plant cover slough sedge (Carex obnupta).	40%	yes
Less than 30% relative plant cover of invasive species**.	8%	yes
Min 55% relative plant cover is comprised of native spp	89%	yes

Phase 2 Vegetation Standards Assessment:

Standard	Results	Met
Wetgrass Prairie Habitat: Years 1&2		
At least 50% relative native plant cover	79.90%	yes
Tufted hair grass at least 25% relative plant cover.	33.70%	yes
At least 3 native spp (2 grass/1 herb) with 5% relative plant cover each.*	6 species > 5%	yes
No more than 15% relative invasive spp cover**.	2.30%	yes
Moisture index is between 2 and 3.	2.48	yes
No more than 5% relative cover by trees/shrubs	0%	yes
By year 5 at least 10 wet prairie cohort species	15	yes
Emergent Wetland Habitat: Final Standards		
A minimum of 55% relative plant cover is comprised of native spp	97.80%	yes
At least 25% relative cover native graminoids	91.60%	yes
A minimum of 5 native herbaceous species.	9 spp	yes
No more than 15% relative plant cover invasive spp**.	0.34%	yes
Vegetation moisture index is less than 3.0.	1.68	yes

4: Further Actions:

Remedial work recommended Yes ☐ No ☒

Deed Restriction or other protection instrument attached Yes ☐ No ☒

Final Monitoring Report? Yes ☐ No ☒

Requesting release or partial release of financial security? Yes ☐ No ☒

TURNSTONE
ENVIRONMENTAL CONSULTANTS

Year Seven Monitoring Report

for

Muddy Creek Mitigation Bank

Benton County, Oregon

Prepared for:
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May 15, 2015

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1.0 Mitigation Plan Purpose and Overview

A. Location

The legal description for Muddy Creek Mitigation Bank (MCMB) is Township14, Range 5W, Section 9. The tax lot number is 300. The center of the site is located at latitude 44.3688/longitude -123.2986. The bank is located west of Highway 99 between McFarland and Dawson Roads about 3 miles north of Monroe, in Benton County, Oregon(*Appendix A: Figure 1*).

B. Mitigation goals and objectives.

The primary goals of MCMB are to enhance 67 acres and create 41 acres of wetland on 108 acres of degraded farmed wetland. Habitats to be both created and enhanced are wetgrass prairie, emergent wetland, and forested wetland. When complete, the Bank will feature a 101-acre mosaic of shallow-water palustrine emergent and wet prairie grassland habitats with 62.2 acres of wetgrass prairie and 38.8 acres of emergent wetland. The remaining 7-acre parcel will be forested wetland. This mitigation project is intended to replace the functions and values lost within the Service Area in the categories shown in Table 1. Vegetation and hydrology data is presented in Appendix B.

Hydrology Goals and Objectives:

Enhancing site hydrology is a primary restoration goal of MCMB. Increasing the extent of shallow inundation and the duration of saturation facilitates the transition to native wet prairie vegetation and provides habitat for waterfowl and waterbirds.

Objectives for enhancing MCMB hydrology include:

1. Reconfigure the routing of surface water from perimeter ditches out onto the Bank by selectively plugging ditches locations to promote overland flow through the Bank's swale system.

2. Intercept surface water overland flow that exits the Bank on its northern border by building berms across existing swales.

3. Increase surface water retention (and extend saturation duration) by constructing 10 low-lying, low profile berms.

4. Excavate 11 shallow (typical depth no greater than 12 inches) depression pools to capture precipitation and to selectively create wetlands on the upland mounds.

5. Design and construct the water retention features to maximize duration on the Bank site while not impacting surface drainage from neighboring properties.

Vegetation Goals and Objectives:

The primary goal is to create and/or increase the coverage of native vegetation in forested wetland, palustrine emergent and wet prairie habitats. The desired outcome will be to develop self-sustaining native plant communities that provide a diversity of habitats for wildlife in a properly functioning floodplain setting and promote improved water quality while avoiding water impoundment issues on neighboring properties. This will be accomplished through management actions to remove existing non-native species; and water management, to preferentially select for species tolerant of seasonally saturated soil conditions.

Wet Prairie
Wet prairie habitat is proposed for approximately 62.8 acres (58% of Bank). Wet prairie habitat will undergo several years of herbicide spray to deplete the seed bank in the upper soil layers. As this habitat is largely confined to the areas of the Bank that do not yet meet hydrology standards, wet prairie habitat will be created by selectively grading these uplands to achieve wetland hydrology.

The initial matrix of wet prairie grasses, tufted hair grass, meadow barley, water foxtail, American slough grass, and spike bentgrass will be cultivated for several seasons prior to no-till drilling of forb seeds. It is likely that forb seeds will not be drilled until the first maintenance burn to reduce thatch and expose bare soil that will promote seeding success.

Palustrine Emergent
Palustrine emergent habitat is proposed for approximately 38.2 acres (36% of Bank). The primary focus in this habitat is to establish a matrix of species that, when mature, will be composed of obligate and facultative wetland forbs and grass-like vegetation with a complementary component of grasses that can withstand extended inundation. Weed infestation is likely not to be as pervasive in this habitat due to inundation so the lengthy herbicide regime is not necessary. This habitat will be planted with a forb and grass mix following berm construction. Palustrine Emergent habitat grades into wet prairie along its margins so the palustrine emergent seed mixture will be supplemented with the wet prairie seed mixture when planting along these margins.

Forested Wetland
Forested wetland habitat is proposed for seven acres (four acres planted, three acres enhanced; 6% of Bank). The primary focus in this habitat will be to first eliminate the introduced grass understory. This will be achieved through herbicide application and extending the inundation period when berm construction is complete. When understory conditions are acceptable, slough sedge plugs and bare-root shrub stock will be planted. Since the overstory is already composed of mature Oregon ash trees, there is no need to plant tree stock.

Along the southwestern edge of the Bank, four acres of forested wetland will be planted. It is intended that this area increase the forested buffer to Muddy Creek. Plant species for both the establishment and density of species is designed to mimic composition found in the forested wetlands bordering the western edge of the Bank.

Table 1. MCMB Summary

Muddy Creek Mitigation Bank					
Mitigation Method	**Acres**	**HGM**	**Cowardin**	**Mitigation Ratio**	**Credits**
Enhancement	60	Flats/RFT	PEM/R2	2:1	30
Enhancement	4	Flats/RFT	PFO/R2	2:1	2
Enhancement	3	Flats/RFT	PFO/R2	3:1	1
Creation	41	Flats	PEM	1.5:1	27.3
Total	108				60.3

C. Maintenance and management actions

An as-built drawing for the South Block of Phase 2 is included in Appendix C. In the past year, the following activities were conducted:

Management activities: Phase 1

Enhanced forest habitat:

- Continue selective spot spraying for invasive species; pennyroyal, climbing nightshade, and reed canary grass.
- Expand slough grass plantings.

Planted forest habitat:

- Continue selective spraying for invasive species.
- Monitor grow tube condition; replace and/or re-cap as needed.

Enhanced Wetland habitat:

- Continue selective spraying for non-native grasses and forbs.
- Continue spot spraying of targeted invasives, reed canary grass, pennyroyal, bull and Canadian thistle.

Created Wetland habitat:

- Continue late fall spraying regime of Reward, (a grass-specific herbicide) to evaluate effectiveness for control of rattail fescue.
- Continue selective spraying for invasives, primarily Queen Anne's lace and thistle spp.
- Continue rotational late season mowing of habitat.
- No-till drill forb seed mixture to increase species diversity.

Management activities: Phase 2

Well log monitoring:

- Continue monitoring established, and supplemental, wells drilled in the south block of Phase 2 to establish a hydrologic saturation baseline, as well as, evaluate effectiveness of current restoration contouring/grading.

Enhanced Wetland habitat:

- Continue selective spraying for invasives (reed canary grass, pennyroyal, and bull thistle).
- Plant cottonwood and willow cuttings along swale margins.

Created Wetland: North Block:

- Selective spraying for non-natives and invasives continues.
- Continue late summer mowing.
- Broadcast spray grass-specific herbicide to control non-native grasses.

Created Wetland: South Block

- Broadcast sprayed with glyphosate herbicide in spring and fall for weed maintenance prior to planting.
- Drilled grass and forb mixture in fall.
- Over the winter of 2014/2015 finalize the wetland delineation and as-built construction of phase 2.
- Selective spraying for invasives

D. Monitoring methods

Vegetation monitoring will occur in each habitat present at the site: wet prairie, emergent wetland, and forested wetland. Botanists will employ monitoring methodology similar to that described in John Marshall's 2004 *Draft Guidance for Vegetation Monitoring in Western Oregon Wetlands and Riparian Areas: Using Reference Sites to Help Plan and Evaluate Vegetation Performance of Mitigation Sites*. The basis of this methodology uses carefully selected reference sites to create benchmarks for restoration performance. Monitoring efforts will serve to compare the targeted vegetation performance of to the actual vegetation performance of our site.

Vegetation monitoring will be conducted in June of each monitoring year. Timing of monitoring efforts will be scheduled in order to consistently capture vegetation in a similar phenological stage from year to year. Additional monitoring of some or all of the vegetation transects may be implemented as deemed necessary at other times of the year, in order to acquire information to guide new management strategies or to target problem areas.

For all types of survey plots, all species will be listed along with percent cover and nativity designation. For forested wetland plots, surveyors will also count the number of stems at ground level for each tree species recorded in the plot, in order to calculate percent survival. Data sheets to be used will be from the Draft Vegetation Monitoring document (Marshall, 2004).

Reference Site – Reference sites will be monitored once, initially, to establish baseline conditions at the sites and subsequently thereafter as deemed necessary by MBRT and Bank sponsors. The primary reason for selecting and monitoring reference sites is to determine whether problems occurring within the Bank are a result of management strategy or indicative of a larger event within the watershed.

Reference sites have been selected for each of the proposed habitat types at the Bank, wetgrass prairie, emergent wetland, and forested wetland. Locations for reference sites were chosen based on meeting the following criteria:

1. Located in the same watershed as MCMB
2. Relatively undisturbed status
3. Similar or identical hydrogeomorphic and soil conditions of the Bank.
4. Close proximity to MCMB

<u>Wetgrass prairie reference site</u>

A section of the Research Natural Area (RNA) at Finley National Wildlife Refuge was selected as the reference site for the wetgrass prairie habitat types at MCMB. The specific location is the southeast quarter of Section 28, Township 13 South, Range 5 West, Willamette Meridian (44° 24.5' N, 123°18' W). The site chosen was utilized in a comprehensive inventory of native prairie vegetation in 1972, and already has permanent transects established by William Moir and Peter Mika. This site was chosen due to its close proximity to the Bank, its undisturbed nature, and high biodiversity of wetgrass prairie species. The existing data and research available for the site is extensive, and provides a comprehensive database and species list. The size of the selected reference site at approximately 61 acres is comparable to the proposed 62.75 acres of wetgrass prairie to be created and enhanced at the Bank. Both the RNA at Finley and the Bank are also situated similarly to the east of Muddy Creek, and are affected likewise by hydrologic fluctuations within the watershed.

Emergent wetland reference site

Also within the Finley National Wildlife Refuge, a reference site was chosen to provide baseline data for the emergent wetland habitats at the Bank. The reference site is in the McFadden Marsh area of the Finley Refuge. The site was chosen due to its location adjacent to the wetgrass prairie habitat, its proximity to the Bank site, the successful nature of the ongoing restoration projects in and around the refuge's emergent wetland habitats.

Forested wetland reference site

Six reference sites for the Oregon ash (*Fraxinus latifolia*) forested wetland community are established on the property directly adjacent to the Bank, also under the ownership of the sponsors. Sites were chosen for their close proximity to the Bank, relatively undisturbed nature and similarity in sources of hydrology and soil composition. Transects have been established and baseline data collected at these sites that will help determine planting densities for the forested wetland to be created and enhanced at the Bank.

E. Monitoring data locations

The monitoring protocol uses a stratified systematic plot method with a series of baselines, each with transects running perpendicular from the baseline across each sampling area. Baselines are established in each habitat type and section of the bank site, with enough baselines to encompass the entire area. Care has been taken to ensure that a baseline runs along each habitat type that will be created on site, with a total of six baselines established (*Appendix A: Figure 2*).

For wetgrass prairie and emergent wetlands, transects are approximately 250 feet apart along the baseline. A total of 12 transects were established in these two habitats. The location of the first sample plot along the transect line is randomly placed, and then the remaining plot locations follow at roughly 150 foot intervals. Plots were one-square meter quadrats.

For the planted forested wetlands, six 150' x 50' rectangular plots describe tree and shrub information. Within each plot herbaceous vegetation was recorded from a randomly located one-square meter quadrat.

For enhanced forested wetlands, four randomly located 50-feet circular plots record tree and shrub information. Within each plot herbaceous vegetation was recorded from a randomly located one-square meter quadrat.

F. Hydrology methods and context

Hydrology monitoring data is collected to validate compliance with 1987 manual soil saturation standard. 26 monitoring wells were initially established throughout the Bank. 20 of the 26 wells are located in areas originally delineated as uplands in the 2006 wetland delineation. 4 additional wells were drilled in the winter of 2012 in the northeast corner of Phase 2 North Block to substantiate the conversion of uplands (*Appendix A: Figure 3*).

In December 2012, 12 additional wells were drilled on creation ground uplands in the South Block of Phase 2 to substantiate hydrologic/saturation conditions on the newly converted uplands.

Saturation/soil water depth was measured 9 times on 3-4 day time intervals from March 17 through April 14, 2014.

Table 2. Precipitation during monitoring and two weeks prior

Date	3-Mar	4-Mar	5-Mar	6-Mar	7-Mar	8-Mar	9-Mar
Precip	0.45	0.22	0.62	1.24	0.36	T	0.75
Date	10-Mar	11-Mar	12-Mar	13-Mar	14-Mar	15-Mar	16-Mar
Precip	0.16	T	0.00	0.00	0.19	0.06	T
Date	17-Mar	18-Mar	19-Mar	20-Mar	21-Mar	22-Mar	23-Mar
Precip	0.19	0.01	0.00	0.00	0.00	0.00	0.00
Date	24-Mar	25-Mar	26-Mar	27-Mar	28-Mar	29-Mar	30-Mar
Precip	0.00	0.21	0.46	0.61	0.42	0.80	0.37
Date	31-Mar	1-Apr	2-Apr	3-Apr	4-Apr	5-Apr	6-Apr
Precip	0.04	0.17	0.03	0.00	0.08	0.02	0.03
Date	7-Apr	8-Apr	9-Apr	10-Apr	11-Apr	12-Apr	13-Apr
Precip	0.01	0.00	0.02	0.00	0.00	0.00	0.00
Date	14-Apr	15-Apr	16-Apr	17-Apr	18-Apr	19-Apr	20-Apr
Precip	0.00	0.00	T	0.08	0.43	T	0.03

Source: National Climate Data Center (NCDC), Station: CORVALLIS STATE UNIVERSITY, OR US GHCND:USC00351862

Table 3 Percent of normal rainfall for the water year to date of monitoring (October 1, 2013-April 14, 2014)

Month	Actual	Average	Percent of Normal
October	1.17	3.02	39
November	2.71	6.94	39
December	2.04	7.43	27
January	2.78	6.46	43
February	8.08	5.71	142
March	7.44	4.59	162
April	3.02	2.98	101
Total:	27.24	37.13	73

Source: Corvallis State University WETS Table and NCDC

Table 4. Monthly percent of normal precipitation for 3 months preceding monitoring

Month	Actual	Average	Percent of Normal
January	2.78	6.46	43
February	8.08	5.71	142
March	7.44	4.59	162
Total:	18.30	16.76	109

Source: Corvallis State University WETS Table and NCDC

2. Results

A. Vegetation Standards.

Table 5. Phase 1 Vegetation Standards Assessment:

Standard	Results	Met
Wetgrass Prairie Habitat Standards		
At least 60% relative plant cover is comprised of native spp	84.80	yes
Tufted hair grass at least 25% relative plant cover.	26.47%	yes
At least 5 native species with 5% relative plant cover each*	6 species > 5%	yes
No more than 15% relative cover comprised of invasive spp**.	0.47%	yes
Wetgrass prairie vegetation moisture index is between 2 and 3.	1.81%	yes
No more than 5% relative plant cover by trees or shrubs.	0%	yes
At least 10 wet prairie cohort species	12 species	yes
Emergent Wetland Habitat Standards		
A minimum of 55% relative plant cover is comprised of native spp	89.20%	yes
At least 25% relative cover of native grass or grass-like species	49.60%	yes
A minimum of 5 native herbaceous species	10 native herbs	yes
Less than 15% relative plant cover is comprised of invasive spp**	0.63%	yes
Vegetation moisture index is less than 3.0	1.39	yes
Planted Wetland Forest Habitat Standards		
Min. 2 native tree species at 200 stems/acre	8 spp; 413 s/a	yes
A minimum of 55% relative plant cover is comprised of native spp	74.30%	yes
Min. 3 native shrub species at 240 stems per acre.	7 spp; 467 s/a	yes
Less than 15% relative plant cover is comprised of invasive spp**	4.16%	yes
Vegetation moisture index is less than 3.0	2.69	yes
Enhanced Wetland Forest Habitat Standards		
Min. 2 native shrub species at 240 stems per acre.	3 spp; 377 s/a	yes
Min 20% relative plant cover slough sedge (Carex obnupta).	40%	yes
Less than 30% relative plant cover of invasive species**.	8%	yes
Min 55% relative plant cover is comprised of native spp	89%	yes

Table 6. Phase 2 Vegetation Standards Assessment:

Standard	Results	Met
Wetgrass Prairie Habitat: Years 1&2		
At least 50% relative native plant cover	79.90%	yes
Tufted hair grass at least 25% relative plant cover.	33.70%	yes
At least 3 native spp (2 grass/1 herb) with 5% relative plant cover each.*	6 species > 5%	yes
No more than 15% relative invasive spp cover**.	2.30%	yes
Moisture index is between 2 and 3.	2.48	yes
No more than 5% relative cover by trees/shrubs	0%	yes
By year 5 at least 10 wet prairie cohort species	15	yes
Emergent Wetland Habitat: Final Standards		
A minimum of 55% relative plant cover is comprised of native spp	97.80%	yes
At least 25% relative cover native graminoids	91.60%	yes
A minimum of 5 native herbaceous species.	9 spp	yes
No more than 15% relative plant cover invasive spp**.	0.34%	yes
Vegetation moisture index is less than 3.0.	1.68	yes

Phase 1 Vegetation Performance Standards

Vegetation Data can be found in Attachment B of this report.

Wet Prairie Habitat

Performance Standard 1 Result: *Percent Vegetative Cover- At least 50% of the relative plant cover (including bare soil) is comprised of native species for Years 1 and 2 after revegetation; raises to 60% cover in Years 3-5.*

Native plant cover is 85 percent. This performance standard has been met.

Performance Standard 2 Result: *Tufted hair grass is represented by at least 25% relative plant cover.*

Tufted hairgrass has 26.5 percent cover. This performance standard has been met.

Performance Standard 3 Result: *At least 2 native grass species and 1 native forb with 5% cover each in the native cover matrix for Years 1 & 2, raises to 5 native species with at least 5% cover for each species in Years 3-5.*

There are six native grass species and two native herb species with at least five percent cover. *Alopecurus geniculatus, Deschampsia caespitosa, Eleocharis palustris,Gnaphalium uliginosum, and Glyceria occidentalis* have greater than five percent cover. This performance standard has been met.

Performance Standard 4 Result: *No more than 15% of relative plant cover is comprised of non-native invasive species.*

Non-native invasive species have only 0.47% cover. This performance standard has been met.

Performance Standard 5 Result: *Wet prairie vegetation moisture index is between 2 and 3.*

Moisture index is 1.81. This should be acceptable because it is wetter than what is required.

Performance Standard 6 Result: *No more than 5% relative plant cover by trees or shrubs.*

There are no trees or shrubs within the wet prairie habitat. This performance standard has been met.

Performance Standard 7 Result: *By Year 5, presence of at least 10 wet prairie cohort species and no more than twice the percent cover of bare soil present at the reference site.*

There are 12 cohort species with no more than twice the percent cover of bare soil present at the reference site. This performance standard has been met.

Emergent Wetland Habitat

Performance Standard 1 Result: *A minimum of 55% relative plant cover is comprised of native species.*

Native plant species comprise 89.2% relative plant cover. This performance standard has been met.

Performance Standard 2 Result: *Native grass or grass-like species (i.e. Juncus, Carex, or Eleocharis species) represent at least 25% of relative plant cover.*

49.6% relative plant cover consists of graminoids. This performance standard has been met.

Performance Standard 3 Result: *A minimum of 3 herbaceous species is represented in Years 1 & 2, increasing to a minimum of 5 species in Years 3-5.*

There are 10 native herbs present. This performance standard has been met.

Performance Standard 4 Result: *Less than 15% relative plant cover is comprised of non-native invasive species.*

Non-native invasive species have only 0.63% cover. This performance standard has been met.

Performance Standard 5 Result: *The moisture index is less than 3.0.*

The moisture index is 1.39. This performance standard has been met.

Forested Wetland Habitat- Planted

Performance Standard 1 Result: *A minimum of 2 tree species planted to a density of 200 stems per acre (number of planted trees derived by calculating an 80% estimate of trees in the six reference plots).*

There are eight tree species with 413 stems per acre. This performance standard has been met.

Performance Standard 2 Result: *A minimum of 55% relative plant cover is comprised of native species.*

Native species comprise 74.3%. This performance standard has been met.

Performance Standard 3 Result: *A minimum of 3 native shrub species with 240 stems per acre (number derived from 80% of stem count in reference plots).*

There are seven native shrub species with 467 stems per acre. This performance standard has been met.

Performance Standard 4 Result: *Less than 15% relative plant cover is comprised of non-native invasive species.*

Non-native invasive species have 4.16% cover. This performance standard has been met.

Performance Standard 5 Result: *Moisture index is less than 3.0*

The moisture index is 2.69. This performance standard has been met.

Forested Wetland Habitat- Enhanced

Performance Standard 1 Result: *A minimum of 2 native shrub species with 240 stems per acre.*

There are three native shrub species present at 377 stems per acre. This performance standard has been met.

Performance Standard 2 Result: *A minimum of 20% relative plant cover slough sedge (Carex obnupta).*

There is 40% cover of slough sedge. This performance standard has been met.

Performance Standard 3 Result: *Less than 30% relative plant cover of non-native invasive species.*

Non-native invasive species comprise 8%. This performance standard has been met.

Performance Standard 4 Result: *A minimum of 55% relative plant cover is comprised of native species.*

Native species comprise 89%. This performance standard has been met.

Phase II Performance Standards

Wet Prairie Habitat

Performance Standard 1 Result: *Percent Vegetative Cover- At least 50% of the relative plant cover (including bare soil) is comprised of native species for Years 1 and 2 after revegetation; raises to 60% cover in Years 3-5.*

Native plant cover is 79.9% percent. This performance standard has been met.

Performance Standard 2 Result: *Tufted hair grass is represented by at least 25% relative plant cover.*

Tufted hairgrass has 33.7% percent cover. This performance standard has been met.

Performance Standard 3 Result: *At least 2 native grass species and 1 native forb with 5% cover each in the native cover matrix for Years 1 & 2, raises to 5 native species with at least 5% cover for each species in Years 3-5.*

There are three native grass species and three native herb species with at least five percent cover. *Downingia elegens, Gnaphalium uliginosum, Plagiobothrys figuratus, Alopecurus geniculatus, Deschampsia elongata, D. caespitosa* have greater than five percent cover. This performance standard has been met.

Performance Standard 4 Result: *No more than 15% of relative plant cover is comprised of non-native invasive species.*

Only 2.3% non-native invasive species present. This performance standard has been met.

Performance Standard 5 Result: *Wet prairie vegetation moisture index is between 2 and 3.*

The moisture index is 2.48. This performance standard has been met.

Performance Standard 6 Result: *No more than 5% relative plant cover by trees or shrubs.*

There are not trees or shrubs present within the wetgrass prairie areas. This performance standard has been met.

Performance Standard 7 Result: *By Year 5, presence of at least 10 wet prairie cohort species and no more than twice the percent cover of bare soil present at the reference site.*

There are 15 wet prairie cohort species present with no more than twice the percent cover of bare soil present at the reference site. This performance standard has been met.

Emergent Wetland Habitat

Performance Standard 1 Result: *A minimum of 55% relative plant cover is comprised of native species.*

Native species comprise 97.8%. This performance standard has been met.

Performance Standard 2 Result: *Native grass or grass-like species (i.e. Juncus, Carex, or Eleocharis species) represent at least 25% of relative plant cover.*

Graminoids represent 91.6% cover. This performance standard has been met.

Performance Standard 3 Result: *A minimum of 3 herbaceous species is represented in Years 1 & 2, increasing to a minimum of 5 species in Years 3-5.*

There are nine native herbs present. This performance standard has been met.

Performance Standard 4 Result: *Less than 15% relative plant cover is comprised of non-native invasive species.*

There is only 0.34% cover of non-native species. This performance standard has been met.

Performance Standard 5 Result: *The moisture index is less than 3.0.*

The moisture index is 1.68. This performance standard has been met.

B. Hydrology Standards Result:

Wetland hydrology shall meet 1987 US Army Corps of Engineers Wetland Delineation Manual (1987 Manual) and any supplemental guidance adopted by both DSL and the Corps where saturation is within 12 inches of the soil surface for a minimum of **11** consecutive days (5% of the 211 day growing season). The saturation standard must be met for a minimum of 3 out of 5 years. Precipitation must approximate normal (within 85% of normal monthly average recorded at Oregon State University Climate Station, Hyslop Farm, Corvallis, OR) during the evaluation months.

Well log data summary shows all Phase 1 wells meeting hydrology standards (*Appendix B: Table II a*). Well log data shows all Phase 2 North-block monitoring wells meeting hydrology standards. Well log data for Phase 2 South-block shows all but one well (Number 34) meeting hydrology standards.

C. Delineation of wetland acreage achieved.

A wetland delineation was conducted for the southern half of Phase II in March of 2015. A summary of wetland acreage is presented below. The delineation report is included in Appendix D of this report.

Wetland A: 25.07 acres (1,092,049.20 square feet)
Wetland A is a Flats (Hydrogeomorphic) and Palustrine Emergent/Riverine Intermittent (Cowardin) wetland. Wetland A was formerly a perennial ryegrass (*Lolium perenne*) field that has been converted to a wet prairie through excavation and seeding. The wetland continues offsite to the west and south and is bounded by an access road to the north and an old railroad grade to the east. Hydrology is derived primarily from precipitation and overland flow.

Unnamed Tributary A: 4.17 acres (181,645.20 square feet)
Unnamed Tributary A is an intermittent stream that is a tributary to Muddy Creek. The stream is a Riverine Intermittent (Cowardin) non-wetland water that is fed by groundwater and overland flow. The stream was historically fed by the flooding of the Long Tom River. Flooding no longer reaches the tributary because of diking.

3. Conclusions and Recommendations

A. Project status.

The mitigation project is in compliance with all performance standards and the trend from previous years is a consistent progression towards excellence. The trajectory of vegetation cover shows exceedance of native cover standards and successful achievement of invasive cover criteria.

B. Recommendations.

Management activities will continue throughout the life of MCMB including mowing, spraying, burning, and supplemental planting when necessary.

C. Credit Sales

Four credit sales were transacted in 2013, totaling 2.16 credits. 17.6 credits were reserved in 2013.

Four credit sales were transacted in 2014, totaling 18.12 credits

D. Financial Security status.

A Letter of Credit in the amount of $50,000 was established at permit issuance, and $50,000 is currently in the account.

Table 7. 2013 Credit Ledger

Customer	Consultant	Date	DSL Permit #	Corps Permit #	Number of Credits
Benton County Public Works 360 SW Avery Avenue Corvallis, OR 97333	Benton County Public Works Debie Wyne Admin Service Manager Project 25322-01-09 Project location: West Hill/53rd St. Corvallis, OR	2/20/2013	55711-RF	NWP-2014-62	0.15
Benton County Public Works PO Box 964 Corvallis, OR 97339	Benton County Public Works Project P46602-01-10 Project location: Alpine, OR	2/18/2013	R/F to be determined	NWP-20013	0.118
Retreat at Oak Creek, LLC	J. Wesley Rogers	5/1/2013	52988-RF	NWP 2013-68	17.6
Lowe's Lebanon, OR, RDC	Marty Jones Lowe's HIW, Inc. Lowe's Lebanon, OR, RDC	7/15/2013	34539-RF	20050307	0.98
Walnut Creek LLC	Steve Allen, Mgr	12/5/2013	7388-ENF		0.91

Table 8. 2014 Credit Ledger

Customer	Consultant	Date	DSL Permit #	Corps Permit #	Number of Credits
Benton County Public Works Norton Creek	Benton County Public Works Adam Stebbins Benton County Projects Coordinator Project Name: Norton Creek Project Location: Norton Creek Road	5/5/2014	56220-RF	NWP-2012-30	0.115
Benton County Public Works Harris Bridge	Benton County Public Works Adam Stebbins Benton County Projects Coordinator Project Name: Harris Bridge Project Location: Benton County	5/9/2014	15356-R/F	pending	0.32
Retreat at Oak Creek 3701 SW Western Blvd Corvallis, OR 97333	J. Wesley Rogers 455 Epps Bridge Parkway Building 100, Suite 201 Athens, GA 30606 Corvallis, OR 97333 Project Name: Retreat at Oak Creek Project Location: 3701 SW Western Blvd, Corvallis, OR 97333	5/1/2013	52988-RF	NWP 2013-68 credits reserved in 2013	17.6
ODOT/S bypass mitigation	ODOT Project Name: OR 34/US 20 South Bypass-Riverside Drive Project Location: Hwy 34 frm South Bypass (Hwy 20) east to Riverside Drive, Linn County, East of Corvallis	7/3/2014	56542-RF	NWP-1024-236	0.073

Appendix A

Figures

TURNSTONE
ENVIRONMENTAL CONSULTANTS

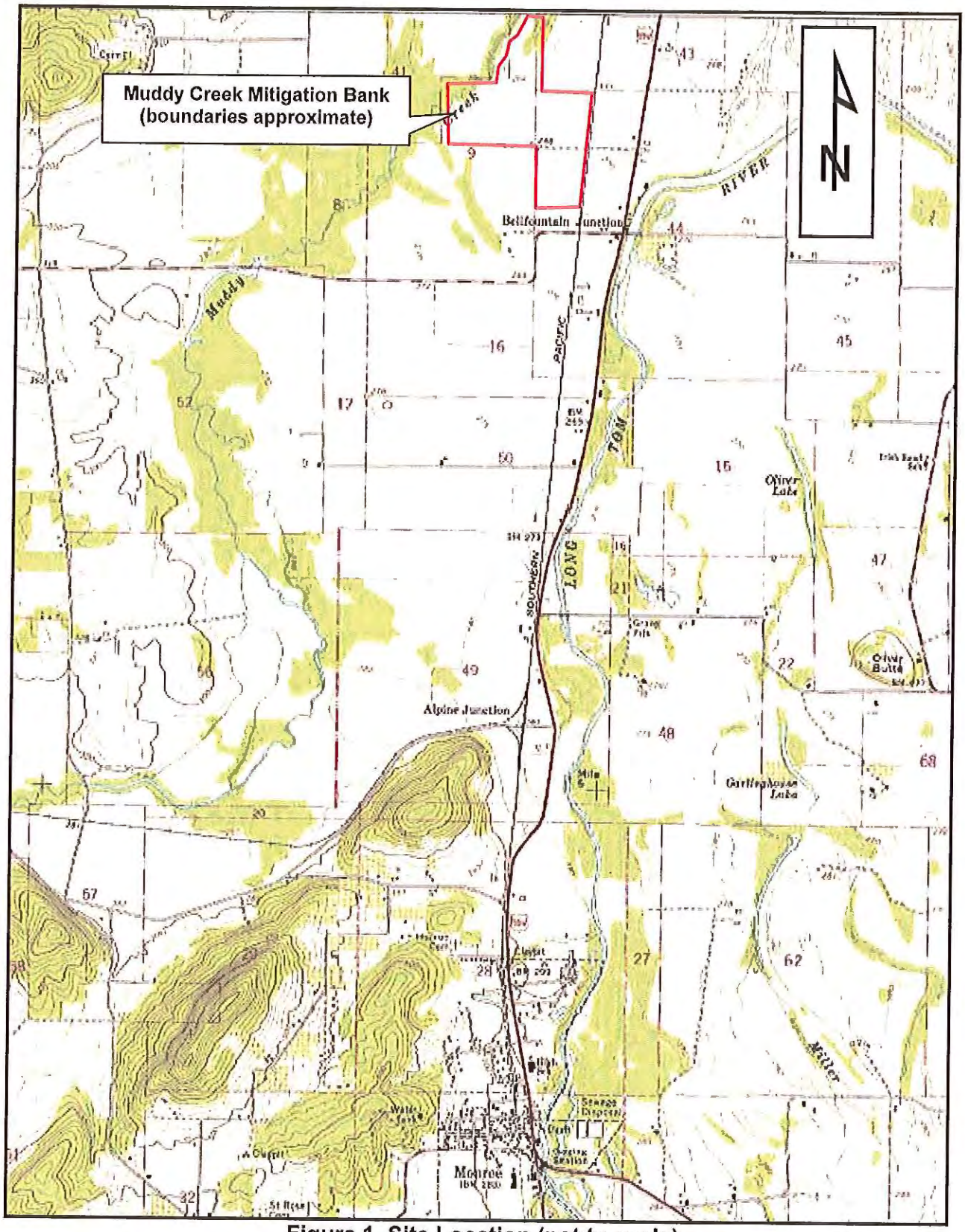


Figure 1. Site Location (not to scale)

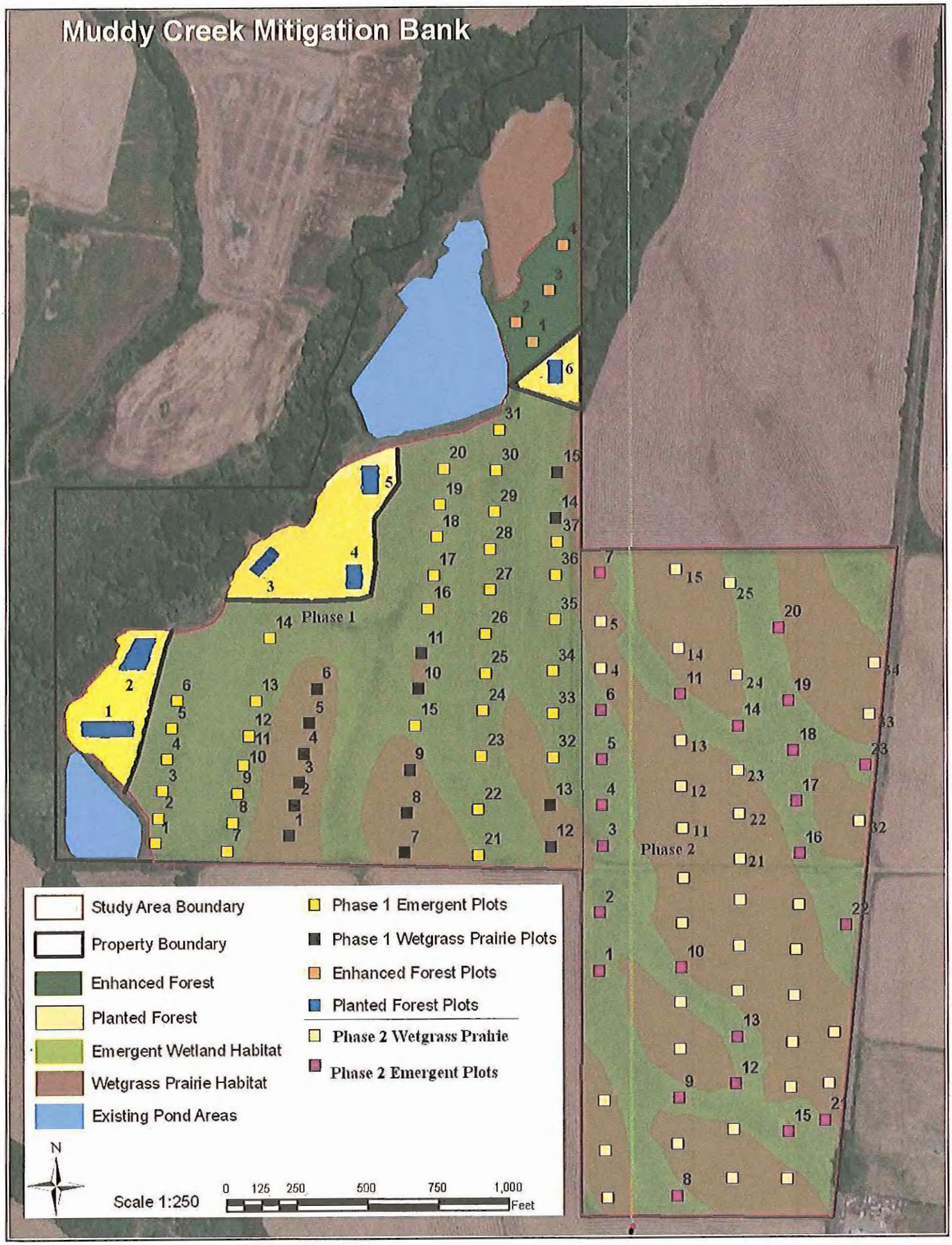
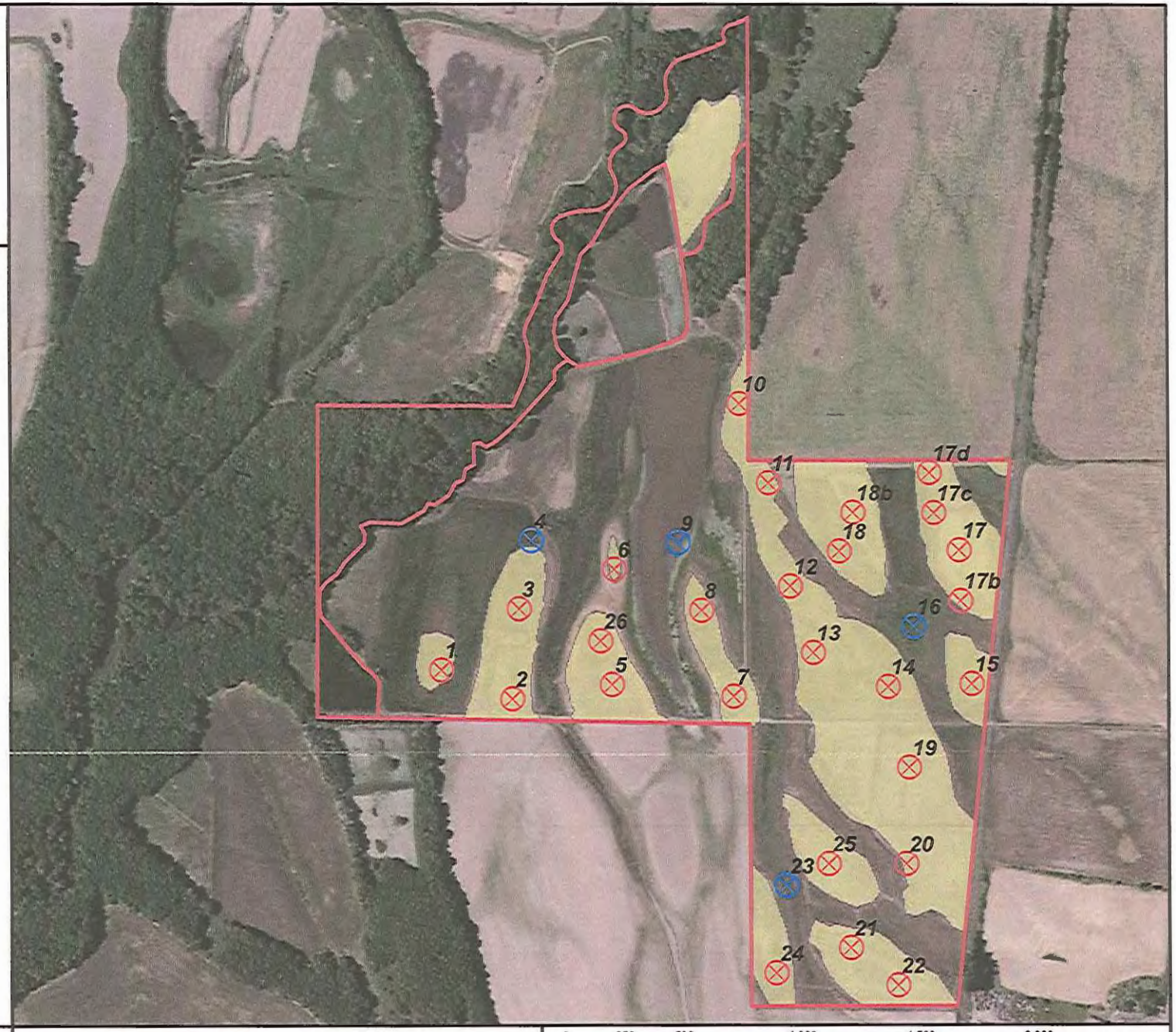

Muddy Creek Mitigation Bank
Phase 1
Phase 2
Study Area Boundary
Property Boundary
Enhanced Forest
Planted Forest
Emergent Wetland Habitat
Wetgrass Prairie Habitat
Existing Pond Areas
Phase 1 Emergent Plots
Phase 1 Wetgrass Prairie Plots
Enhanced Forest Plots
Planted Forest Plots
Phase 2 Wetgrass Prairie
Phase 2 Emergent Plots
N
Scale 1:250
0 125 250 500 750 1,000
Feet

Figure: 3

Legend

- Upland Monitoring Wells
- Wetland Monitoring Wells
- Upland Areas



N
W E
S

1:7,250

Muddy Creek Mitigation Bank
2012 Hydrology Monitoring Wells

Benton County, Or. *11/29/2012*

0 250 500 1,000 1,500 2,000 Feet

NOTES: A more recent version of this figure has been provided to the IRT

Appendix B

Vegetation and Hydrology Data

TURNSTONE
ENVIRONMENTAL CONSULTANTS

Table 1

Hydrology Data

Table 1

2014 Muddy Creek Mitigation Bank Hydrology Wells Monitoring Data

0.0 = water at/or above ground level

12 new wells were established in the winter of 2012-13 in the south block of Phase 2 to document soil saturation condition with ongoing restoration

Phase 2 North Block

2014	phs-2	phs-2	phs-2	phs-2	phs-2	phs-2	phs-2	phs-2	phs-2	phs-2	phs-2	phs-2
well #	**11**	**12**	**13**	**14**	**15**	**16**	**17a**	**17b**	**17c**	**17d**	**18a**	**18b**
3/17/2014	0.0	1.5	0.0	5.0	0.0	0.0	2.5	3.0	4.5	1.0	3.5	5.0
3/20/2014	0.0	1.0	0.0	6.0	0.0	0.0	3.0	3.0	4.0	1.0	4.5	6.0
3/24/2014	0.0	3.0	1.5	6.5	0.0	0.0	4.5	5.5	6.0	2.0	6.0	7.0
3/27/2014	0.0	4.5	2.0	6.5	0.0	0.0	0.0	7.0	7.5	0.0	1.0	2.5
3/31/2014	0.0	0.0	0.0	1.5	0.0	0.0	1.0	2.0	1.0	0.0	1.0	2.5
4/3/2014	0.0	0.0	0.0	1.0	0.0	0.0	1.0	2.0	0.0	0.0	1.5	1.5
4/7/2014	0.0	2.0	1.0	3.5	0.0	0.0	3.5	3.0	2.0	0.0	3.0	4.0
4/10/2014	0.0	3.0	3.5	5.5	0.0	0.0	4.0	3.5	3.5	2.0	5.0	6.5
4/14/2014	0.0	4.0	4.5	7.0	0.0	0.0	6.0	5.0	4.0	3.5	7.5	8.5
meets criteria	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes

Phase 2 South Block

well #	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**
3/17/2014	0.0	2.5	2.0	3.5	1.0	4.5	6.0	5.0	0.0	7.0	4.5	0.0	0.0	2.0	1.0	4.5	2.0	1.5	0.0
3/20/2014	0.0	1.5	3.0	3.0	1.0	3.5	6.5	4.5	0.0	5.5	6.0	0.0	0.0	2.0	1.0	5.0	2.0	2.0	0.0
3/24/2014	1.5	3.0	5.5	4.0	2.0	6.0	8.0	6.5	2.5	8.5	8.5	2.0	0.0	3.0	2.0	8.5	3.5	4.0	2.5
3/27/2014	0.0	0.0	3.5	0.0	0.0	2.0	5.5	7.0	1.0	4.5	8.0	4.5	0.0	1.5	1.0	7.0	2.0	1.0	0.0
3/31/2014	0.0	0.0	2.0	0.0	0.0	2.5	6.0	7.0	0.0	4.0	6.0	0.0	0.0	1.5	0.0	10.0	4.0	1.0	0.0
4/3/2014	0.0	1.0	1.0	1.5	1.0	1.0	4.5	6.5	1.5	6.5	5.5	0.0	0.0	1.0	1.0	9.5	2.0	2.5	1.0
4/7/2014	2.0	2.0	3.5	4.0	1.5	4.0	6.5	7.5	2.0	7.0	7.0	3.0	0.0	3.0	3.5	13.0	3.0	5.5	3.5
4/10/2014	2.0	3.5	5.5	7.5	2.5	5.5	8.0	8.5	2.0	9.0	8.0	5.5	0.0	5.5	6.0	16.0	4.5	7.5	5.0
4/14/2014	3.5	4.5	7.0	8.5	4.0	7.0	9.0	10.0	4.0	11.0	10.5	5.0	0.0	7.5	6.5	16.0	6.5	8.5	6.0
meets criteria	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	no	yes	yes	yes

Table 2a

Vegetation Data
Emergent Enhancement

Table 2a

2014 Monitoring plot data: **Enhancement Ground (Emergent Wetland Habitat)** Data set combines both phase 1 & 2. Plots are in same location, just re-numbered (in red).

Native		Moisture	1.0	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Herbaceus Vegetation	veg form	Index	1.0	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Alisma plantago-aquatica	Broadleaf	1	60		15	90		70	40	65		7	1		2	3					30					15	79		30	70	90		
Alisma gramineum	Broadleaf	1										3																		1			
Bidens cernua	Broadleaf	2																				20							5				
Downingia elegens	Broadleaf	1																															
Epilobeum ciliatum	Broadleaf	2.5											1	1				1				1						2					
Epilobeum glandulosum	Broadleaf	2.5																															
Gnaphalium uliginosum	Broadleaf	2															5	1				35	2										
Lemna minor	Broadleaf	1																															
Lotus unifoliatus	Broadleaf	2											3					1		1													
Myosotis laxa	Broadleaf	1																															
Plagiobothrys scouleri	Broadleaf	2															15			80													
Rorippa curvisiliqua	Broadleaf	2.5																3					3	1	3				1				
Rumex salicifolius	Broadleaf	2																															
Sparganium emersum	Broadleaf	1																			65					85	15						
Typha latifolia	Broadleaf	1								10					35																		
Veronica peregrina	Broadleaf	1																															
Alopecurus aequalis	Grass	1																				38	65	77	86				62	11			
Alopecurus geniculatus	Grass	1					70				75					85	3	10		1								92					15
Beckmannia syzigachne	Grass	1					5											1															
Carex obnupta	Grass-like	1																65	90	1													
Carex stipata	Grass-like	1.5																															
Carex unilateralis	Grass-like	2																															
Deschampsia cespitosa	Grass	2											5															5					20
Deschampsia elongata	Grass	2.5																															
Eleocharis acicularis	Grass-like	1																															
Eleocharis palustris	Grass-like	1	40	100	85	10	15	30	60	25	5	80	90	90	63	10			10								1		2			100	
Glyceria occidentalis	Grass	1																													10		
Hordeum brachyantherum	Grass	2.5									20																						35
Juncus bufonius	Grass-like	2															30			10													
Juncus nevadensis	Grass-like	2																															
Paspatum distichum	Grass	2					5																25										
Native Woody Veg																																	

Spiraea douglasii	Shrub	2												3				15																
Non-Native Vegetation																																		
Cerastrium glomeratum	Broadleaf	4																				2		2	1					3				10
Galium aparine	Broadleaf	4																1																
Geranium molle	Broadleaf	nol					3																											
Hypochaeris radicata	Broadleaf	4																																5
Matricaria discoidea	Broadleaf	4															3			5		2												
Navarettia intertexta	Broadleaf	2																																
Parentucellia viscosa	Broadleaf	3					2										25			2		1												
Rumex acetosella	Broadleaf	2												2																				
Rumex crispa	Broadleaf	2																											1					15
Sonchus asper	Broadleaf	3.5																																
Agrostis capillaris	Grass	3																																
Briza minor	Grass	3												1																				
Echinochloa crus-galli	Grass	2																				1	5	15	10					5				
Poa annua	Grass	3												1																				
Vulpia myuros	Grass	3															10																	
Invasive Vegetation																																		
Lythrum portula	Broadleaf	1															2																	
Mentha pulegium	Broadleaf	1																																
Phalaris arundaceae	Grass	1																			5													
Bare Ground/Water			0.0	0	0	0	0	0	0	0	0	10	0	2	0	2	7	2	0	0	0	0	0	5	0	0	5	0	0	10	0	0	0
Plot Total			100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
PERFORMANCE SUMMARY																																		
% relative cover native species			100	100	100	100	95	100	100	100	100	90	100	94	100	98	53	97	100	93	95	94	95	78	89	100	95	99	100	82	100	100	70
% relative cover, native grass/ grass-like spec			40	100	85	10	95	30	60	25	100	80	95	90	63	95	33	76	100	12	0	38	90	77	86	0	1	97	64	11	10	100	70
% cover IRT-listed invasive species			0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% cover non-native species			0.0	0	0	0	5	0	0	0	0	0	0	4	0	0	38	1	0	7	0	6	5	17	11	0	0	1	0	8	0	0	30
Species count per plot			2.0	1	2	2	6	2	2	3	3	3	5	6	3	3	8	9	2	7	3	8	5	4	4	2	3	4	5	5	2	1	6
Species moisture index total			2.0	1	2	2	8	2	2	3	4.5	3	8.5	14	3	3	18	18	2	15	3	21	9.5	9.5	9.5	2	3	7.5	7.5	9	2	1	16
Plot moisture index			1.0	1.0	1.0	1.0	1.3	1.0	1.0	1.0	1.5	1.0	1.7	2.3	1.0	1.0	2.3	2.0	1.0	2.1	1.0	2.6	1.9	2.4	2.4	1.0	1.0	1.9	1.5	1.8	1.0	1.0	2.6

32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	2014	row
32	33	34	35	36	37	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	row total	avg
		20					10		25	5		10			80										2				819	**13.65**
																													4	0.07
											2																		27	0.45
				1																	1								2	0.03
				2							5					4		15	25										57	0.95
			1	3					1				1			1	1	1		10							15		34	0.57
																													43	0.72
									1																				1	0.02
																													5	0.08
																											1		1	0.02
				1																									96	1.60
						1		5	3		20				5			1											46	0.77
																						3							3	0.05
																													165	2.75
																								50	10			85	190	3.17
																													0	0.00
												10																	349	**5.82**
				29				55	13	70	70			90				1			89	62	5						835	**13.92**
			5											1				60				35							107	1.78
																													156	2.60
35																				15							20		70	1.17
					20																		5						25	0.42
				15	20	35							30	1		95	80	20	65	30						90	35		546	**9.10**
						30												2											32	0.53
5																													5	0.08
60	100	80	90				80	25	55	20	3	75		2									80	45	63			15	1609	**26.82**
					20									5										5	25				65	1.08
				2		30							60				15		1	5							5		173	2.88
				3															3										46	0.77
				10																									10	0.17
																													30	0.50

																												18	0.30	
				2							3	1	1					1								15		41	0.68	
				1																								2	0.03	
																										5		8	0.13	
											2	2														1		10	0.17	
												2																12	0.20	
												3																3	0.05	
																												30	0.50	
														15														17	0.28	
				1												3												20	0.33	
						1																				2		3	0.05	
			3	30	40	1						1				1			40					10			126	2.10	
																												1	0.02	
																												36	0.60	
																		5										6	0.10	
																												10	0.17	
																												2	0.03	
									2																			2	0.03	
																												5	0.08	
0	0	0	1	0	0	2	10	15	0	5	0	0	0	0	0	0	0	0	0	0	10	0	10	0	0	0	1	0		
100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100		**Habitat**
																														Averages
100	100	100	96	66	60	96	90	85	98	95	100	95	91	99	85	100	96	100	94	60	90	100	90	100	100	90	76	100	5569	**92.8**
100	100	80	95	59	60	95	80	80	68	90	73	85	90	99	0	95	95	83	69	50	89	97	90	50	88	90	60	15	4058	**67.6**
0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	**0.1**
0	0	0	3	34	40	2	0	0	0	0	0	5	9	1	15	0	4	0	6	40	0	0	0	0	0	10	23	0	325	**5.4**
3	1	2	4	13	4	6	2	3	7	3	5	5	8	6	3	3	5	7	6	5	2	3	3	3	4	2	9	2	250	**6.8**
3.5	1	2	7.5	31	8	16	2	4.5	10	3	9	11	24	10	5.5	7	12	14	16	12	2	4	4	3	4	5	21	2	463	**12.5**
1.2	1.0	1.0	1.9	2.3	2.0	2.7	1.0	1.5	1.4	1.0	1.8	2.2	3.0	1.7	1.8	2.3	2.4	2.0	2.7	2.3	1.0	1.3	1.3	1.0	1.0	2.5	2.3	1.0	96.8	**1.6**

Table 2b

Vegetation Data
Phase 1
Wet Prairie Creation

Table 2b

2014 Monitoring plot data: PHASE 1 Wetland Prairie Habitat (Creation Ground): Planted in 2009

data collected: May 22, 2014

Field plot numbers in red

			plot #															2014	2014
	Vegetative	Moistur	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	row	row
Native Vegetation	Form	index	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	total	average
Alisima plantago-aquatic	Broadleaf	1																0	0.00
Alisima gramineum	Broadleaf	1				15												15	1.00
Bidens cernua	Broadleaf	2							10									10	0.67
Boisduvalia densa	Broadleaf	2.5																0	0.00
Boisduvalia stricta	Broadleaf	2.5		1														1	0.07
Downingia elegens	Broadleaf	1																0	0.00
Epilobeum ciliatum	Broadleaf	2.5		1														1	0.07
Epilobeum glandulosum	Broadleaf	2.5																0	0.00
Gnaphalium uliginosum	Broadleaf	2.5	1	5						25				20	30			81	**5.40**
Lotus unifoliatus	Broadleaf	2	1				40	50			7							98	**6.53**
Lupinus bicolor	Broadleaf	3.5								1								1	0.07
Myosotis laxa	Broadleaf	1									1							1	0.07
Plagiobothrys figuratus	Broadleaf	2																0	0.00
Plagiobothrys scouleri	Broadleaf	2			15					5				65	35			120	**8.00**
Rorippa curvisiliqua	Broadleaf	1	1											3				4	0.27
Veronica peregrina	Broadleaf	1													2			2	0.13
Agrostis exarata	Grass	3																0	0.00
Alopecurus geniculatus	Grass	1			70		5		74				72			3		224	**14.93**
Bechmannia syzignache	Grass	1				15												15	1.00
Carex unilateralis	Grass-like	2					2											2	0.13
Deschampsia cespitosa	Grass	2	90		1		42	45	15	3	92	80	25	1				394	**26.27**
Deschampsia elongata	Grass	2.5																0	0.00
Eleocharis acicularis	Grass-like	1																0	0.00
Eleocharis palustris	Grass-like	1				70							3			10		83	**5.53**
Glyceria occidentalis	Grass	1												2	5	72	95	174	**11.60**
Hordeum brachyantheru	Grass	2.5	3				1		1			5						10	0.67
Juncus bufonius	Grass-like	2		2						15				5	5			27	1.80
Juncus nevadensis	Grass-like	2					10	5										15	1.00
Non-Native Vegetation																			
Castilleja tenuis	Broadleaf	4.5																0	0.00
Cerastium glomeratum	Broadleaf	4			5									1	1			7	0.47
Geranium molle	Broadleaf	4										1						1	0.07
Hypochaeris radicata	Broadleaf	nol																0	0.00
Lactuca serriola	Broadleaf	4		1														0	0.00

Matricaria discoidea	Broadleaf	4								1					1			2	0.13	
Navarettia intertexta	Broadleaf	2		2						30					2			34	2.27	
Parentucellia viscosa	Broadleaf	3													1			1	0.07	
Rumex crispus	Broadleaf	2			5					1								6	0.40	
Sonchus asper	Broadleaf	3.5		1						1		1			2			5	0.33	
Stellaria spp.	Broadleaf	nol		2						1		1			1			5	0.33	
Trapapogon spp	Broadleaf	nol		1														1	0.07	
Trifolium dubium	Broadleaf	nol																0	0.00	
Trifolium repens	Broadleaf	3.5																0	0.00	
Agrostis stolonifera	Grass	3										3						3	0.20	
Hordeum commercial	Grass	nol																0	0.00	
Poa annua	Grass	3																0	0.00	
Vulpia myuros	Grass	3		2						5								7	0.47	
Invasive Vegetation																				
Daucus carota	Broadleaf	4		1														1	0.07	
Lythrum portula	Broadleaf	1												1				1	0.07	
Mentha puligeum	Broadleaf	2	1															1	0.07	
Lolium multiflorum	Grass	4																0	0.00	
Bare Ground and/or Water			3	81	4	0	0	0	0	12	0	9	0	2	15	15	5			
Plot Total			100	100	100	100	100	100	100	100	100	100	100	100	100	100	100		**Habitat**	
Performance Summary																			**Averages**	
% relative cover native species			96	9	86	100	100	100	100	49	100	85	100	96	77	85	95	1278.00	**85.20**	
% relative cover tufted hair grass			90	0	1	0	42	45	15	3	92	80	25	1	0	0	0	394	**26.27**	
% cover IRT-listed invasive species			0	1	0	2	0	0	0	0	0	0	0	0	4	0	0	7	**0.00**	
% cover non-native species			0	9	10	0	0	0	0	39	0	0	0	0	0	0	0	58	**0.00**	
Species Count per plot			6	11	5	3	6	3	4	11	3	6	3	8	11	3	1	84	**5.60**	
Species moisture Index total.			12.0	26.0	11.0	3.0	11.5	6.0	7.5	26.5	5.0	15.0	4.0	15.5	25.0	3.0	1.0	172.0	**0.2**	
Plot Moisture Index			2.00	2.36	2.20	1.00	1.92	2.00	1.88	2.41	1.67	2.50	1.33	1.94	2.27	1.00	1.00	27.47	**1.83**	
% cover by trees and shrubs			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.00**	

Table 2c

Vegetation Data
Phase 2
Wet Prairie Creation

Table 2c

2014 Monitoring data: **Phase 2 Creation Ground (Wetgrass Prairie)--North Block.**

data collected: may 18,2014

Field plot numbers in red

	vegetative	moist	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	2014 row	2014 row
Native Vegetation	form	index	4	5	11	12	13	14	15	21	22	23	24	25	34	35	36	total	average
Bidens cernua	Broadleaf	2										2			1			3	0.20
Boisduvalia densiflora	Broadleaf	2																0	0.00
Boisduvalia stricta	Broadleaf	2.5																0	0.00
Downingia elegens	Broadleaf	1				3									1			4	0.27
Epilobium ciliatum	Broadleaf	2.5																0	0.00
Epilobeum glandulosum	Broadleaf	2.5															1	1	0.07
Gnaphalium uliginosum	Broadleaf	2.5		24		15			1								1	41	2.73
Lupinus bicolor	Broadleaf	3.5																0	0.00
Lotus unifoliatus	Broadleaf	2																0	0.00
Cardamine penduliflora	Broadleaf	3																0	0.00
Myosotis laxa	Broadleaf	1							1									1	0.07
Plagiobothrys figuratus	Broadleaf	2																0	0.00
Plagiobothrys scouleri	Broadleaf	2				50									50			100	**6.67**
Rorippa curvisiliqua	Broadleaf	1				1						15					3	19	1.27
Rumex salicifolius	Broadleaf	2								30		1						31	2.07
Alopecurus geniculatus	Grass	1		75		3		8			15	70	75		35		65	346	**23.07**
Bechmania syzigachne	Grass	1													2			2	0.13
Deschampsia elongata	Grass	2.5			15		65				30							110	**7.33**
Deschampsia cespitosa	Grass	2	90	1	70	15	10	80	80	60	53	5		74	3	22	20	583	**38.87**
Eleocharis palustris	Grass-like	1			3						1		25					29	1.93
Glyceria occidentalis	Grass	1																0	0.00
Hordeum brachyantherum	Grass	2.5			5	1	10	2		1	1			10		50		80	**5.33**
Juncus bufonius	Grass-like	2			2				3									5	0.33
Juncus nevadensis	Grass-like	2								2				5			3	10	0.67
Non-Native Vegetation																			
Anthemis cotula	Broadleaf	nol																0	0.00
Cerastium glomeratum	Broadleaf	5								1					1		1	3	0.20
Geranium molle	Broadleaf	4			3		2		2					5		2		14	0.93
Hypericum perforatum	Broadleaf	4																0	0.00
Lactuca serriola	Broadleaf	4	1															1	0.07
Medicago lupa-lina	Broadleaf	3																0	0.00

Naverettia intertexta	Broadleaf	2					1											1	0.07	
Parentucellia viscosa	Broadleaf	3																0	0.00	
Polygonum aviculare	Broadleaf	4	1									1						2	0.13	
Rumex acetosella	Broadleaf	4.5																0	0.00	
Sonchus asper	Broadleaf	3.5	2				2					2				1		7	0.47	
Stellaria spp.	Broadleaf	3.5			1	1	1		1									4	0.27	
Trifolium dubium	Broadleaf	3.5					2											2	0.13	
Trifolium repens	Broadleaf	3.5																0	0.00	
Vicia villosa	Broadleaf	nol																0	0.00	
Avena fatua	Grass	nol																0	0.00	
Agrostis solonifera	Grass	3					1							5		5		11	0.73	
Holcus lanatus	Grass	3														5		5	0.33	
Hordeum commercial	Grass	nol																0	0.00	
Poa annua	Grass	3	2				1		2	2						1	1	9	0.60	
Vulpia myuros	Grass	3																0	0.00	
Invasive Vegetation																				
Lythrum portula	Broadleaf	1				5												5	0.33	
Lolium multiflorum	Grass	4					1							1				2	0.13	
Mentha puligeum	Broadleaf	2					1											1	0.07	
Bare Ground and/or Water			4	0	1	6	3	10	10	4	0	4	0	0	7	14	5			
plot total			100	100	100	100	100	100	100	100	100	100	100	100	100	100	100		**Habitat**	
PERFORMANCE SUMMARY																			**Averages**	
% relative cover native species			90	100	95	88	85	90	85	93	100	93	100	89	92	72	93	1365.00	**91.0**	
tufted hair grass relative plant cover			90	1	70	15	10	80	80	60	53	5	0	74	3	22	20	583.00	**38.9**	
% cover IRT-listed invasive species			5	7	5	0	5	3	2	0	0	2	0	0	1	0	5	35.00	**2.3**	
%cover non-native			6	0	4	1	10	0	5	3	0	3	0	10	1	14	2	59.00	**3.9**	
Species Count			5	3	7	9	12	3	7	6	5	7	2	6	7	7	8	94	**6.3**	
Species sum by moist. Indx			16.5	5.5	17.5	16.5	35.5	5.5	18.0	16.5	9.0	15.5	2.0	17.5	14.0	21.0	19.0	229.5		
Plot Moisture Index			3.30	1.83	2.50	1.83	2.96	1.83	2.57	2.75	1.80	2.21	1.00	2.92	2.00	3.00	2.38	34.89	**2.33**	
% cover by trees and shrubs			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0.00**	

Table 2d

Vegetation Data
Planted Forest Habitat

Table 2d.											
2014 monitoring data: planted forest habitat.											
Data collection 5/20/2014											
Tree/shrub monitoring plots (MP) are 125 by 75 feet. Multiplier for stems per acre is 4.65.											
Supplemental tree and shrub root stock planted in 2013											
		veg	moist.	MP-1	MP-2	MP-3	MP-4	MP-5	MP-6		
Trees	Origin	form	Index								
Crategeus douglasii	native	Tree	3	6	5	3	4	4	2		
Fraxinus latifolia	native	Tree	2	31	27	69	33	43	73		
Pinus ponderosa	native	Tree	4.5	5	8	11	14	5	4		
Populus tricocarpa	native	Tree	3	5	5	11	16	15	8		
Pseudotsuga menziesii	native	Tree	4	1	13	1	7	9	4		
Rhamnus purshiana	native	Tree	3	3	3	2	1	2			
Pyrus fusca	native	Tree	3.5	5	7	6	4	5	3		
Quercus garryana	native	Tree	nol	5	3	7	2	2	8		
Thuja plicata	native	Tree	3	6	3	3	4	1	6		
Trees: stem count total				**67**	**74**	**113**	**85**	**86**	**108**	**533**	
Trees: stems per acre				**311.6**	**344.1**	**525.5**	**395.3**	**399.9**	**502.2**	**2478.45**	
Tree Stems per Acre--Habitat average										**413.1**	
Shrubs											
Amelanchier alnifolia	native	Shrub	3	2	1	3	2		1		
Cornus sericea	native	Shrub	2	4	15		9	7	27		
Oemlaria cerasiformus	native	Shrub	3	5	16	5	3	1	3		
Physocarpus capitatus	native	Shrub	2.5	7	7	4		1			
Rosa pisiocarpa	native	Shrub	3	34	30	24	57	58	45		
Salix scouleriana	native	Shrub	3	5	13	12	22	15	3		
Spirea douglasii	native	Shrub	2	13	11	20	25	12			
Symphorocarpus albus	native	Shrub	4	11	26	34	3	6	1		
Shrubs: stem count total				**81**	**119**	**102**	**121**	**100**	**80**	**603**	
Shrubs: stems per acre				**376.7**	**553.4**	**474.3**	**562.7**	**465.0**	**372.0**	**2804.0**	
Shrub Stems per Acre: Habitat average										**467.33**	
Broadleaf Species-% cover	Origin		Index								
Cerastium glomeratum	non-native	Broadleaf	3	1		5		1			
Cirsium arvense	invasive	Broadleaf	3		3	5			5		
Cirsium vulgare	invasive	Broadleaf	3			1	5				
Epilobeum glandulosum	native	Broadleaf	3				5	5			

Hypericum radicata	non-native	Broadleaf	4	1	5	5		10	15		
Lotus unifoliatus	native	Broadleaf	2				1	1			
Mentha puligeum	invasive	Broadleaf	1	3		2	1				
Sonchus asper	non-native	Broadleaf	3.5	7	5		3		1		
Tanacetum vulgare	non-native	Broadleaf	3	3	1		10	10	3		
Grasses- % Cover											
Agrostis stolonifera	non-native	Grass	3	10	2		40	20	25		
Alopecurus geniculatus	native	Grass	1			1			3		
Deschampsia caespitosa	native	Grass	2	65	40	30	30	40	40		
Hordeum brachyantherum	native	Grass	2	10	40	50	5	5	5		
Vulpia myuros	non-native	Grass	3					5			
PERFORMANCE SUMMARY										***Habitat Averages***	
% cover native:				89%	80%	75%	61%	70%	71%	**74.33%**	
% cover IRT listed invasive species				3%	3%	8%	6%	0%	5%	**4.16%**	
Native tree species-count				9	9	9	9	9	8	**8**	
Stems per acre				311.6	344.1	525.5	395.3	399.9	502.2	**413.1**	
Native shrub species count				8	8	7	7	7	7	**7**	
Stems per acre				376.7	553.4	474.3	562.7	465.0	372.0	**467.3**	
Total species				25	23	24	25	25	22		
moisture index				2.59	2.87	2.56	2.59	2.77	2.79	**2.69**	

Table 2e

Vegetation Data
Enhanced Forest Habitat

Table 2e

2014 monitoring data: **Enhanced Forest wetland habitat**.

Data Collection: May 26,2014. Understory vegetation re-assessed July 7, after water receded.

Data plots are 50-foot diameter circles; Multiplier for stem count per acre is 22.2

Shrub rootstock and Carex planted in 2008, supplemental plantings 2009, 2013.

								Total Cover	Cover Avg	stem count			
			moisture										
Overstory Cover: Tree	Origin	form	index	ef-1	ef-2	ef-3	ef-4			ef1	ef2	ef3	ef4
Fraxinus latifolia	native	Tree	2	75	95	95	90	355	88.8				
Understory Cover:Tree													
Fraxinus latifolia	native	Tree	2	3	5	10		18	4.5				
Understory Cover:Shrub													
Amelanchier alnifolia	native	Shrub	4				15	15	3.8				5
Cornus sericea	native	Shrub	2	3	20		1	24	6.0	3	17		1
Pyrus fusca	native	Shrub	2		10			10	2.5		6		
Rosa pisiocarpa	native	Shrub	3	1			20	21	5.3	1			34
Salix sitchensis	native	Shrub	2	1				1	0.3	1			
Stems per Acre										111.0	510.6	0.0	888.0
Inderstory Cover: Broadleaf													
Alisma plantago-aquatica	native	Broadleaf	1	1	3			4	1.0				
Bidens frondosa	native	Broadleaf	1.5	15	1	15	1	32	8.0				
Epilobeum glandulosum	native	Broadleaf					1	1	0.3				
Oenanthe sarmentosa	native	Broadleaf	1	10		5	10	25	6.3				
Rumex acetosella	non-native	Broadleaf	2	1	1	1	3	6	1.5				
Solanum dulcamara	invasive	Broadleaf	3	1	1			2	0.5				
Understory Cover: Grasses and Grasslike													
Carex obnupta	native	Grasslike	1	60	30	45	25	160	40.0				
Glyceria elata	native	Grass	1			10	20	30	7.5				
Phalaris arundinacea	invasive	Grass	1	2	15	10	3	30	7.5				
Understory Cover: Bare Ground and/or Water				2	14	4	1						
Understory total				100	100	100	100						
Performance Summary									***Habitat Averages***				
% cover native overstory:				75%	95%	95%	90%		88.75%				
% cover native understory				90%	70%	85%	96%		85.25%				
% cover Carex obnupta:				60%	30%	45%	25%		40.00%				
% cover invasives:				3%	16%	10%	3%		8.00%				
number of native shrub species				3	2	0	3		2.0				
stems per acre shrubs:				111	511	0	888.0		377.0				

Appendix C

As-Built Drawing

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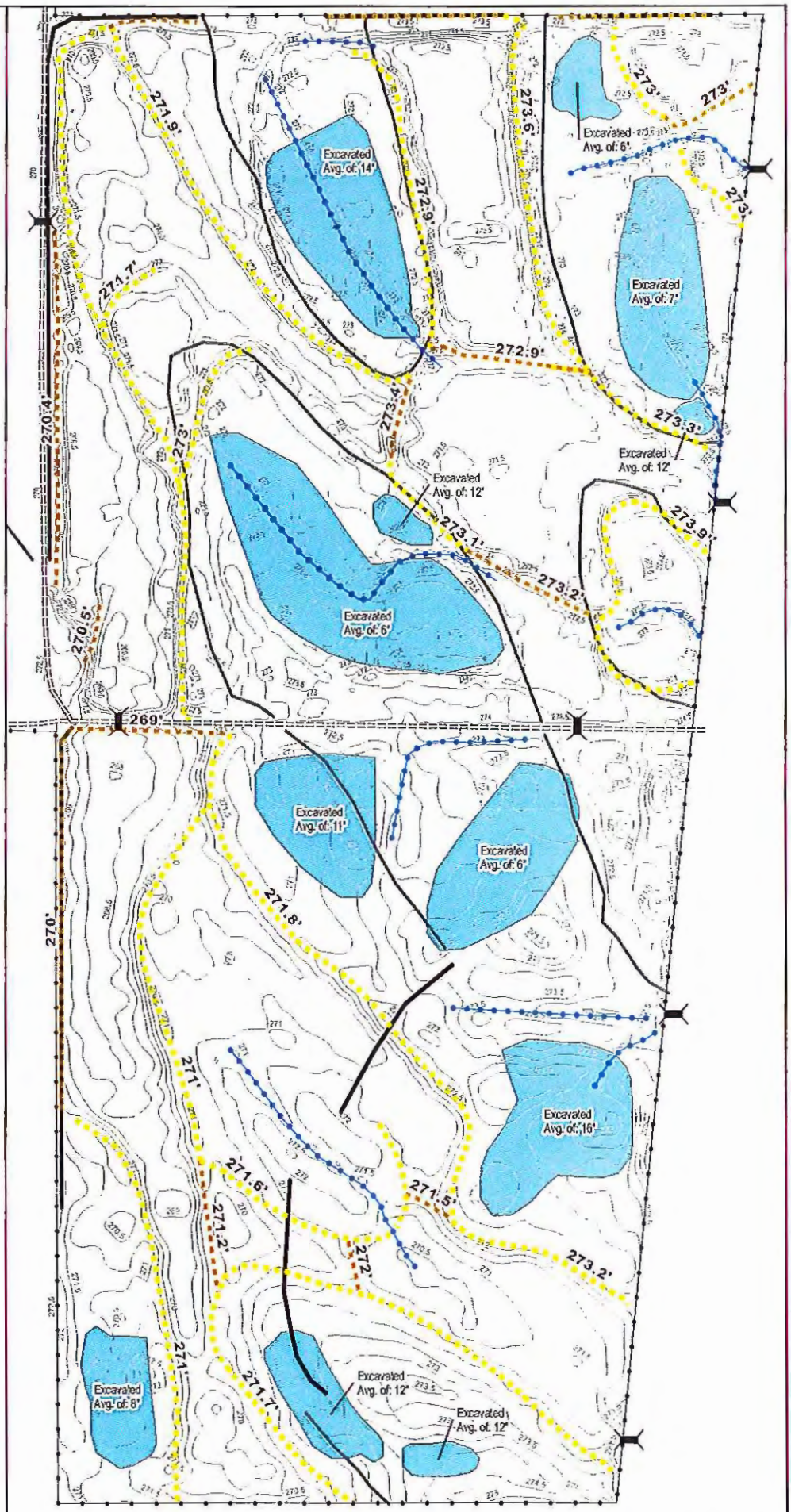

Legend

- Existing Culverts
- Constructed Pass Through Channels
- Proposed Constructed Berm
- Proposed Cut and Fill Berm
- As-built Constructed Berm
- As-built Cut and Fill Berm
- Existing Roads
- 6" Contour
- Muddy Creek Mitigation Bank Boundary
- Excavated Pool Areas

N W E S

1:1,850

Muddy Creek Mitigation Bank
Phase 2
As-built Map

Benton County, Or. 5/4/2015

0 50 100 200 300 400 Feet

NOTES:

1: All Contours derived with survey grade GPS. Northern phase collected in November 2012 and the southern phase collected in April 2015.

Appendix D

Wetland Delineation Report

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Wetland Delineation Report

for

Muddy Creek Mitigation Bank Phase II South

Benton County, Oregon

Prepared for:
Muddy Creek Mitigation Bank, LLC
P.O. Box 816
Philomath, OR 97370

Prepared by:
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18000 NW Lucy Reeder Rd
Portland, OR 97231

April 15, 2015

PREFACE

This wetland delineation report has been prepared using guidance for "Delineation Light" presented in the *Removal-Fill Guide* (DSL, 2013). This report is to be treated as an amendment to the pre-construction wetland delineation and does not repeat background information contained in that report.

Turnstone Environmental Consultants, Inc. (Turnstone) prepared this wetland delineation report for a 25.95-acre study area in Benton County, Oregon. The findings of this report are based upon information gathered during the field investigation and upon state and federal laws regulating wetland areas. Turnstone staff utilized the *Corps of Engineers Wetlands Delineation Manual* (USACE 1987) along with the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region, Version 2* (USACE 2010) to conduct wetland delineations.

The wetland boundaries and classifications described in this document represent the best professional judgment of Turnstone staff. The decisions were based on the environmental circumstances and site conditions at the time of the field visit. Final verification of this wetland delineation is to be made by the appropriate federal, state, and local jurisdictions. Prior to final design or any construction activity on the site is to take place, all appropriate regulatory agencies should be contacted to verify the findings of this report and to obtain appropriate approvals and permits.

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Appendix C: Ground-Level Color Photographs
Appendix D: Literature Citations

A. SITE ALTERATIONS

Recent site alterations include grading activities intended to impound hydrology across the site. Numerous berms were strategically constructed to capture overland flow as it travels towards Muddy Creek. Less recent site alterations are included in the previous delineation report for the study area.

B. PRECIPITATION DATA

Precipitation Analysis

In order to inform field wetland delineation methods and procedures, climate data were analyzed to determine whether recent rainfall was sufficient to expect normal hydrology indicators be present at wetland sampling locations. Precipitation was analyzed by comparing rainfall amounts to historical averages for the water year to the date of the field investigation. Recent precipitation was additionally analyzed using a weighted scoring that compares historical averages to rainfall measured the three months prior to field investigation (Sumner et. al 2009). Precipitation totals by each measure were determined to be within the range of normal conditions and ostensibly, the routine suite of wetland hydrology indicators should be present during the duration of field investigation. The site was investigated on February 12th, 17th, and 20th of 2015.

Table 1. Percent of normal rainfall for the water year to date of field investigation (10/1/14-2/28/15)

Month	Actual (in)	Average (in)	Percent of Normal
October 2014	5.23	3.02	173
November 2014	6.03	6.94	87
December 2014	7.90	7.43	106
January 2015	3.59	6.46	56
February 2015	5.21	5.71	91
TOTAL:	16.7	19.6	85

Source: WETS Tables/National Weather Service

Table 2. Rainfall Assessment for the Preceding Three-Month Period

Rainfall Assessment for the Preceding 3-Month Period								
Prior Month		**WETS Rainfall Percentile (in)**		**Measured Rainfall (in)**	**Condition: (Dry, Wet, Normal)**	**Condition Value (1=dry, 2=normal, or 3=wet)**	**Month weight**	**Multiply (previous two columns)**
		30th	**70th**					
1st (most recent)	January	3.95	7.82	3.59	Dry	1	3	3
2nd	December	3.91	6.80	7.90	Wet	3	2	6
3rd	November	3.46	5.35	6.03	Wet	3	1	3
							Sum	**12**
Rainfall of prior period was: **drier** than normal (sum is 6-9), **normal** (sum is 10-14), **wetter** than normal (sum is 15-18)								***NORMAL, standard met***
WETS Station: Corvallis State University, OR1862, 1971-2000								
Measured Rainfall: Corvallis State University, OR GHCND:USC00351862 November 2014-January 2015								

C. METHODS

Site Specific Methods

The field investigation utilized the "Routine Onsite" method from the *Corps Wetland Delineation Manual* (USACE, 1987) as guidance. The sampling design differed slightly from that suggested in the Manual for sites greater than five acres. The study area was traversed by foot and a visual assessment was conducted for hydrophytic vegetation, suspect topographical features, and wetland hydrology indicators. Paired plots were utilized to characterize wetland boundaries (*Appendix A*). Wetland data forms are included in Appendix B. Photopoints were established near each sample point to document site conditions at the time of the field investigation. Ground-level photographs recorded during the field investigation are located in Appendix C. Ordinary High Water Line (OHWL) determinations were made by locating and mapping the upland limit of physical and biological characteristics outlined in Army Corps of Engineers Regulatory Guidance Letter 05-05 (USACE, 2005).

D. DESCRIPTION OF WETLANDS AND NON-WETLAND WATERS

One wetland and one stream are present within the study area.

Wetland A: 25.07 acres (1,092,049.20 square feet)

Wetland A is a Flats (Hydrogeomorphic) and Palustrine Emergent/Riverine Intermittent (Cowardin) wetland. Wetland A was formerly a perennial ryegrass (*Lolium perenne*) field that has been converted to a wet prairie through excavation and seeding. The wetland continues offsite to the west and south and is bounded by an access road to the north and an old railroad grade to the east. Hydrology is derived primarily from precipitation and overland flow.

Hydrophytic vegetation is dominated by tufted hairgrass (*Deschampsia caespitosa*). Wetland hydrology indicators included High Water Table (A2) and Saturation (A3). Chapter 5 guidance from the *Regional Supplement* for Problematic Soils was used to assess hydric soils. Much of the soil within the study area has yet to develop hydric characteristics because of recent enhancement activities.

Unnamed Tributary A: 4.17 acres (181,645.20 square feet)

Unnamed Tributary A is an intermittent stream that is a tributary to Muddy Creek. The stream is a Riverine Intermittent (Cowardin) non-wetland water that is fed by groundwater and overland flow. The stream was historically fed by the flooding of the Long Tom River. Flooding no longer reaches the tributary because of diking.

E. MAPPING METHOD

Wetland boundary points, Sample Points and the OHWL were collected using a Trimble Pro 6H GPS receiver paired with a Trimble mobile computer equipped with ArcPad software. Data points and wetland boundaries were post-processed to reach sub-meter accuracy. GPS data was collected in a WGS84 geographic coordinate system and later transformed into a local coordinate system, NAD 1983 State Plane Oregon North FIPS3601 Feet, to calculate areas and create associated figures.

F. 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.

Appendix A

Figures

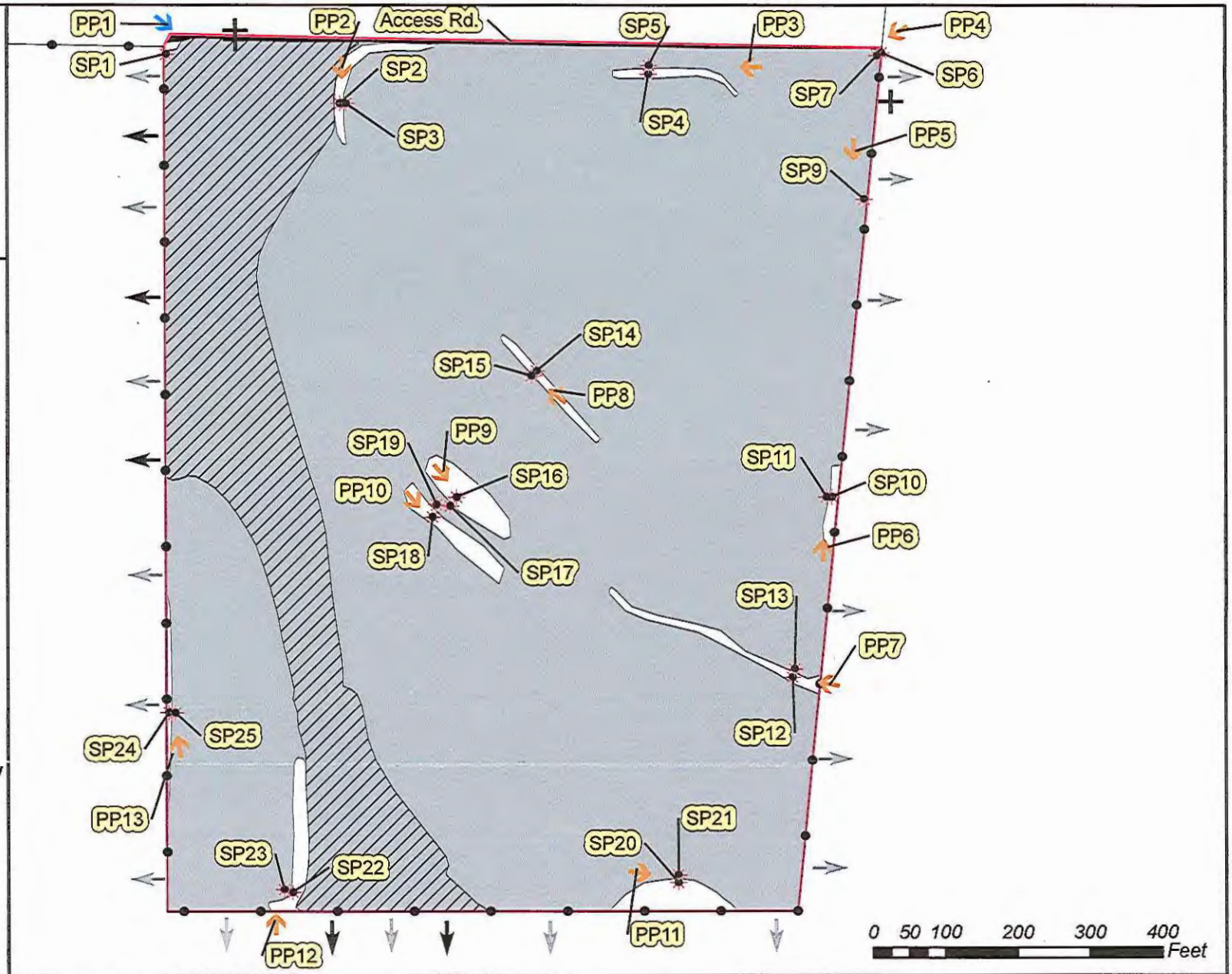
TURNSTONE
ENVIRONMENTAL CONSULTANTS

Figure 1:

Wetland Delineation Map

Legend

- Sample Point
- Culvert End
- Waterway Photo Point
- Wetland Photo Point
- Waterway Extends Outside of Study Area
- Wetland Extends Outside of Study Area
- Unamed Tributary A (4.17 acres)
- Wetland Area (25.07 acres)
- Study Area Boundary (25.95 acres)
- Taxlot Boundary
- Access Road Area



N
W E
S

1:2,350

Muddy Creek Mitigation Bank Phase 2 South Wetland Delineation

Benton County, Or. *4/1/2015*

NOTES:

1. All wetland points and boundaries were collected with a resource grade GPS unit capable of sub-meter accuracy. All features collected have an accuracy of 1 meter or less.

2. Taxlot boundaries provided by Benton County, Spatial accuracy is unknown but assumed to be 1 meter or less.

Appendix B

Wetland Delineation Data Forms

TURNSTONE
ENVIRONMENTAL CONSULTANTS

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site: Muddy Creek Mitigation Bank City/County: Benton Sampling Date: 20-Feb-15

Applicant/Owner: Muddy Creek Mitigation Bank State: OR Sampling Point: 1

Investigator(s): Tom Dee Section, Township, Range: S 9 T 14S R 5W

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): undulating Slope: 3.0 % / 1.7 °

Subregion (LRR): A Lat.: 44.36762 Long.: -123.29807 Datum: NAD 83

Soil Map Unit Name: Awbrig silty clay loam, 0-2% slopes NWI classification: None

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ◉ No ○ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ◉ No ○	Is the Sampled Area within a Wetland? Yes ◉ No ○
Hydric Soil Present?	Yes ◉ No ○	
Wetland Hydrology Present?	Yes ◉ No ○	

Remarks:

VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size: 5m)	Absolute % Cover	Dominant Species? Rel.Strat. Cover	Indicator Status
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size: 3m)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
	0	= Total Cover	
Herb Stratum (Plot size: 1m)			
1. Deschampsia cespitosa	75	☑ 100.0%	FACW
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
6.	0	☐ 0.0%	
7.	0	☐ 0.0%	
8.	0	☐ 0.0%	
9.	0	☐ 0.0%	
10.	0	☐ 0.0%	
11.	0	☐ 0.0%	
	75	= Total Cover	
Woody Vine Stratum (Plot size: 3m)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
	0	= Total Cover	

% Bare Ground in Herb Stratum: 25

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC:	1	(A)
Total Number of Dominant Species Across All Strata:	1	(B)
Percent of dominant Species That Are OBL, FACW, or FAC:	100.0%	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	75	x 2 =	150
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	75 (A)		150 (B)

Prevalence Index = B/A = 2.000

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrologic Vegetation
- ☑ 2 - Dominance Test is > 50%
- ☑ 3 - Prevalence Index is ≤3.0 [1]
- ☐ 4 - Morphological Adaptations [1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ 5 - Wetland Non-Vascular Plants [1]
- ☐ Problematic Hydrophytic Vegetation [1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks:

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: 1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-20	10YR 3/2	100%					Silty Clay Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (except in MLRA 1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☑ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ◉ No ○

Remarks:

See Chapter 5 of the WMVC Regional Supplement for Problematic Hydric Soils (5) Recently Developed Wetlands. The Sample Point is within a wetland restoration area where hydric soil indicators have yet to develop.

Hydrology

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) (LRR A)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
- ☐ Drainage Patterns (B10)
- ☐ Dry Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☑ FAC-neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (LRR A)
- ☐ Frost Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):	
Water Table Present?	Yes ◉	No ○	Depth (inches):	7
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches):	10

Wetland Hydrology Present? Yes ◉ No ○

Describe Recorded Data (stream gauge, monitor well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site: Muddy Creek Mitigation Bank City/County: Benton Sampling Date: 20-Feb-15

Applicant/Owner: Muddy Creek Mitigation Bank State: OR Sampling Point: 2

Investigator(s): Tom Dee Section, Township, Range: S 9 T 14S R 5W

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): undulating Slope: 0.0 % / 0.0 °

Subregion (LRR): A Lat.: 44.36743 Long.: -123.29715 Datum: NAD 83

Soil Map Unit Name: Awbrig silty clay loam, 0-2% slopes NWI classification: None

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ◉ No ○ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ◉	No ○
Hydric Soil Present?	Yes ○	No ◉
Wetland Hydrology Present?	Yes ○	No ◉

Is the Sampled Area within a Wetland? Yes ○ No ◉

Remarks:

VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size: 5m)	Absolute % Cover	Dominant Species? Rel.Strat. Cover	Indicator Status
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size: 3m)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
	0	= Total Cover	
Herb Stratum (Plot size: 1m)			
1. Deschampsia caespitosa	75	☑ 83.3%	FACW
2. Epilobium ciliatum	5	☐ 5.6%	FACW
3. Cardamine oligosperma	5	☐ 5.6%	FAC
4. Geranium pusillum	5	☐ 5.6%	UPL
5.	0	☐ 0.0%	
6.	0	☐ 0.0%	
7.	0	☐ 0.0%	
8.	0	☐ 0.0%	
9.	0	☐ 0.0%	
10.	0	☐ 0.0%	
11.	0	☐ 0.0%	
	90	= Total Cover	
Woody Vine Stratum (Plot size: 3m)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
	0	= Total Cover	

% Bare Ground in Herb Stratum: 10

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC:	1	(A)
Total Number of Dominant Species Across All Strata:	1	(B)
Percent of dominant Species That Are OBL, FACW, or FAC:	100.0%	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	80	x 2 =	160
FAC species	5	x 3 =	15
FACU species	0	x 4 =	0
UPL species	5	x 5 =	25
Column Totals:	90 (A)		200 (B)

Prevalence Index = B/A = 2.222

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrologic Vegetation
- ☑ 2 - Dominance Test is > 50%
- ☑ 3 - Prevalence Index is ≤3.0 [1]
- ☐ 4 - Morphological Adaptations [1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ 5 - Wetland Non-Vascular Plants [1]
- ☐ Problematic Hydrophytic Vegetation [1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks:

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: 2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)		Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-20	10YR	3/3	100%					Silty Clay Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (except in MLRA 1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ○ No ◉

Remarks:

Hydrology

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) (LRR A)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
- ☐ Drainage Patterns (B10)
- ☐ Dry Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☑ FAC-neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (LRR A)
- ☐ Frost Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):	
Water Table Present?	Yes ○	No ◉	Depth (inches):	
Saturation Present? (includes capillary fringe)	Yes ○	No ◉	Depth (inches):	

Wetland Hydrology Present? Yes ○ No ◉

Describe Recorded Data (stream gauge, monitor well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site: Muddy Creek Mitigation Bank City/County: Benton Sampling Date: 20-Feb-15

Applicant/Owner: Muddy Creek Mitigation Bank State: OR Sampling Point: 3

Investigator(s): Tom Dee Section, Township, Range: S 9 T 14S R 5W

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): undulating Slope: 0.0 % / 0.0 °

Subregion (LRR): A Lat.: 44.36743 Long.: -123.29712 Datum: NAD 83

Soil Map Unit Name: Awbrig silty clay loam, 0-2% slopes NWI classification: None

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ◉ No ○ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ◉ No ○	Is the Sampled Area within a Wetland? Yes ◉ No ○
Hydric Soil Present?	Yes ◉ No ○	
Wetland Hydrology Present?	Yes ◉ No ○	

Remarks:

VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size: 5m)	Absolute % Cover	Dominant Species? Rel.Strat. Cover	Indicator Status
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size: 3m)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
	0	= Total Cover	
Herb Stratum (Plot size: 1m)			
1. Deschampsia cespitosa	50	☑ 100.0%	FACW
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
6.	0	☐ 0.0%	
7.	0	☐ 0.0%	
8.	0	☐ 0.0%	
9.	0	☐ 0.0%	
10.	0	☐ 0.0%	
11.	0	☐ 0.0%	
	50	= Total Cover	
Woody Vine Stratum (Plot size: 3m)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
	0	= Total Cover	

% Bare Ground in Herb Stratum: 50

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC:	1	(A)
Total Number of Dominant Species Across All Strata:	1	(B)
Percent of dominant Species That Are OBL, FACW, or FAC:	100.0%	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	50	x 2 =	100
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	50 (A)		100 (B)

Prevalence Index = B/A = 2.000

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrologic Vegetation
- ☑ 2 - Dominance Test is > 50%
- ☑ 3 - Prevalence Index is ≤3.0 [1]
- ☐ 4 - Morphological Adaptations [1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ 5 - Wetland Non-Vascular Plants [1]
- ☐ Problematic Hydrophytic Vegetation [1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks:

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: 3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)		Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-20	10YR	3/3	100%					Silty Clay Loam	

[1]Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (except in MLRA 1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☑ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ◉ No ○

Remarks:

See Chapter 5 of the WMVC Regional Supplement for Problematic Hydric Soils (5) Recently Developed Wetlands. The Sample Point is within a wetland restoration area where hydric soil indicators have yet to develop.

Hydrology

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) (LRR A)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
- ☐ Drainage Patterns (B10)
- ☐ Dry Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☑ FAC-neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (LRR A)
- ☐ Frost Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):	
Water Table Present?	Yes ◉	No ○	Depth (inches):	12
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches):	8

Wetland Hydrology Present? Yes ◉ No ○

Describe Recorded Data (stream gauge, monitor well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site: Muddy Creek Mitigation Bank City/County: Benton Sampling Date: 20-Feb-15

Applicant/Owner: Muddy Creek Mitigation Bank State: OR Sampling Point: 4

Investigator(s): Tom Dee Section, Township, Range: S 9 T 14S R 5W

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): undulating Slope: 0.0 % / 0.0 °

Subregion (LRR): A Lat.: 44.36755 Long.: -123.29552 Datum: NAD 83

Soil Map Unit Name: Coburg silty clay loam, 0-3% slopes NWI classification: None

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ◉ No ○ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ◉	No ○
Hydric Soil Present?	Yes ○	No ◉
Wetland Hydrology Present?	Yes ○	No ◉

Is the Sampled Area within a Wetland? Yes ○ No ◉

Remarks:

VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size: 5m)	Absolute % Cover	Dominant Species? Rel.Strat. Cover	Indicator Status
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size: 3m)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
	0	= Total Cover	
Herb Stratum (Plot size: 1m)			
1. Deschampsia cespitosa	50	☑ 83.3%	FACW
2. Cardamine oligosperma	5	☐ 8.3%	FAC
3. Epilobium ciliatum	5	☐ 8.3%	FACW
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
6.	0	☐ 0.0%	
7.	0	☐ 0.0%	
8.	0	☐ 0.0%	
9.	0	☐ 0.0%	
10.	0	☐ 0.0%	
11.	0	☐ 0.0%	
	60	= Total Cover	
Woody Vine Stratum (Plot size: 3m)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
	0	= Total Cover	

% Bare Ground in Herb Stratum: 40

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC:	1	(A)
Total Number of Dominant Species Across All Strata:	1	(B)
Percent of dominant Species That Are OBL, FACW, or FAC:	100.0%	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	55	x 2 =	110
FAC species	5	x 3 =	15
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	60 (A)		125 (B)

Prevalence Index = B/A = 2.083

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrologic Vegetation
- ☑ 2 - Dominance Test is > 50%
- ☑ 3 - Prevalence Index is ≤3.0 [1]
- ☐ 4 - Morphological Adaptations [1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ 5 - Wetland Non-Vascular Plants [1]
- ☐ Problematic Hydrophytic Vegetation [1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks:

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: 4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-20	10YR 3/3	100%						

[1]Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (except in MLRA 1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ○ No ◉

Remarks:

Hydrology

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) (LRR A)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
- ☐ Drainage Patterns (B10)
- ☐ Dry Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☑ FAC-neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (LRR A)
- ☐ Frost Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):	
Water Table Present?	Yes ○	No ◉	Depth (inches):	
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches):	18

Wetland Hydrology Present? Yes ○ No ◉

Describe Recorded Data (stream gauge, monitor well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site: Muddy Creek Mitigation Bank City/County: Benton Sampling Date: 20-Feb-15

Applicant/Owner: Muddy Creek Mitigation Bank State: OR Sampling Point: 5

Investigator(s): Tom Dee Section, Township, Range: S 9 T 14S R 5W

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): undulating Slope: 0.0 % / 0.0 °

Subregion (LRR): A Lat.: 44.36758 Long.: -123.29551 Datum: NAD 83

Soil Map Unit Name: Coburg silty clay loam, 0-3% slopes NWI classification: None

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ◉ No ○ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ◉ No ○	Is the Sampled Area within a Wetland? Yes ◉ No ○
Hydric Soil Present?	Yes ◉ No ○	
Wetland Hydrology Present?	Yes ◉ No ○	

Remarks:

VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size: 5m)	Absolute % Cover	Dominant Species? Rel.Strat. Cover	Indicator Status
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size: 3m)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
	0	= Total Cover	
Herb Stratum (Plot size: 1m)			
1. Deschampsia cespitosa	S0	☑ 100.0%	FACW
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
6.	0	☐ 0.0%	
7.	0	☐ 0.0%	
8.	0	☐ 0.0%	
9.	0	☐ 0.0%	
10.	0	☐ 0.0%	
11.	0	☐ 0.0%	
	S0	= Total Cover	
Woody Vine Stratum (Plot size: 3m)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
	0	= Total Cover	

% Bare Ground in Herb Stratum: 50

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	50	x 2 =	100
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	50 (A)		100 (B)

Prevalence Index = B/A = 2.000

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrologic Vegetation
- ☑ 2 - Dominance Test is > 50%
- ☑ 3 - Prevalence Index is ≤3.0 [1]
- ☐ 4 - Morphological Adaptations [1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ 5 - Wetland Non-Vascular Plants [1]
- ☐ Problematic Hydrophytic Vegetation [1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks:

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: 5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-20	10YR 3/2	100%					Silty Clay Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (except in MLRA 1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☑ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ◉ No ○

Remarks:

See Chapter 5 of the WMVC Regional Supplement for Problematic Hydric Soils (5) Recently Developed Wetlands. The Sample Point is within a wetland restoration area where hydric soil indicators have yet to develop.

Hydrology

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) (LRR A)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
- ☐ Drainage Patterns (B10)
- ☐ Dry Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☑ FAC-neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (LRR A)
- ☐ Frost Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):	
Water Table Present?	Yes ◉	No ○	Depth (inches):	4
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches):	0

Wetland Hydrology Present? Yes ◉ No ○

Describe Recorded Data (stream gauge, monitor well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site: Muddy Creek Mitigation Bank City/County: Benton Sampling Date: 20-Feb-15

Applicant/Owner: Muddy Creek Mitigation Bank State: OR Sampling Point: 6

Investigator(s): Tom Dee Section, Township, Range: S 9 T 14S R 5W

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): undulating Slope: 0.0 % / 0.0 °

Subregion (LRR): A Lat.: 44.36763 Long.: -123.29428 Datum: NAD 83

Soil Map Unit Name: Awbrig silty clay loam, 0-2% slopes NWI classification: None

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ◉ No ○ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ○ No ◉	Is the Sampled Area within a Wetland? Yes ○ No ◉
Hydric Soil Present?	Yes ○ No ◉	
Wetland Hydrology Present?	Yes ○ No ◉	

Remarks:

VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size: 5m)	Absolute % Cover	Dominant Species? Rel.Strat. Cover	Indicator Status
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size: 3m)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
	0	= Total Cover	
Herb Stratum (Plot size: 1m)			
1. Alopecurus pratensis	50	☑ 62.5%	FAC
2. Hypochaeris radicata	25	☑ 31.3%	FACU
3. Geranium pusillum	5	☐ 6.3%	UPL
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
6.	0	☐ 0.0%	
7.	0	☐ 0.0%	
8.	0	☐ 0.0%	
9.	0	☐ 0.0%	
10.	0	☐ 0.0%	
11.	0	☐ 0.0%	
	80	= Total Cover	
Woody Vine Stratum (Plot size: 3m)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
	0	= Total Cover	

% Bare Ground in Herb Stratum: 20

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC:	1	(A)
Total Number of Dominant Species Across All Strata:	2	(B)
Percent of dominant Species That Are OBL, FACW, or FAC:	50.0%	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	50	x 3 =	150
FACU species	25	x 4 =	100
UPL species	5	x 5 =	25
Column Totals:	80 (A)		275 (B)

Prevalence Index = B/A = 3.438

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrologic Vegetation
- ☐ 2 - Dominance Test is > 50%
- ☐ 3 - Prevalence Index is ≤3.0 [1]
- ☐ 4 - Morphological Adaptations [1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ 5 - Wetland Non-Vascular Plants [1]
- ☐ Problematic Hydrophytic Vegetation [1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ○ No ◉

Remarks:

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: 6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 3/3	100%					Silty Clay Loam	

[1]Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (except in MLRA 1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: Gravel fill

Depth (inches): 10

Hydric Soil Present? Yes ○ No ◉

Remarks:

Shovel refusal at 10"

Hydrology

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) (LRR A)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
- ☐ Drainage Patterns (B10)
- ☐ Dry Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (LRR A)
- ☐ Frost Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):	
Water Table Present?	Yes ○	No ◉	Depth (inches):	
Saturation Present? (Includes capillary fringe)	Yes ○	No ◉	Depth (inches):	

Wetland Hydrology Present? Yes ○ No ◉

Describe Recorded Data (stream gauge, monitor well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site: Muddy Creek Mitigation Bank City/County: Benton Sampling Date: 20-Feb-15

Applicant/Owner: Muddy Creek Mitigation Bank State: OR Sampling Point: 7

Investigator(s): Tom Dee Section, Township, Range: S 9 T 14S R 5W

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): undulating Slope: 0.0 % / 0.0 °

Subregion (LRR): A Lat.: 44.36762 Long.: -123.29431 Datum: NAD 83

Soil Map Unit Name: Awbrig silty clay loam, 0-2% slopes NWI classification: None

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ◉ No ○ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ◉ No ○	Is the Sampled Area within a Wetland? Yes ◉ No ○
Hydric Soil Present?	Yes ◉ No ○	
Wetland Hydrology Present?	Yes ◉ No ○	

Remarks:

VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size: 5m)	Absolute % Cover	Dominant Species? Rel.Strat. Cover	Indicator Status
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size: 3m)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
	0	= Total Cover	
Herb Stratum (Plot size: 1m)			
1. Alopecurus pratensis	50	☑ 90.9%	FAC
2. Hypochaeris radicata	5	☐ 9.1%	FACU
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
6.	0	☐ 0.0%	
7.	0	☐ 0.0%	
8.	0	☐ 0.0%	
9.	0	☐ 0.0%	
10.	0	☐ 0.0%	
11.	0	☐ 0.0%	
	55	= Total Cover	
Woody Vine Stratum (Plot size: 3m)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
	0	= Total Cover	

% Bare Ground in Herb Stratum: 45

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC:	1	(A)
Total Number of Dominant Species Across All Strata:	1	(B)
Percent of dominant Species That Are OBL, FACW, or FAC:	100.0%	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	50	x 3 =	150
FACU species	5	x 4 =	20
UPL species	0	x 5 =	0
Column Totals:	55 (A)		170 (B)

Prevalence Index = B/A = 3.091

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrologic Vegetation
- ☑ 2 - Dominance Test is > 50%
- ☐ 3 - Prevalence Index is ≤3.0 [1]
- ☐ 4 - Morphological Adaptations [1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ 5 - Wetland Non-Vascular Plants [1]
- ☐ Problematic Hydrophytic Vegetation [1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks:

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: 7

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-20	10YR 3/2	100%					Silty Clay Loam	

[1]Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (except in MLRA 1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☑ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ◉ No ○

Remarks:

See Chapter 5 of the WMVC Regional Supplement for Problematic Hydric Soils (5) Recently Developed Wetlands. The Sample Point is within a wetland restoration area where hydric soil indicators have yet to develop.

Hydrology

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) (LRR A)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
- ☐ Drainage Patterns (B10)
- ☐ Dry Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (LRR A)
- ☐ Frost Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):	
Water Table Present?	Yes ◉	No ○	Depth (inches):	10
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches):	7

Wetland Hydrology Present? Yes ◉ No ○

Describe Recorded Data (stream gauge, monitor well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site: Muddy Creek Mitigation Bank City/County: Benton Sampling Date: 20-Feb-15

Applicant/Owner: Muddy Creek Mitigation Bank State: OR Sampling Point: 9

Investigator(s): Tom Dee Section, Township, Range: S 9 T 14S R 5W

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): undulating Slope: 0.0 % / 0.0 °

Subregion (LRR): A Lat.: 44.36707 Long.: -123.29436 Datum: NAD 83

Soil Map Unit Name: Awbrig silty clay loam, 0-2% slopes NWI classification: None

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ◉ No ○ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ◉ No ○	Is the Sampled Area within a Wetland? Yes ◉ No ○
Hydric Soil Present?	Yes ◉ No ○	
Wetland Hydrology Present?	Yes ◉ No ○	

Remarks:

VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size: 5m)	Absolute % Cover	Dominant Species? Rel.Strat. Cover	Indicator Status
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size: 3m)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
	0	= Total Cover	
Herb Stratum (Plot size: 1m)			
1. Deschampsia cespitosa	90	☑ 100.0%	FACW
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
6.	0	☐ 0.0%	
7.	0	☐ 0.0%	
8.	0	☐ 0.0%	
9.	0	☐ 0.0%	
10.	0	☐ 0.0%	
11.	0	☐ 0.0%	
	90	= Total Cover	
Woody Vine Stratum (Plot size: 3m)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
	0	= Total Cover	

% Bare Ground in Herb Stratum: 10

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC:	1	(A)
Total Number of Dominant Species Across All Strata:	1	(B)
Percent of dominant Species That Are OBL, FACW, or FAC:	100.0%	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	90	x 2 =	180
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	90 (A)		180 (B)

Prevalence Index = B/A = 2.000

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrologic Vegetation
- ☑ 2 - Dominance Test is > 50%
- ☑ 3 - Prevalence Index is ≤3.0 [1]
- ☐ 4 - Morphological Adaptations [1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ 5 - Wetland Non-Vascular Plants [1]
- ☐ Problematic Hydrophytic Vegetation [1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks:

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: 9

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)		%	Redox Features Color (moist)		%	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR	3/2	100%						Silty Clay Loam	
6-20	10YR	3/2	75%	10YR	5/8	25%	C	M	Silty Clay Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (except in MLRA 1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☑ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ◉ No ○

Remarks:

Hydrology

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) (LRR A)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
- ☐ Drainage Patterns (B10)
- ☐ Dry Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☑ FAC-neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (LRR A)
- ☐ Frost Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):	
Water Table Present?	Yes ◉	No ○	Depth (inches):	7
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches):	4

Wetland Hydrology Present? Yes ◉ No ○

Describe Recorded Data (stream gauge, monitor well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site: Muddy Creek Mitigation Bank City/County: Benton Sampling Date: 20-Feb-15

Applicant/Owner: Muddy Creek Mitigation Bank State: OR Sampling Point: 10

Investigator(s): Tom Dee Section, Township, Range: S 9 T 14S R 5W

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): undulating Slope: 0.0 % / 0.0 °

Subregion (LRR): A Lat.: 44.36594 Long.: -123.29454 Datum: NAD 83

Soil Map Unit Name: Coburg silty clay loam, 0-3% slopes NWI classification: None

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ◉ No ○ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ◉	No ○
Hydric Soil Present?	Yes ○	No ◉
Wetland Hydrology Present?	Yes ○	No ◉

Is the Sampled Area within a Wetland? Yes ○ No ◉

Remarks:

VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size: 5m)	Absolute % Cover	Dominant Species? Rel.Strat. Cover	Indicator Status
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size: 3m)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
	0	= Total Cover	
Herb Stratum (Plot size: 1m)			
1. Deschampsia cespitosa	80	☑ 84.2%	FACW
2. Sonchus arvensis	10	☐ 10.5%	FACU
3. Hypochaeris radicata	5	☐ 5.3%	FACU
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
6.	0	☐ 0.0%	
7.	0	☐ 0.0%	
8.	0	☐ 0.0%	
9.	0	☐ 0.0%	
10.	0	☐ 0.0%	
11.	0	☐ 0.0%	
	95	= Total Cover	
Woody Vine Stratum (Plot size: 3m)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
	0	= Total Cover	

% Bare Ground in Herb Stratum: 5

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC:	1	(A)
Total Number of Dominant Species Across All Strata:	1	(B)
Percent of dominant Species That Are OBL, FACW, or FAC:	100.0%	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	80	x 2 =	160
FAC species	0	x 3 =	0
FACU species	15	x 4 =	60
UPL species	0	x 5 =	0
Column Totals:	95 (A)		220 (B)

Prevalence Index = B/A = 2.316

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrologic Vegetation
- ☑ 2 - Dominance Test is > 50%
- ☑ 3 - Prevalence Index is ≤3.0 [1]
- ☐ 4 - Morphological Adaptations [1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ 5 - Wetland Non-Vascular Plants [1]
- ☐ Problematic Hydrophytic Vegetation [1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks:

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: 10

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)		%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-15	10YR	3/3	100%					Silty Clay Loam	

[1]Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (except in MLRA 1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: Gravel fill

Depth (inches): 15

Hydric Soil Present? Yes ○ No ◉

Remarks:

Shovel refusal at 15"

Hydrology

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) (LRR A)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
- ☐ Drainage Patterns (B10)
- ☐ Dry Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☑ FAC-neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (LRR A)
- ☐ Frost Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):	
Water Table Present?	Yes ○	No ◉	Depth (inches):	
Saturation Present? (includes capillary fringe)	Yes ○	No ◉	Depth (inches):	

Wetland Hydrology Present? Yes ○ No ◉

Describe Recorded Data (stream gauge, monitor well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site: Muddy Creek Mitigation Bank City/County: Benton Sampling Date: 20-Feb-15

Applicant/Owner: Muddy Creek Mitigation Bank State: OR Sampling Point: 11

Investigator(s): Tom Dee Section, Township, Range: S 9 T 14S R 5W

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): undulating Slope: 5.0 % / 2.9 °

Subregion (LRR): A Lat.: 44.36594 Long.: -123.29457 Datum: NAD 83

Soil Map Unit Name: Coburg silty clay loam, 0-3% slopes NWI classification: None

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ◉ No ○ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ◉ No ○	Is the Sampled Area within a Wetland? Yes ◉ No ○
Hydric Soil Present?	Yes ◉ No ○	
Wetland Hydrology Present?	Yes ◉ No ○	

Remarks:

VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size: 5m)	Absolute % Cover	Dominant Species? Rel.Strat. Cover	Indicator Status
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size: 3m)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
	0	= Total Cover	
Herb Stratum (Plot size: 1m)			
1. Deschampsia cespitosa	80	☑ 84.2%	FACW
2. Alopecurus pratensis	10	☐ 10.5%	FAC
3. Daucus carota	5	☐ 5.3%	FACU
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
6.	0	☐ 0.0%	
7.	0	☐ 0.0%	
8.	0	☐ 0.0%	
9.	0	☐ 0.0%	
10.	0	☐ 0.0%	
11.	0	☐ 0.0%	
	95	= Total Cover	
Woody Vine Stratum (Plot size: 3m)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
	0	= Total Cover	

% Bare Ground in Herb Stratum: 5

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC:	1	(A)
Total Number of Dominant Species Across All Strata:	1	(B)
Percent of dominant Species That Are OBL, FACW, or FAC:	100.0%	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	80	x 2 =	160
FAC species	10	x 3 =	30
FACU species	5	x 4 =	20
UPL species	0	x 5 =	0
Column Totals:	95 (A)		210 (B)

Prevalence Index = B/A = 2.211

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrologic Vegetation
- ☑ 2 - Dominance Test is > 50%
- ☑ 3 - Prevalence Index is ≤3.0 [1]
- ☐ 4 - Morphological Adaptations [1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ 5 - Wetland Non-Vascular Plants [1]
- ☐ Problematic Hydrophytic Vegetation [1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks:

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: 11

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-20	10YR 3/3	100%					Silty Clay Loam	

[1]Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (except in MLRA 1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☑ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ◉ No ○

Remarks:

See Chapter 5 of the WMVC Regional Supplement for Problematic Hydric Soils (5) Recently Developed Wetlands. The Sample Point is within a wetland restoration area where hydric soil indicators have yet to develop.

Hydrology

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) (LRR A)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
- ☐ Drainage Patterns (B10)
- ☐ Dry Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☑ FAC-neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (LRR A)
- ☐ Frost Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):	
Water Table Present?	Yes ◉	No ○	Depth (inches):	12
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches):	8

Wetland Hydrology Present? Yes ◉ No ○

Describe Recorded Data (stream gauge, monitor well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site: Muddy Creek Mitigation Bank City/County: Benton Sampling Date: 20-Feb-15

Applicant/Owner: Muddy Creek Mitigation Bank State: OR Sampling Point: 12

Investigator(s): Tom Dee Section, Township, Range: S 9 T 14S R 5W

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): undulating Slope: 0.0 % / 0.0 °

Subregion (LRR): A Lat.: 44.36525 Long.: -123.29475 Datum: NAD 83

Soil Map Unit Name: Awbrig silty clay loam, 0-2% slopes NWI classification: None

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ◉ No ○ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ◉	No ○
Hydric Soil Present?	Yes ○	No ◉
Wetland Hydrology Present?	Yes ○	No ◉

Is the Sampled Area within a Wetland? Yes ○ No ◉

Remarks:

VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size: 5m)	Absolute % Cover	Dominant Species? Rel.Strat. Cover	Indicator Status
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size: 3m)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
	0	= Total Cover	
Herb Stratum (Plot size: 1m)			
1. Deschampsia cespitosa	25	☑ 62.5%	FACW
2. Cerastium arvense	5	☐ 12.5%	FACU
3. Epilobium ciliatum	5	☐ 12.5%	FACW
4. Cardamine oligosperma	5	☐ 12.5%	FAC
5.	0	☐ 0.0%	
6.	0	☐ 0.0%	
7.	0	☐ 0.0%	
8.	0	☐ 0.0%	
9.	0	☐ 0.0%	
10.	0	☐ 0.0%	
11.	0	☐ 0.0%	
	40	= Total Cover	
Woody Vine Stratum (Plot size: 3m)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
	0	= Total Cover	

% Bare Ground in Herb Stratum: 60

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC:	1	(A)
Total Number of Dominant Species Across All Strata:	1	(B)
Percent of dominant Species That Are OBL, FACW, or FAC:	100.0%	(A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:
OBL species	0	x 1 =	0
FACW species	30	x 2 =	60
FAC species	5	x 3 =	15
FACU species	5	x 4 =	20
UPL species	0	x 5 =	0
Column Totals:	40 (A)		95 (B)

Prevalence Index = B/A = 2.375

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrologic Vegetation
- ☑ 2 - Dominance Test is > 50%
- ☑ 3 - Prevalence Index is ≤3.0 [1]
- ☐ 4 - Morphological Adaptations [1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ 5 - Wetland Non-Vascular Plants [1]
- ☐ Problematic Hydrophytic Vegetation [1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks:

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: 12

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-20	10YR 3/3	100%					Silty Clay Loam	

[1]Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (except in MLRA 1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ○ No ◉

Remarks:

Hydrology

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) (LRR A)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
- ☐ Drainage Patterns (B10)
- ☐ Dry Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☑ FAC-neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (LRR A)
- ☐ Frost Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):	
Water Table Present?	Yes ○	No ◉	Depth (inches):	
Saturation Present? (includes capillary fringe)	Yes ○	No ◉	Depth (inches):	

Wetland Hydrology Present? Yes ○ No ◉

Describe Recorded Data (stream gauge, monitor well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site: Muddy Creek Mitigation Bank City/County: Benton Sampling Date: 20-Feb-15

Applicant/Owner: Muddy Creek Mitigation Bank State: OR Sampling Point: 13

Investigator(s): Tom Dee Section, Township, Range: S 9 T 14S R 5W

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): undulating Slope: 0.0 % / 0.0 °

Subregion (LRR): A Lat.: 44.36528 Long.: -123.29474 Datum: NAD 83

Soil Map Unit Name: Awbrig silty clay loam, 0-2% slopes NWI classification: None

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ◉ No ○ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ◉ No ○	Is the Sampled Area within a Wetland? Yes ◉ No ○
Hydric Soil Present?	Yes ◉ No ○	
Wetland Hydrology Present?	Yes ◉ No ○	

Remarks:

VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size: 5m)	Absolute % Cover	Dominant Species? Rel.Strat. Cover	Indicator Status
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size: 3m)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
	0	= Total Cover	
Herb Stratum (Plot size: 1m)			
1. Deschampsia cespitosa	50	☑ 71.4%	FACW
2. Cardamine oligosperma	10	☐ 14.3%	FAC
3. Geranium pusillum	10	☐ 14.3%	UPL
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
6.	0	☐ 0.0%	
7.	0	☐ 0.0%	
8.	0	☐ 0.0%	
9.	0	☐ 0.0%	
10.	0	☐ 0.0%	
11.	0	☐ 0.0%	
	70	= Total Cover	
Woody Vine Stratum (Plot size: 3m)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
	0	= Total Cover	

% Bare Ground in Herb Stratum: 30

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC:	1	(A)
Total Number of Dominant Species Across All Strata:	1	(B)
Percent of dominant Species That Are OBL, FACW, or FAC:	100.0%	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	50	x 2 =	100
FAC species	10	x 3 =	30
FACU species	0	x 4 =	0
UPL species	10	x 5 =	50
Column Totals:	70 (A)		180 (B)

Prevalence Index = B/A = 2.571

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrologic Vegetation
- ☑ 2 - Dominance Test is > 50%
- ☑ 3 - Prevalence Index is ≤3.0 [1]
- ☐ 4 - Morphological Adaptations [1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ 5 - Wetland Non-Vascular Plants [1]
- ☐ Problematic Hydrophytic Vegetation [1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks:

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: 13

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-20	10YR 3/3	100%					Silty Clay Loam	

[1]Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (except in MLRA 1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☑ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ◉ No ○

Remarks:

See Chapter 5 of the WMVC Regional Supplement for Problematic Hydric Soils (5) Recently Developed Wetlands. The Sample Point is within a wetland restoration area where hydric soil indicators have yet to develop.

Hydrology

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) (LRR A)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
- ☐ Drainage Patterns (B10)
- ☐ Dry Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☑ FAC-neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (LRR A)
- ☐ Frost Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (Inches):	
Water Table Present?	Yes ◉	No ○	Depth (inches):	11
Saturation Present? (Includes capillary fringe)	Yes ◉	No ○	Depth (inches):	7

Wetland Hydrology Present? Yes ◉ No ○

Describe Recorded Data (stream gauge, monitor well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site: Muddy Creek Mitigation Bank City/County: Benton Sampling Date: 20-Feb-15

Applicant/Owner: Muddy Creek Mitigation Bank State: OR Sampling Point: 14

Investigator(s): Tom Dee Section, Township, Range: S 9 T 14S R 5W

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): undulating Slope: 0.0 % / 0.0 °

Subregion (LRR): A Lat.: 44.36642 Long.: -123.29610 Datum: NAD 83

Soil Map Unit Name: Awbrig silty clay loam, 0-2% slopes NWI classification: None

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ◉ No ○ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ◉	No ○
Hydric Soil Present?	Yes ○	No ◉
Wetland Hydrology Present?	Yes ○	No ◉

Is the Sampled Area within a Wetland? Yes ○ No ◉

Remarks:

VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size: 5m)	Absolute % Cover	Dominant Species? Rel.Strat. Cover	Indicator Status
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size: 3m)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
	0	= Total Cover	
Herb Stratum (Plot size: 1m)			
1. Deschampsia cespitosa	50	☑ 100.0%	FACW
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
6.	0	☐ 0.0%	
7.	0	☐ 0.0%	
8.	0	☐ 0.0%	
9.	0	☐ 0.0%	
10.	0	☐ 0.0%	
11.	0	☐ 0.0%	
	50	= Total Cover	
Woody Vine Stratum (Plot size: 3m)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
	0	= Total Cover	

% Bare Ground in Herb Stratum: 50

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	50	x 2 =	100
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	50 (A)		100 (B)

Prevalence Index = B/A = 2.000

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrologic Vegetation
- ☑ 2 - Dominance Test is > 50%
- ☑ 3 - Prevalence Index is ≤3.0 [1]
- ☐ 4 - Morphological Adaptations [1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ 5 - Wetland Non-Vascular Plants [1]
- ☐ Problematic Hydrophytic Vegetation [1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks:

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: 14

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-20	10YR 3/3	100%					Silty Clay Loam	

[1]Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (except in MLRA 1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ○ No ◉

Remarks:

Hydrology

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) (LRR A)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
- ☐ Drainage Patterns (B10)
- ☐ Dry Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☑ FAC-neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (LRR A)
- ☐ Frost Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):	
Water Table Present?	Yes ○	No ◉	Depth (inches):	
Saturation Present? (includes capillary fringe)	Yes ○	No ◉	Depth (inches):	

Wetland Hydrology Present? Yes ○ No ◉

Describe Recorded Data (stream gauge, monitor well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site: Muddy Creek Mitigation Bank City/County: Benton Sampling Date: 20-Feb-15

Applicant/Owner: Muddy Creek Mitigation Bank State: OR Sampling Point: 15

Investigator(s): Tom Dee Section, Township, Range: S 9 T 14S R 5W

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): undulating Slope: 0.0 % / 0.0 °

Subregion (LRR): A Lat.: 44.36640 Long.: -123.29613 Datum: NAD 83

Soil Map Unit Name: Awbrig silty clay loam, 0-2% slopes NWI classification: None

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ◉ No ○ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ◉ No ○	Is the Sampled Area within a Wetland? Yes ◉ No ○
Hydric Soil Present? Yes ◉ No ○	
Wetland Hydrology Present? Yes ◉ No ○	

Remarks:

VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size: 5m)	Absolute % Cover	Dominant Species? Rel.Strat. Cover	Indicator Status
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size: 3m)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
	0	= Total Cover	
Herb Stratum (Plot size: 1m)			
1. Deschampsia cespitosa	60	☑ 85.7%	FACW
2. Festuca arundinacea	10	☐ 14.3%	FAC
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
6.	0	☐ 0.0%	
7.	0	☐ 0.0%	
8.	0	☐ 0.0%	
9.	0	☐ 0.0%	
10.	0	☐ 0.0%	
11.	0	☐ 0.0%	
	70	= Total Cover	
Woody Vine Stratum (Plot size: 3m)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
	0	= Total Cover	

% Bare Ground in Herb Stratum: 30

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC:	1	(A)
Total Number of Dominant Species Across All Strata:	1	(B)
Percent of dominant Species That Are OBL, FACW, or FAC:	100.0%	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	60	x 2 =	120
FAC species	10	x 3 =	30
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	70 (A)		150 (B)

Prevalence Index = B/A = 2.143

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrologic Vegetation
- ☑ 2 - Dominance Test is > 50%
- ☑ 3 - Prevalence Index is ≤3.0 [1]
- ☐ 4 - Morphological Adaptations [1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ 5 - Wetland Non-Vascular Plants [1]
- ☐ Problematic Hydrophytic Vegetation [1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks:

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: 15

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-20	10YR 3/3	100%					Silty Clay Loam	

[1]Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (except in MLRA 1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☑ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ◉ No ○

Remarks:

See Chapter 5 of the WMVC Regional Supplement for Problematic Hydric Soils (5) Recently Developed Wetlands. The Sample Point is within a wetland restoration area where hydric soil indicators have yet to develop.

Hydrology

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) (LRR A)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
- ☐ Drainage Patterns (B10)
- ☐ Dry Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☑ FAC-neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (LRR A)
- ☐ Frost Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):	
Water Table Present?	Yes ◉	No ○	Depth (inches):	14
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches):	10

Wetland Hydrology Present? Yes ◉ No ○

Describe Recorded Data (stream gauge, monitor well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site: Muddy Creek Mitigation Bank **City/County:** Benton **Sampling Date:** 20-Feb-16

Applicant/Owner: Muddy Creek Mitigation Bank **State:** OR **Sampling Point:** 16

Investigator(s): Tom Dee **Section, Township, Range:** S 9 T 14S R 5W

Landform (hillslope, terrace, etc.): Terrace **Local relief (concave, convex, none):** undulating **Slope:** 0.0 % / 0.0 °

Subregion (LRR): A **Lat.:** 44.36593 **Long.:** -123.29653 **Datum:** NAD 83

Soil Map Unit Name: Coburg silty clay loam, 0-3% slopes **NWI classification:** None

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ◉ No ○ **(If no, explain in Remarks.)**

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **significantly disturbed?** **Are "Normal Circumstances" present?** Yes ◉ No ○

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **naturally problematic?** **(If needed, explain any answers in Remarks.)**

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ○	No ◉
Hydric Soil Present?	Yes ○	No ◉
Wetland Hydrology Present?	Yes ◉	No ○

Is the Sampled Area within a Wetland? Yes ○ No ◉

Remarks:

VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size: 5m)	Absolute % Cover	Dominant Species? Rel.Strat. Cover	Indicator Status
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size: 3m)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
	0	= Total Cover	
Herb Stratum (Plot size: 1m)			
1. Deschampsia cespitosa	50	☑ 66.7%	FACW
2. Hypochaeris radicata	25	☑ 33.3%	FACU
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
6.	0	☐ 0.0%	
7.	0	☐ 0.0%	
8.	0	☐ 0.0%	
9.	0	☐ 0.0%	
10.	0	☐ 0.0%	
11.	0	☐ 0.0%	
	75	= Total Cover	
Woody Vine Stratum (Plot size: 3m)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
	0	= Total Cover	

% Bare Ground in Herb Stratum: 25

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC:	1	(A)
Total Number of Dominant Species Across All Strata:	2	(B)
Percent of dominant Species That Are OBL, FACW, or FAC:	50.0%	(A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:
OBL species	0	x 1 =	0
FACW species	50	x 2 =	100
FAC species	0	x 3 =	0
FACU species	25	x 4 =	100
UPL species	0	x 5 =	0
Column Totals:	75 (A)		200 (B)

Prevalence Index = B/A = 2.667

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrologic Vegetation
- ☐ 2 - Dominance Test is > 50%
- ☑ 3 - Prevalence Index is ≤3.0 [1]
- ☐ 4 - Morphological Adaptations [1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ 5 - Wetland Non-Vascular Plants [1]
- ☐ Problematic Hydrophytic Vegetation [1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ○ No ◉

Remarks:

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: 16

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-20	10YR 3/3	100%						

[1]Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (except in MLRA 1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ○ No ◉

Remarks:

Hydrology

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) (LRR A)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
- ☐ Drainage Patterns (B10)
- ☐ Dry Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (LRR A)
- ☐ Frost Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):	
Water Table Present?	Yes ◉	No ○	Depth (inches):	10
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches):	7

Wetland Hydrology Present? Yes ◉ No ○

Describe Recorded Data (stream gauge, monitor well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site: Muddy Creek Mitigation Bank City/County: Benton Sampling Date: 20-Feb-15

Applicant/Owner: Muddy Creek Mitigation Bank State: OR Sampling Point: 17

Investigator(s): Tom Dee Section, Township, Range: S 9 T 14S R 5W

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): undulating Slope: 0.0 % / 0.0 °

Subregion (LRR): A Lat.: 44.36590 Long.: -123.29656 Datum: NAD 83

Soil Map Unit Name: Coburg silty clay loam, 0-3% slopes NWI classification: None

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ◉ No ○ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ◉ No ○	Is the Sampled Area within a Wetland? Yes ◉ No ○
Hydric Soil Present?	Yes ◉ No ○	
Wetland Hydrology Present?	Yes ◉ No ○	

Remarks:

VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size: 5m)	Absolute % Cover	Dominant Species? Rel.Strat. Cover	Indicator Status
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size: 3m)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
	0	= Total Cover	
Herb Stratum (Plot size: 1m)			
1. Deschampsia cespitosa	50	☑ 83.3%	FACW
2. Trifolium repens	10	☐ 16.7%	FAC
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
6.	0	☐ 0.0%	
7.	0	☐ 0.0%	
8.	0	☐ 0.0%	
9.	0	☐ 0.0%	
10.	0	☐ 0.0%	
11.	0	☐ 0.0%	
	60	= Total Cover	
Woody Vine Stratum (Plot size: 3m)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
	0	= Total Cover	

% Bare Ground in Herb Stratum: 40

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC:	1	(A)
Total Number of Dominant Species Across All Strata:	1	(B)
Percent of dominant Species That Are OBL, FACW, or FAC:	100.0%	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	50	x 2 =	100
FAC species	10	x 3 =	30
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	60 (A)		130 (B)

Prevalence Index = B/A = 2.167

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrologic Vegetation
- ☑ 2 - Dominance Test is > 50%
- ☑ 3 - Prevalence Index is ≤3.0 [1]
- ☐ 4 - Morphological Adaptations [1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ 5 - Wetland Non-Vascular Plants [1]
- ☐ Problematic Hydrophytic Vegetation [1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks:

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: 17

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)		%	Redox Features Color (moist)		%	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR	3/3	100%						Silty Clay Loam	
6-20	10YR	3/2	80%	10YR	5/8	20%	C	M	Silty Clay Loam	

[1]Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (except in MLRA 1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☑ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ◉ No ○

Remarks:

Hydrology

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) (LRR A)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
- ☐ Drainage Patterns (B10)
- ☐ Dry Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☑ FAC-neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (LRR A)
- ☐ Frost Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):	
Water Table Present?	Yes ◉	No ○	Depth (inches):	11
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches):	8

Wetland Hydrology Present? Yes ◉ No ○

Describe Recorded Data (stream gauge, monitor well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site: Muddy Creek Mitigation Bank City/County: Benton Sampling Date: 20-Feb-16

Applicant/Owner: Muddy Creek Mitigation Bank State: OR Sampling Point: 18

Investigator(s): Tom Dee Section, Township, Range: S 9 T 14S R 5W

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): undulating Slope: 0.0 % / 0.0 °

Subregion (LRR): A Lat.: 44.36586 Long.: -123.29665 Datum: NAD 83

Soil Map Unit Name: Coburg silty clay loam, 0-3% slopes NWI classification: None

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ◉ No ○ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ◉	No ○
Hydric Soil Present?	Yes ○	No ◉
Wetland Hydrology Present?	Yes ○	No ◉

Is the Sampled Area within a Wetland? Yes ○ No ◉

Remarks:

VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size: 5m)	Absolute % Cover	Dominant Species? Rel.Strat. Cover	Indicator Status
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size: 3m)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
	0	= Total Cover	
Herb Stratum (Plot size: 1m)			
1. Poa trivialis	70	☑ 87.5%	FAC
2. Deschampsia cespitosa	10	☐ 12.5%	FACW
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
6.	0	☐ 0.0%	
7.	0	☐ 0.0%	
8.	0	☐ 0.0%	
9.	0	☐ 0.0%	
10.	0	☐ 0.0%	
11.	0	☐ 0.0%	
	80	= Total Cover	
Woody Vine Stratum (Plot size: 3m)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
	0	= Total Cover	

% Bare Ground in Herb Stratum: 20

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC:	1	(A)
Total Number of Dominant Species Across All Strata:	1	(B)
Percent of dominant Species That Are OBL, FACW, or FAC:	100.0%	(A/B)

Prevalence Index worksheet:

	Total % Cover of:	Multiply by:	
OBL species	0	x 1 =	0
FACW species	10	x 2 =	20
FAC species	70	x 3 =	210
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	80 (A)		230 (B)

Prevalence Index = B/A = 2.875

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrologic Vegetation
- ☑ 2 - Dominance Test is > 50%
- ☑ 3 - Prevalence Index is ≤3.0 [1]
- ☐ 4 - Morphological Adaptations [1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ 5 - Wetland Non-Vascular Plants [1]
- ☐ Problematic Hydrophytic Vegetation [1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks:

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: 18

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-20	10YR 3/3	100%					Silty Clay Loam	

[1]Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (except in MLRA 1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ○ No ◉

Remarks:

Hydrology

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) (LRR A)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
- ☐ Drainage Patterns (B10)
- ☐ Dry Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (LRR A)
- ☐ Frost Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):
Water Table Present?	Yes ○	No ◉	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes ○	No ◉	Depth (inches):

Wetland Hydrology Present? Yes ○ No ◉

Describe Recorded Data (stream gauge, monitor well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site: Muddy Creek Mitigation Bank City/County: Benton Sampling Date: 20-Feb-15

Applicant/Owner: Muddy Creek Mitigation Bank State: OR Sampling Point: 19

Investigator(s): Tom Dee Section, Township, Range: S 9 T 14S R 5W

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): undulating Slope: 0.0 % / 0.0 °

Subregion (LRR): A Lat.: 44.36590 Long.: -123.29663 Datum: NAD 83

Soil Map Unit Name: Coburg silty clay loam, 0-3% slopes NWI classification: None

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ◉ No ○ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ◉ No ○	Is the Sampled Area within a Wetland? Yes ◉ No ○
Hydric Soil Present?	Yes ◉ No ○	
Wetland Hydrology Present?	Yes ◉ No ○	

Remarks:

VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size: 5m)	Absolute % Cover	Dominant Species? Rel.Strat. Cover	Indicator Status
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size: 3m)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
	0	= Total Cover	
Herb Stratum (Plot size: 1m)			
1. Deschampsia cespitosa	75	☑ 88.2%	FACW
2. Trifolium repens	5	☐ 5.9%	FAC
3. Grindelia integrifolia	5	☐ 5.9%	FACW
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
6.	0	☐ 0.0%	
7.	0	☐ 0.0%	
8.	0	☐ 0.0%	
9.	0	☐ 0.0%	
10.	0	☐ 0.0%	
11.	0	☐ 0.0%	
	85	= Total Cover	
Woody Vine Stratum (Plot size: 3m)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
	0	= Total Cover	

% Bare Ground in Herb Stratum: 15

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC:	1	(A)
Total Number of Dominant Species Across All Strata:	1	(B)
Percent of dominant Species That Are OBL, FACW, or FAC:	100.0%	(A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:
OBL species	0	x 1 =	0
FACW species	80	x 2 =	160
FAC species	5	x 3 =	15
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	85 (A)		175 (B)

Prevalence Index = B/A = 2.059

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrologic Vegetation
- ☑ 2 - Dominance Test is > 50%
- ☑ 3 - Prevalence Index is ≤3.0 [1]
- ☐ 4 - Morphological Adaptations [1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ 5 - Wetland Non-Vascular Plants [1]
- ☐ Problematic Hydrophytic Vegetation [1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks:

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: 19

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)		%	Redox Features Color (moist)		%	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR	3/3	100%						Silty Clay Loam	
6-20	10YR	3/2	80%	10YR	5/8	20%	C	M	Silty Clay Loam	

[1]Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (except in MLRA 1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☑ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ◉ No ○

Remarks:

Hydrology

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) (LRR A)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
- ☐ Drainage Patterns (B10)
- ☐ Dry Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☑ FAC-neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (LRR A)
- ☐ Frost Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):	
Water Table Present?	Yes ◉	No ○	Depth (inches):	11
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches):	8

Wetland Hydrology Present? Yes ◉ No ○

Describe Recorded Data (stream gauge, monitor well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site: Muddy Creek Mitigation Bank City/County: Benton Sampling Date: 20-Feb-15

Applicant/Owner: Muddy Creek Mitigation Bank State: OR Sampling Point: 20

Investigator(s): Tom Dee Section, Township, Range: S 9 T 14S R 5W

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): undulating Slope: 0.0 % / 0.0 °

Subregion (LRR): A Lat.: 44.36446 Long.: -123.29535 Datum: NAD 83

Soil Map Unit Name: Coburg silty clay loam, 0-3% slopes NWI classification: None

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ◉ No ○ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ○ No ◉	Is the Sampled Area within a Wetland? Yes ○ No ◉
Hydric Soil Present?	Yes ○ No ◉	
Wetland Hydrology Present?	Yes ○ No ◉	

Remarks:

VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size: 5m)	Absolute % Cover	Dominant Species? Rel.Strat. Cover	Indicator Status
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size: 3m)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
	0	= Total Cover	
Herb Stratum (Plot size: 1m)			
1. Deschampsia cespitosa	50	☑ 66.7%	FACW
2. Daucus carota	25	☑ 33.3%	FACU
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
6.	0	☐ 0.0%	
7.	0	☐ 0.0%	
8.	0	☐ 0.0%	
9.	0	☐ 0.0%	
10.	0	☐ 0.0%	
11.	0	☐ 0.0%	
	75	= Total Cover	
Woody Vine Stratum (Plot size: 3m)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
	0	= Total Cover	

% Bare Ground in Herb Stratum: 25

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC:	1	(A)
Total Number of Dominant Species Across All Strata:	2	(B)
Percent of dominant Species That Are OBL, FACW, or FAC:	50.0%	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	50	x 2 =	100
FAC species	0	x 3 =	0
FACU species	25	x 4 =	100
UPL species	0	x 5 =	0
Column Totals:	75 (A)		200 (B)

Prevalence Index = B/A = 2.667

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrologic Vegetation
- ☐ 2 - Dominance Test is > 50%
- ☑ 3 - Prevalence Index is ≤3.0 [1]
- ☐ 4 - Morphological Adaptations [1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ 5 - Wetland Non-Vascular Plants [1]
- ☐ Problematic Hydrophytic Vegetation [1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ○ No ◉

Remarks:

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: 20

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)		%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-20	10YR	3/3	100%					Silty Clay Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (except in MLRA 1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ○ No ◉

Remarks:

Hydrology

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) (LRR A)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
- ☐ Drainage Patterns (B10)
- ☐ Dry Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (LRR A)
- ☐ Frost Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):
Water Table Present?	Yes ○	No ◉	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes ○	No ◉	Depth (inches):

Wetland Hydrology Present? Yes ○ No ◉

Describe Recorded Data (stream gauge, monitor well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site: Muddy Creek Mitigation Bank City/County: Benton Sampling Date: 20-Feb-15

Applicant/Owner: Muddy Creek Mitigation Bank State: OR Sampling Point: 21

Investigator(s): Tom Dee Section, Township, Range: S 9 T 14S R 5W

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): undulating Slope: 0.0 % / 0.0 °

Subregion (LRR): A Lat.: 44.36449 Long.: -123.29535 Datum: NAD 83

Soil Map Unit Name: Coburg silty clay loam, 0-3% slopes NWI classification: None

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ◉ No ○ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ◉ No ○	Is the Sampled Area within a Wetland? Yes ◉ No ○
Hydric Soil Present?	Yes ◉ No ○	
Wetland Hydrology Present?	Yes ◉ No ○	

Remarks:

VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size: 5m)	Absolute % Cover	Dominant Species? Rel.Strat. Cover	Indicator Status
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size: 3m)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
	0	= Total Cover	
Herb Stratum (Plot size: 1m)			
1. Deschampsia cespitosa	75	☑ 88.2%	FACW
2. Daucus carota	10	☐ 11.8%	FACU
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
6.	0	☐ 0.0%	
7.	0	☐ 0.0%	
8.	0	☐ 0.0%	
9.	0	☐ 0.0%	
10.	0	☐ 0.0%	
11.	0	☐ 0.0%	
	85	= Total Cover	
Woody Vine Stratum (Plot size: 3m)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
	0	= Total Cover	

% Bare Ground in Herb Stratum: 15

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	75	x 2 =	150
FAC species	0	x 3 =	0
FACU species	10	x 4 =	40
UPL species	0	x 5 =	0
Column Totals:	85 (A)		190 (B)

Prevalence Index = B/A = 2.235

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrologic Vegetation
- ☑ 2 - Dominance Test is > 50%
- ☑ 3 - Prevalence Index is ≤3.0 [1]
- ☐ 4 - Morphological Adaptations [1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ 5 - Wetland Non-Vascular Plants [1]
- ☐ Problematic Hydrophytic Vegetation [1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks:

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: 21

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-20	10YR 3/3	100%					Silty Clay Loam	

[1]Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (except in MLRA 1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☑ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ◉ No ○

Remarks:

See Chapter 5 of the WMVC Regional Supplement for Problematic Hydric Soils (5) Recently Developed Wetlands. The Sample Point is within a wetland restoration area where hydric soil indicators have yet to develop.

Hydrology

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) (LRR A)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
- ☐ Drainage Patterns (B10)
- ☐ Dry Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☑ FAC-neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (LRR A)
- ☐ Frost Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):	
Water Table Present?	Yes ◉	No ○	Depth (inches):	12
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches):	9

Wetland Hydrology Present? Yes ◉ No ○

Describe Recorded Data (stream gauge, monitor well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site: Muddy Creek Mitigation Bank City/County: Benton Sampling Date: 20-Feb-15

Applicant/Owner: Muddy Creek Mitigation Bank State: OR Sampling Point: 22

Investigator(s): Tom Dee Section, Township, Range: S 9 T 14S R 5W

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): undulating Slope: 0.0 % / 0.0 °

Subregion (LRR): A Lat.: 44.36442 Long.: -123.29739 Datum: NAD 83

Soil Map Unit Name: Awbrig silty clay loam, 0-2% slopes NWI classification: None

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ◉ No ○ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ◉	No ○
Hydric Soil Present?	Yes ○	No ◉
Wetland Hydrology Present?	Yes ○	No ◉

Is the Sampled Area within a Wetland? Yes ○ No ◉

Remarks:

VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size: 5m)	Absolute % Cover	Dominant Species? Rel.Strat. Cover	Indicator Status
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
	0	= Total Cover	

Sapling/Shrub Stratum (Plot size: 3m)	Absolute % Cover	Dominant Species? Rel.Strat. Cover	Indicator Status
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
	0	= Total Cover	

Herb Stratum (Plot size: 1m)	Absolute % Cover	Dominant Species? Rel.Strat. Cover	Indicator Status
1. Deschampsia cespitosa	75	☑ 83.3%	FACW
2. Geranium pusillum	5	☐ 5.6%	UPL
3. Hypochaeris radicata	5	☐ 5.6%	FACU
4. Daucus carota	5	☐ 5.6%	FACU
5.	0	☐ 0.0%	
6.	0	☐ 0.0%	
7.	0	☐ 0.0%	
8.	0	☐ 0.0%	
9.	0	☐ 0.0%	
10.	0	☐ 0.0%	
11.	0	☐ 0.0%	
	90	= Total Cover	

Woody Vine Stratum (Plot size: 3m)	Absolute % Cover	Dominant Species? Rel.Strat. Cover	Indicator Status
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
	0	= Total Cover	

% Bare Ground in Herb Stratum: 10

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	75	x 2 =	150
FAC species	0	x 3 =	0
FACU species	10	x 4 =	40
UPL species	5	x 5 =	25
Column Totals:	90 (A)		215 (B)

Prevalence Index = B/A = 2.389

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrologic Vegetation
- ☑ 2 - Dominance Test is > 50%
- ☑ 3 - Prevalence Index is ≤3.0 [1]
- ☐ 4 - Morphological Adaptations [1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ 5 - Wetland Non-Vascular Plants [1]
- ☐ Problematic Hydrophytic Vegetation [1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks:

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: 22

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)		Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-20	10YR	3/3	100%					Silty Clay Loam	

[1]Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (except in MLRA 1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ○ No ◉

Remarks:

Hydrology

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) (LRR A)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
- ☐ Drainage Patterns (B10)
- ☐ Dry Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☑ FAC-neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (LRR A)
- ☐ Frost Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):	
Water Table Present?	Yes ○	No ◉	Depth (inches):	
Saturation Present? (includes capillary fringe)	Yes ○	No ◉	Depth (inches):	

Wetland Hydrology Present? Yes ○ No ◉

Describe Recorded Data (stream gauge, monitor well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site: Muddy Creek Mitigation Bank City/County: Benton Sampling Date: 20-Feb-16

Applicant/Owner: Muddy Creek Mitigation Bank State: OR Sampling Point: 23

Investigator(s): Tom Dee Section, Township, Range: S 9 T 14S R 5W

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): undulating Slope: 0.0 % / 0.0 °

Subregion (LRR): A Lat.: 44.36443 Long.: -123.29744 Datum: NAD 83

Soil Map Unit Name: Awbrig silty clay loam, 0-2% slopes NWI classification: None

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ◉ No ○ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ◉ No ○	Is the Sampled Area within a Wetland? Yes ◉ No ○
Hydric Soil Present?	Yes ◉ No ○	
Wetland Hydrology Present?	Yes ◉ No ○	

Remarks:

VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size: 5m)	Absolute % Cover	Dominant Species? Rel.Strat. Cover	Indicator Status
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size: 3m)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
	0	= Total Cover	
Herb Stratum (Plot size: 1m)			
1. Deschampsia cespitosa	75	☑ 88.2%	FACW
2. Geranium pusillum	5	☐ 5.9%	UPL
3. Hypochaeris radicata	5	☐ 5.9%	FACU
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
6.	0	☐ 0.0%	
7.	0	☐ 0.0%	
8.	0	☐ 0.0%	
9.	0	☐ 0.0%	
10.	0	☐ 0.0%	
11.	0	☐ 0.0%	
	85	= Total Cover	
Woody Vine Stratum (Plot size: 3m)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
	0	= Total Cover	

% Bare Ground in Herb Stratum: 15

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC:	1	(A)
Total Number of Dominant Species Across All Strata:	1	(B)
Percent of dominant Species That Are OBL, FACW, or FAC:	100.0%	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	75	x 2 =	150
FAC species	0	x 3 =	0
FACU species	5	x 4 =	20
UPL species	5	x 5 =	25
Column Totals:	85 (A)		195 (B)

Prevalence Index = B/A = 2.294

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrologic Vegetation
- ☑ 2 - Dominance Test is > 50%
- ☑ 3 - Prevalence Index is ≤3.0 [1]
- ☐ 4 - Morphological Adaptations [1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ 5 - Wetland Non-Vascular Plants [1]
- ☐ Problematic Hydrophytic Vegetation [1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks:

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: 23

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-20	10YR 3/3	100%					Silty Clay Loam	

[1]Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (except in MLRA 1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☑ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ◉ No ○

Remarks:

See Chapter 5 of the WMVC Regional Supplement for Problematic Hydric Soils (5) Recently Developed Wetlands. The Sample Point is within a wetland restoration area where hydric soil indicators have yet to develop.

Hydrology

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) (LRR A)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
- ☐ Drainage Patterns (B10)
- ☐ Dry Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☑ FAC-neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (LRR A)
- ☐ Frost Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):	
Water Table Present?	Yes ◉	No ○	Depth (inches):	11
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches):	8

Wetland Hydrology Present? Yes ◉ No ○

Describe Recorded Data (stream gauge, monitor well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site: Muddy Creek Mitigation Bank City/County: Benton Sampling Date: 20-Feb-15

Applicant/Owner: Muddy Creek Mitigation Bank State: OR Sampling Point: 24

Investigator(s): Tom Dee Section, Township, Range: S 9 T 14S R 5W

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): undulating Slope: 0.0 % / 0.0 °

Subregion (LRR): A Lat.: 44.36511 Long.: -123.29804 Datum: NAD 83

Soil Map Unit Name: Coburg silty clay loam, 0-3% slopes NWI classification: None

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ◉ No ○ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ◉	No ○
Hydric Soil Present?	Yes ○	No ◉
Wetland Hydrology Present?	Yes ○	No ◉

Is the Sampled Area within a Wetland? Yes ○ No ◉

Remarks:

VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size: 5m)	Absolute % Cover	Dominant Species? Rel.Strat. Cover	Indicator Status
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size: 3m)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
	0	= Total Cover	
Herb Stratum (Plot size: 1m)			
1. Lolium perenne	25	☑ 35.7%	FAC
2. Deschampsia cespitosa	25	☑ 35.7%	FACW
3. Geranium pusillum	10	☐ 14.3%	UPL
4. Epilobium ciliatum	10	☐ 14.3%	FACW
5.	0	☐ 0.0%	
6.	0	☐ 0.0%	
7.	0	☐ 0.0%	
8.	0	☐ 0.0%	
9.	0	☐ 0.0%	
10.	0	☐ 0.0%	
11.	0	☐ 0.0%	
	70	= Total Cover	
Woody Vine Stratum (Plot size: 3m)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
	0	= Total Cover	

% Bare Ground in Herb Stratum: 30

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC:	2	(A)
Total Number of Dominant Species Across All Strata:	2	(B)
Percent of dominant Species That Are OBL, FACW, or FAC:	100.0%	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	35	x 2 =	70
FAC species	25	x 3 =	75
FACU species	0	x 4 =	0
UPL species	10	x 5 =	50
Column Totals:	70 (A)		195 (B)

Prevalence Index = B/A = 2.786

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrologic Vegetation
- ☑ 2 - Dominance Test is > 50%
- ☑ 3 - Prevalence Index is ≤3.0 [1]
- ☐ 4 - Morphological Adaptations [1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ 5 - Wetland Non-Vascular Plants [1]
- ☐ Problematic Hydrophytic Vegetation [1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks:

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: 24

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)		Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-20	10YR	3/3	100%					Silty Clay Loam	

[1]Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (except in MLRA 1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ○ No ◉

Remarks:

Hydrology

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) (LRR A)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
- ☐ Drainage Patterns (B10)
- ☐ Dry Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☑ FAC-neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (LRR A)
- ☐ Frost Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):
Water Table Present?	Yes ○	No ◉	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes ○	No ◉	Depth (inches):

Wetland Hydrology Present? Yes ○ No ◉

Describe Recorded Data (stream gauge, monitor well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site: Muddy Creek Mitigation Bank City/County: Benton Sampling Date: 20-Feb-15

Applicant/Owner: Muddy Creek Mitigation Bank State: OR Sampling Point: 25

Investigator(s): Tom Dee Section, Township, Range: S 9 T 14S R 5W

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): undulating Slope: 0.0 % / 0.0 °

Subregion (LRR): A Lat.: 44.36510 Long.: -123.29801 Datum: NAD 83

Soil Map Unit Name: Coburg silty clay loam, 0-3% slopes NWI classification: None

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ◉ No ○ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ◉ No ○	Is the Sampled Area within a Wetland? Yes ◉ No ○
Hydric Soil Present?	Yes ◉ No ○	
Wetland Hydrology Present?	Yes ◉ No ○	

Remarks:

VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size: 5m)	Absolute % Cover	Dominant Species? Rel.Strat. Cover	Indicator Status
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size: 3m)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
	0	= Total Cover	
Herb Stratum (Plot size: 1m)			
1. Deschampsia cespitosa	50	☑ 100.0%	FACW
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
6.	0	☐ 0.0%	
7.	0	☐ 0.0%	
8.	0	☐ 0.0%	
9.	0	☐ 0.0%	
10.	0	☐ 0.0%	
11.	0	☐ 0.0%	
	50	= Total Cover	
Woody Vine Stratum (Plot size: 3m)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
	0	= Total Cover	

% Bare Ground in Herb Stratum: 50

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC:	1	(A)
Total Number of Dominant Species Across All Strata:	1	(B)
Percent of dominant Species That Are OBL, FACW, or FAC:	100.0%	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	50	x 2 =	100
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	50 (A)		100 (B)

Prevalence Index = B/A = 2.000

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrologic Vegetation
- ☑ 2 - Dominance Test is > 50%
- ☑ 3 - Prevalence Index is ≤3.0 [1]
- ☐ 4 - Morphological Adaptations [1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ 5 - Wetland Non-Vascular Plants [1]
- ☐ Problematic Hydrophytic Vegetation [1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks:

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: 25

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-20	10YR 3/3	100%					Silty Clay Loam	

[1]Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (except in MLRA 1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☑ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ◉ No ○

Remarks:

See Chapter 5 of the WMVC Regional Supplement for Problematic Hydric Soils (5) Recently Developed Wetlands. The Sample Point is within a wetland restoration area where hydric soil indicators have yet to develop.

Hydrology

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☑ Water Marks (B1)
- ☑ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) (LRR A)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
- ☐ Drainage Patterns (B10)
- ☐ Dry Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☑ FAC-neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (LRR A)
- ☐ Frost Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):	
Water Table Present?	Yes ◉	No ○	Depth (inches):	12
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches):	8

Wetland Hydrology Present? Yes ◉ No ○

Describe Recorded Data (stream gauge, monitor well, aerial photos, previous inspections), if available:

Remarks:

Appendix C

Ground-Level Color Photographs

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Photopoint 1: Sample Point 1 Looking Southeast

Photopoint 2: Sample Points 2 and 3 Looking South

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Photopoint 3: Sample Points 4 and 5 Looking West

Photopoint 4: Sample Points 6 and 7 Looking Southwest

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Photopoint 5: Sample Point 9 Looking South (8 has been culled)

Photopoint 6: Sample Points 10 and 11 Looking North

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Photopoint 7: Sample Points 12 and 13 Looking West

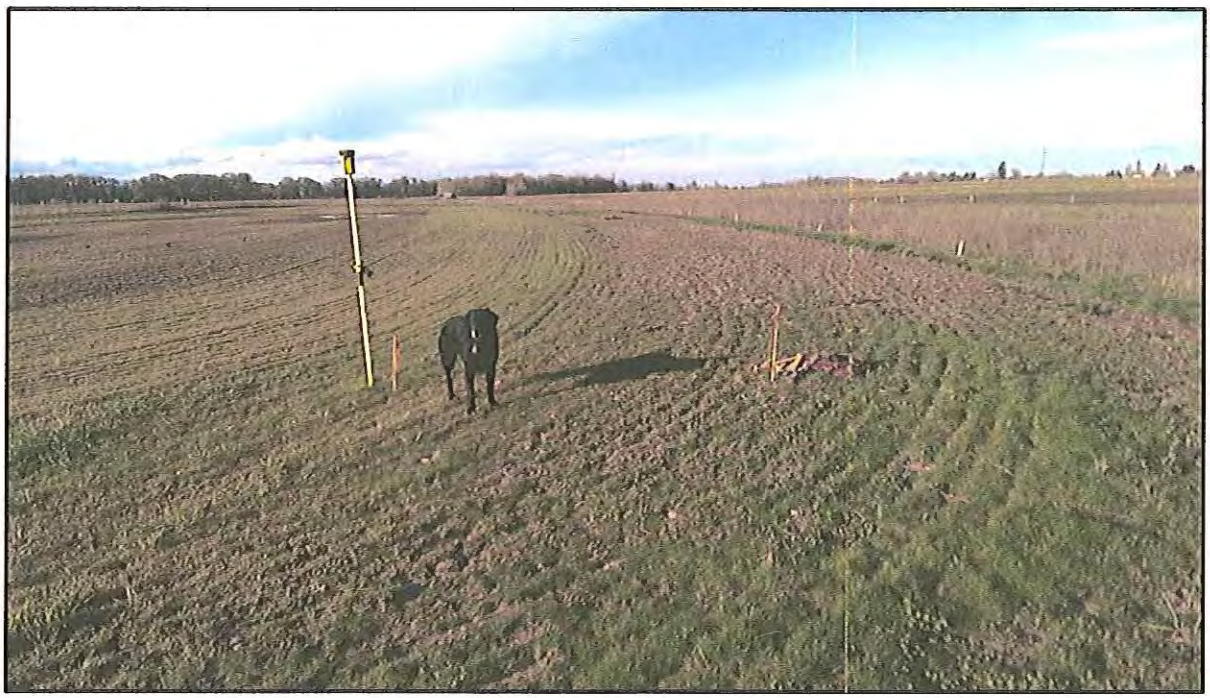
Photopoint 8: Sample Points 14 and 15 Looking Northwest

TURNSTONE
ENVIRONMENTAL CONSULTANTS

Photopoint 9: Sample Points 16 and 17 Looking Southeast

Photopoint 10: Sample Points 18 and 19 Looking Southeast

Photopoint 11: Sample Points 20 and 21 Looking East



Photopoint 12: Sample Points 22 and 23 Looking North

Photopoint 13: Sample Points 24 and 25 Looking North

Appendix D

Literature Citations

TURNSTONE
ENVIRONMENTAL CONSULTANTS

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe, 1979. Classification of Wetlands and Deepwater Habitats of the United States. U.S. Fish and Wildlife Service.

Department of State Lands. *Removal-Fill Guide*. May 2013

Environmental Laboratory. 1987. Corps of Engineers Wetlands Delineation Manual, Technical Report Y-87-1, US Army Engineer Waterways Experiment Station, Vicksburg, MS.

Gretag Macbeth. 2000. Munsell Soil Color Charts, 2000 Edition. Baltimore, MD.

Hitchcock, C. L., A. Cronquist. 1973. Flora of the Pacific Northwest. University of Washington.

National Oceanic and Atmospheric Administration. 2013. National Climate Data Center. Accessed online April 2015. Corvallis State University,OR GHCND:USC00351862.

Soil Conservation Service. 1988. Hydric Soils of the State of Oregon. In cooperation with The National Technical Committee for Hydric Soils.

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Web Soil Survey. Available online at http://websoilsurvey.nrcs.usda.gov/. Accessed February 5, 2015 (Microsoft Access Database).

Sumner JP, MJ Vepraskis, and RK Kolka. 2009. Methods to Evaluate Normal Rainfall for Short Term Wetland Hydrology Assessment. Wetlands. 29(3):1049-1062.

U.S. Army Corps of Engineers. 2010. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (Version 2.0), ed. J. S. Wakeley, R. W. Lichvar, and C. V. Noble. ERDC/EL TR-10-3. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

U.S. Army Corp of Engineers. 2005. Regulatory Guidance Letter 05-05: Guidance on Ordinary High Water Mark Identification.

U.S. Army Corp of Engineers. 2013. State of Oregon-NWPL Final Draft Ratings.

U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS). 2015. The PLANTS Database (http://plants.usda.gov, 10 February 2015). National Plant Data Team, Greensboro, NC 27401-4901 USA.

USDA. 2002. NRCS WETS Tables for Corvallis State University. Accessed online February 2012.

Appendix E

Literature Citations

TURNSTONE
ENVIRONMENTAL CONSULTANTS

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe, 1979. Classification of Wetlands and Deepwater Habitats of the United States. U.S. Fish and Wildlife Service.

Department of State Lands. *Removal-Fill Guide*. May 2013

Environmental Laboratory. 1987. Corps of Engineers Wetlands Delineation Manual, Technical Report Y-87-1, US Army Engineer Waterways Experiment Station, Vicksburg, MS.

Gretag Macbeth. 2000. Munsell Soil Color Charts, 2000 Edition. Baltimore, MD.

Hitchcock, C. L., A. Cronquist. 1973. Flora of the Pacific Northwest. University of Washington.

National Oceanic and Atmospheric Administration. 2013. National Climate Data Center. Accessed online April 2015. Corvallis State University,OR GHCND:USC00351862.

Soil Conservation Service. 1988. Hydric Soils of the State of Oregon. In cooperation with The National Technical Committee for Hydric Soils.

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Web Soil Survey. Available online at http://websoilsurvey.nrcs.usda.gov/. Accessed February 5, 2015 (Microsoft Access Database).

Sumner JP, MJ Vepraskis, and RK Kolka. 2009. Methods to Evaluate Normal Rainfall for Short Term Wetland Hydrology Assessment. Wetlands. 29(3):1049-1062.

U.S. Army Corps of Engineers. 2010. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (Version 2.0), ed. J. S. Wakeley, R. W. Lichvar, and C. V. Noble. ERDC/EL TR-10-3. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

U.S. Army Corp of Engineers. 2005. Regulatory Guidance Letter 05-05: Guidance on Ordinary High Water Mark Identification.

U.S. Army Corp of Engineers. 2013. State of Oregon-NWPL Final Draft Ratings.

U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS). 2015. The PLANTS Database (http://plants.usda.gov, 10 February 2015). National Plant Data Team, Greensboro, NC 27401-4901 USA.

USDA. 2002. NRCS WETS Tables for Corvallis State University. Accessed online February 2012.