

FOSTER CREEK WETLAND MITIGATION BANK
2020 VEGETATION MONITORING REPORT
CLACKAMAS COUNTY, OREGON

Wetland Systems, LLC
2016 SE Henkle Road
Corbett, Oregon 97019

December 2020

Table of Contents

1	PROJECT OVERVIEW	1
	Status and Location.....	1
	Summary of 2020 Credit Activity.....	1
2	PERFORMANCE REQUIREMENTS.....	1
	Summary of Mitigation Performance Standards	1
3	METHODOLOGY.....	3
	Vegetation Monitoring Methodology.....	3
4	MONITORING RESULTS.....	3
	Vegetation Monitoring Summary Data.....	3
	Discussion of Vegetation Performance.....	4
	Wet Prairie.....	4
	Forested Wetland.....	5
5	CORRECTIVE ACTIONS AND RECOMMENDATIONS.....	6
	Weed Control.....	6
	Species Establishment	6
	New PFO Establishment.....	6
6	REFERENCES	7

List of Tables

- Table 1 – Wet Prairie Performance Standards
- Table 2 – Forested Wetland Performance Standards
- Table 3 – Performance Criteria Results

List of Figures

- Figure 1 – Site Monitoring Map

Appendices

- Appendix A – Foster Creek Bank 2020 Credit Ledger
 - Appendix B – Wet Prairie Species 2020 Percent Cover by Plot
-
-

1 PROJECT OVERVIEW

Status and Location

Foster Creek Wetland Mitigation Bank is owned and operated by Wetland Systems, LLC. The Foster Creek Wetland Mitigation Bank was authorized with approval of the Instrument in June 2006 (Corps File Number: 200500621, and DSL Permit 36499-RF). Comments or questions concerning this report may be directed to the report's author: Mark Vlahakis at mvlahakis@q.com.

The site is located on S. Eaden Road near Barton in Clackamas County, Oregon. The Foster Creek Wetland Mitigation Bank (Bank) serves the Clackamas River basin below 1,200 feet, all of the Johnson Creek basin, all of the Abernathy Creek basin, and limited portions of the Willamette basin (around Oregon City and Milwaukie). Urban areas served by this bank include Damascus, Oregon City, portions of Gresham, Milwaukie, Portland, and Sandy; and unincorporated Clackamas County.

The Foster Creek Wetland Mitigation Bank provides Slope/Flats and Depressional wetlands according to the Hydrogeomorphic classification, and Palustrine Emergent and Palustrine Forested wetlands according to the Cowardin classification. The habitat focus of the Bank is seasonal wet prairie (55.4 acres) with a lesser amount of forested wetland (13.2 acres). The Bank has been approved for a total of 27.56 wetland mitigation credits, with 26.18 of those credits currently approved for release by regulatory oversight.

This is the twelfth annual monitoring report for the Foster Creek Wetland Mitigation Bank (the 2008 annual report monitored revegetation test plots only). For purpose of discussion with this report, the site is segregated into two distinct areas related to current revegetation and vegetation monitoring activities: Wet Prairie and Forested Wetland (Figure 1).

The 68.6-acre wetland site area was fully planted in 2010, with grasses completed in 2009; forbs completed in 2010. Trees/shrubs were fully installed within the forested wetland in 2011 to complete the planting of the entire 68.6-acres. Supplemental plantings and seeding occur throughout the bank on an as-needed basis.

Summary of 2020 Credit Activity

The Foster Creek Bank is currently authorized for release of 95% (26.18) of the Bank's total credits (27.56). There were 1.58 credits sold in 2020. The total number of credits sold to-date is 25.66, with 0.52 credits currently available for transaction. A copy of the Bank's ledger is attached as Appendix A.

2 PERFORMANCE REQUIREMENTS

Summary of Vegetation Performance Standards

In 2014 a revision to the herbaceous diversity and tufted hairgrass performance standards for wet prairie were proposed by DSL/Corps and accepted by the Foster Creek Bank. The new standards replace the vegetation diversity and tufted hairgrass standards in the Bank Instrument (Table 16 of the Instrument) and are as follows:

1. Vegetation Diversity Standard:
Delete the 2 standards under "Number of Native Species" and replace with the following: Number of native species: For Years 3-5, the wet prairie will contain a minimum of 6 native species, or groupings of native species, each with at least 5% cover averages across all wet prairie plots. To qualify as one of the species or groupings to be counted, the species or group will occur in at least 10% of the prairie plots and have at least 1% average cover.

2. Tufted Hairgrass Standard:

In the two standards for Percent Cover of Native Species, delete the 2nd clause “with tufted hairgrass/camas >15% in years 1-2”, and the clause with “tufted hairgrass/camas >20% in years 3-5”.

Vegetation performance standards and the on-going performance status for the wet prairie and forested wetland habitats are presented in Tables 1 and 2. Refer to the “*Monitoring Results*” Section in Section 4 (Page 4) for details on the individual performance criteria results based on the 2020 monitoring. A table summarizing the percent cover and occurrence of all species within wet prairie plots is presented in Appendix B.

TABLE 1 - WET PRAIRIE PERFORMANCE STANDARDS

Wet Prairie Performance Criteria	Wet Prairie Performance Criteria Benchmark	Wet Prairie Performance Criteria Time Period	Wet Prairie Performance Criteria Status: 2009-2020
Percent Cover Native Species	>50% native species	2 Years	Met for 12 Years
Percent Cover Native Species	>60% native species	3 Years	Met for 10 Years
Percent Cover Invasive Species	<20% <15% for reed canarygrass	5 Years 5 Years	Met for 12 Years Met for 12 Years
Percent Cover Trees & Shrubs	<5%	5 Years	Met for 12 Years
Number of Native Species	≥6 native species with at least 5% cover	3 Years	Met for 7 Years*

* 2014 was the first year of implementation for this criterion

TABLE 2 - FORESTED WETLAND PERFORMANCE STANDARDS

Forested Wetland Performance Criteria	Forested Wetland Performance Criteria Benchmark	Forested Wetland Performance Criteria Time Period	Forested Wetland Performance Criteria Status: 2009-2020
# Native Tree/Shrub Species	Minimum 1 native tree species	5 Years	Met for 12 Years
	Minimum 3 native shrub species	5 Years	Met for 12 Years
Density of Native Tree Species	Minimum of 240 stems per acre	5 Years	Met for 11 Years
Density of Native Shrub Species	Minimum of 320 stems per acre	5 Years	Met for 10 Years
Percent Cover Native Herbaceous Species	>50% cover	5 Years	Met for 9 Years
Percent Cover Invasive Species	<20%	5 Years	Met for 10 Years
	<15% reed canarygrass	5 Years	Met for 12 years

3 METHODOLOGY

Vegetation Monitoring Methodology

Vegetation data collection follows protocols described in VEMA (Marshall 2007). Vegetation monitoring was conducted in early summer (June 5-6, 2020) by GreenBanks, LLC., and categorized by the author.

Permanent monitoring transects have been laid out from a baseline transect running east to west across the property, establishing 13 monitoring transects running north and south from the baseline (Figure 1). Five transects on the north side of the baseline (T-1N to T-5N), and eight transects on the south side (T-1S to T-8S), were numbered sequentially from west to east (Transect T-8S is located slightly south of the baseline to facilitate coverage in that area). A transect’s first sample plot (S1) was located at a random distance from the baseline, with subsequent plots located at 100-foot intervals from the first plot to the end of the respective transect. GPS coordinates were recorded at transect end points and for all 102 plot points. Locations of the endpoints of the baseline and transects were field-marked with wooden stakes, and sample plot locations were marked with labeled pin flags. Capped rebar was installed at all these points to create permanent location markers.

For wet prairie monitoring, a total of 79 plots of 1m² were located along the transects to sample herbaceous vegetation within the wet prairie. In addition to the transect plots, four upland (prairie) plots of 1m² (Upland plots A, B, C, and D) were also established on the south side of the baseline. For forested wetland monitoring where trees and shrubs were installed, 19 circular plots with a radius of 30-feet were sampled within five transects (T-2N, T-3N, T-4N, T-7S, T-8S) to count individual stems of trees and shrubs. The flagged sample locations were used to mark the center of the circular plot. Each of the circular plots also contained a 1m² herbaceous plot nested within it, using the same flagged point to mark the lower left corner of the plot.

4 MONITORING RESULTS

Vegetation Monitoring Summary Data

Monitoring data was summarized based on the habitat type (wet prairie or forested wetland) and the performance criteria required of each. Data was summarized by averaging the results of each sample plot within each transect, and then averaging the results of all of the transects to obtain a site-wide result for each criteria. Table 3 summarizes the site-wide results for the respective performance criteria.

TABLE 3 – PERFORMANCE CRITERIA RESULTS

WET PRAIRIE HABITAT												
Criteria Performance	Monitoring Results											
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Native species cover >50% ¹	54%	64%	70%	74%	64%	60%	68%	78%	74%	76%	75%	64%
Native species cover >60% ²	54%	64%	70%	74%	64%	60%	68%	78%	74%	76%	75%	64%
Non-native invasive species cover <20% ³	11%	9%	7%	16%	10%	17%	13%	6%	6%	7%	7%	14%
<15% for reed	0%	<1%	<1%	0%	0%	0%	0%	0%	<1%	0%	0%	0%

canarygrass ³												
Tree and shrub species cover <5% ³	0%	<1%	<1%	<1%	<1%	<1%	<1%	<1%	<1%	<1%	<1%	<1%
≥6 native species/groups with ≥5% cover ²	*	*	*	*	*	6	6	6	6	7	7	7

* 2014 was the first year of implementation for this criterion (see Section 2)

FORESTED WETLAND HABITAT												
Performance Criteria	Monitoring Results											
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Minimum of 1 native tree species ³	2	3	3	4	5	5	5	6	5	5	5	5
Minimum of 3 native shrub species ³	2	6	6	7	7	7	9	9	9	9	9	9
Minimum tree density of 240 stems/acre ³	189	283	480	598	636	750	658	418	861	1095	1101	1102
Minimum shrub density of 320 stems/acre ³	6	240	473	602	602	549	563	370	659	708	662	668
>50% cover native herbaceous species ³	49%	40%	48%	58%	54%	53%	61%	69%	65%	65%	61%	54%
<20% cover non-native invasive species ³	14%	42%	32%	15%	18%	13%	13%	12%	5%	9%	14%	18%
<15% reed canarygrass ³	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

¹ required for 2 years

² required for 3 years

³ required for 5 years

Discussion of Vegetation Performance

Wet Prairie – In 2020, all annual wet prairie performance categories were met (Table 3). With the change in the wet prairie vegetation diversity standard (2014) came a revised focus in vegetation management. We’re now concentrating on a select group of native forb species to maintain target diversity. Native species within the monitoring plots decreased from 75% in 2019 to 64% in 2020. Non-native invasive species as listed in the Instrument increased to 14% in 2020. One invasive species, *Leontodon taraxacoides*, consisted of 12% of the invasive cover, and also heavily influenced the overall non-native percent cover.

Three species met the revised species cover criteria outright in 2020; *Deschampsia caespitosa*, *Sidalcea nelsonii*, and *Madia glomerata*. There are four species groupings that meet the species cover criteria. The species groups include: *Carex* group (*Carex densa*, *C. feta*, *C. pachystachya*, and *C. unilateralis*); FACW group (*Camassia quamash*, *Epilobium densiflorum*, *Galium trifidum*, *Ranunculus occidentalis*, and *Symphotrichum subspicatum*); the FAC group (*Brodiaea hyacinthia*, *Geum macrophyllum*, and

Potentilla gracilis); and the FACU group (*Achillea millefolium*, *Acmispon americanus*, *Penstemon rydbergii*, *Prunella vulgaris*, and *Sidalcea campestris*).

For non-native species, the current trend is an increase in both non-native and invasive forbs, as well as an increase in non-native grasses. Invasive grasses decreased slightly. A couple of species are driving the respective increases (see below).

Cover of non-native forbs increased slightly from 12.8% in 2019 to 13.0% in 2020 and non-native grass species increased from 6.3% in 2019 to 8.9% in 2020. Invasive forbs increased from 5.6% in 2019 to 12.6% in 2020, while invasive grasses decreased from 1.8% in 2019 to 0.9% in 2020. Listed invasive species with over 1% cover in 2020 include *Leontodon taraxacoides* at 12.1%. Other non-native species with greater than 1% cover in 2020 include *Geranium dissectum* at 3.7%, *Bromus racemosus* at 1.9%, and *Bromus hordeaceus* at 1.1%. These and other non-native species of concern were targeted for control following monitoring and will continue to be targeted in 2021 (especially *Leontodon*).

Some additional noteworthy trends and observations revealed by the monitoring and personal observations throughout the year:

- The main story for 2020 monitoring was the marked increase of *Leontodon taraxacoides*. What we think happened was the haying and subsequent grass-specific herbicide application opened up space for *Leontodon* to spread by seed. It is a prolific seeder and can withstand multiple cutting and still produce seed in late season. This can present problems with existing bare ground so providing competing cover is key. Unfortunately, the site contains bare cover annually, primarily from the ubiquitous mole mounds that continually crop up, but also in 2020 with significant bare ground caused by numerous voles coming into the peak year in their 5-year population cycle. Voles not only create bare ground from their extensive runways and holes, but also eat prodigious amounts of seed and vegetation. As much as voles cause havoc with vegetation, they are the food base for numerous predators and we have numerous signs and sightings of raptors/owls to coyotes/bobcats.
- The 2019 haying and grass-specific treatment of the site's west end had mixed results. The herbicide spray had only fair control with no obvious reason. In addition, the subsequent seeding of native grasses (primarily *Deschampsia caespitosa*) produced only spotty germination. Speculation for this centers on the high vole population. This unexpected lack of cover facilitated *Leontodon* seeding in. Our reseeded native grasses should rectify this situation in 2021.
- *Fraxinus latifolia* seedlings appeared to be more numerous in the prairie. Establishment is most numerous in areas adjacent to or near existing trees which annually provide seed for establishment. We continue to control seedlings when encountered during maintenance activities in order to address performance standards for woody cover in the prairie.

Forested Wetland – In 2020, all annual forested wetland performance categories were met (Table 3). Total native species cover of 50.4% was a decrease from last year (60.9% in 2019), with non-native species increasing to 18.1% from 14.4% in 2019. Invasive cover increased to 18.4% in 2020 compared to 14.0% in 2019, largely due to an increase in *Leontodon taraxacoides* (17.0%).

The primary non-native species present in 2020 are: *Leontodon taraxacoides* at 17.0% cover (versus 12.3% in 2019), *Anthoxanthum odoratum* at 13.2% (versus 3.8% in 2019), *Parentucellia viscosa* at 1.1% (versus 0.2% in 2019), and *Vicia sativa* at 1.1%.

Tree density in 2020 was recorded as 1,102/acre while shrub density was 668/acre, similar to 2019 densities.

5 CORRECTIVE ACTIONS AND RECOMMENDATIONS

Post monitoring corrective actions fall into two primary categories: (1) weed control to reduce the occurrence and density of targeted non-native species, and (2) native forb establishment to increase the density and occurrence of select native forb species. These two core activities are directed through an adaptive management process with numerous points of input taken into consideration, which includes formal monitoring.

The 2019 haying of the west portion of the PEM to remove non-native grasses resulted in bare ground which was seeded with native grasses, primarily *Deschampsia caespitosa*. Unfortunately, the control of the non-native grasses was spotty and the subsequent native seeding did not establish well for reasons unsure. This allowed *Leontodon taraxacoides* to expand its cover. In 2020 *Leontodon taraxacoides* was targeted for control with additional native seeding commencing afterwards in these areas.

Weed Control

Weed control efforts are on-going. In 2020 weed control activities concentrated primarily on spot spraying select herbicides performed with backpack applications during the growing season. *Leontodon taraxacoides* was the main targeted species within the PEM.

Areas of the PFO that contain weedy herbaceous cover were targeted as well, especially targeting the recent increases of *Leontodon taraxacoides* and *Anthoxanthum odoratum*. The primary control method included spot spraying during the growing season followed by reseeding native grasses in the fall.

Species Establishment

Establishing additional native species and increasing the density of select prairie cohort species is a core activity at the Bank. Species for establishment are selected each year based on monitoring results, seed availability, integration with weed management activities, and appropriateness for the Bank's habitats. Seeding typically takes place in the fall season.

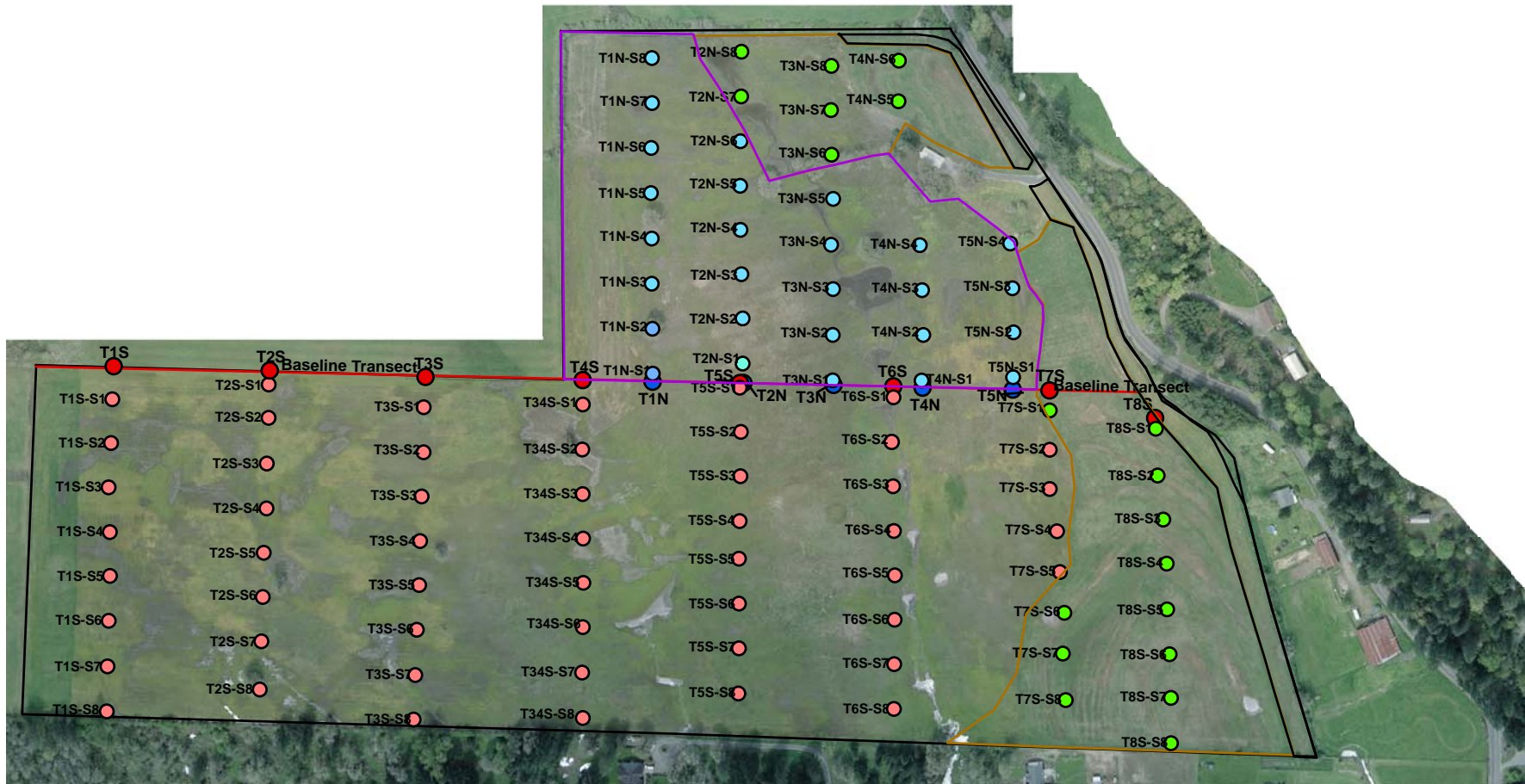
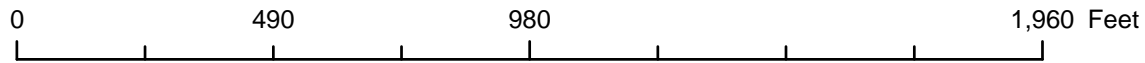
Within the prairie, both native grasses and forbs were seeded within areas of bare ground. Bare ground exists annually primarily due to mole activity with additional disturbance caused by meadow voles. Bare ground throughout the prairie was seeded with native grasses and forbs from late autumn into late winter. We performed supplemental grass seeding of *Deschampsia caespitosa* in the west side hayed area. In the forested wetland there were supplemental seeding of, primarily, *Hordeum brachyantherum* and *Festuca rubra* at various spot spray locations.

New PFO Establishment

We have proposed to modify/change select locations of the existing PEM to PFO. These locations consist of areas where existing nearby off-site *Fraxinus latifolia* persistently deposit seed. Currently, we target these seedlings annually in response to the "<5% woody species within the PEM" performance standard. We feel these areas should be allowed to convert to ash-dominated PFO. The proposed "new" PFO areas would be established with similar species, target densities, and overall performance standards that the Bank's existing PFO areas contain. A proposal for this work was submitted to the IRT in September 2020 but we have not been informed of a definitive decision by the time of this report's submittal.

REFERENCES

- Christy, John A. June 2009. 2009 Vegetation Monitoring, Foster Creek Wetland Mitigation Bank, Clackamas, Oregon. Prepared for Wetland Systems Restoration & Conservation LLC.
- Christy, John A. June 2010. 2010 Vegetation Monitoring, Foster Creek Wetland Mitigation Bank, Clackamas, Oregon. Prepared for Wetland Systems Restoration & Conservation LLC.
- Christy, John A. October 2011. 2011 Vegetation Monitoring, Foster Creek Wetland Mitigation Bank, Clackamas, Oregon. Prepared for Wetland Systems Restoration & Conservation LLC.
- Christy, John A. September 2012. 2012 Vegetation Monitoring, Foster Creek Wetland Mitigation Bank, Clackamas, Oregon. Prepared for Wetland Systems Restoration & Conservation LLC.
- Christy, John A. September 2013. 2013 Vegetation Monitoring, Foster Creek Wetland Mitigation Bank, Clackamas, Oregon. Prepared for Wetland Systems Restoration & Conservation LLC.
- Christy, John A. August 2014. 2014 Vegetation Monitoring, Foster Creek Wetland Mitigation Bank, Clackamas, Oregon. Prepared for Wetland Systems Restoration & Conservation LLC.
- Christy, John A. August 2015. 2015 Vegetation Monitoring, Foster Creek Wetland Mitigation Bank, Clackamas, Oregon. Prepared for Wetland Systems Restoration & Conservation LLC.
- Dennehy, Casey; Alverson, Edward R.; Anderson, Hannah E.; Clements, David R.; Gilbert, Rod; and Kaye, Thomas N. 2011. Management Strategies for Invasive Plants in Pacific Northwest Prairies, Savanas, and Oak Woodlands. Source: Northwest Science, 85(2):329-351. Published by: Northwest Scientific Association.
- Marshall, John L. April 2007. Draft Guidance for Vegetation planning and monitoring in Western Oregon Wetlands and Riparian Areas: *Using Reference Sites to Help Plan and Evaluate Vegetation Performance of Mitigation Sites*. U.S. Fish and Wildlife Service and Oregon Department of State Lands.
- USFWS August 2008. Draft Recovery Plan for Prairie Species of Western Oregon and Southwestern Washington. Region 1, U.S. Fish and Wildlife Service. Portland, Oregon
- Wetland Systems Restoration and Conservation, LLC. May 28, 2006. Foster Creek Wetland Mitigation Bank Instrument, Clackamas County, Oregon.
- Wetland Systems Restoration and Conservation, LLC. February 2014. Amendment #1 to Foster Creek Wetland Mitigation Bank Instrument, Clackamas County, Oregon.
- Wetland Systems, LLC. December, 2016. 2016 Vegetation Monitoring Report, Foster Creek Wetland Mitigation Bank, Clackamas, Oregon.
- Wetland Systems, LLC. December, 2017. 2017 Vegetation Monitoring Report, Foster Creek Wetland Mitigation Bank, Clackamas, Oregon.
- Wetland Systems, LLC. December, 2018. 2018 Vegetation Monitoring Report, Foster Creek Wetland Mitigation Bank, Clackamas, Oregon.
- Wetland Systems, LLC. December, 2019. 2019 Vegetation Monitoring Report, Foster Creek Wetland Mitigation Bank, Clackamas, Oregon.



- South Transect ●
- South Transect Sample Plot ●
- North Transect ●
- North Transect Sample Plot ●
- Forested Wetland Sample Plot ●

**Foster Creek Wetland Bank
2020 Monitoring Report**

Figure 1 - Monitoring Site Map

Aerial Photo Date: April 15, 2009

