

**Marion Mitigation Monitoring Report Cover Sheet
Oregon Department of State Lands**

Block 1: Report Information

DSL Permit Number: 37253-RF	COE Permit Number NWP-2007-701
Permittee: Marion Mitigation Bank LLC	
County: Marion	Report Date: January 2017
Date Removal-Fill Activity Completed: 2008	Monitoring Year 16
Date mitigation was completed Grading: 2008	Planting: Ongoing
Report submitted by: Marion Mitigation Bank LLC	

Block 2: Monitoring Report Purpose

This monitoring report is for monitoring a project that includes: (check all that apply):

- Compensatory **freshwater** wetland mitigation for permanent wetland impacts.
- Compensatory **estuarine** wetland mitigation for permanent wetland impacts.
- Only non-wetland** compensatory mitigation.
- Only mitigation for temporary** impacts that had a monitoring requirement.
- Voluntary** wetland enhancement, creation or restoration (General authorization or individual permit) not funded with money from our wetland mitigation revolving fund.
- Voluntary wetland enhancement, creation or restoration (General authorization or individual permit) funded with money from **our wetland mitigation revolving fund**.
- Mitigation Bank** Report

Block 3: Results

	Success Criteria	Met ? (Y/ N)	Comments/Reason for failure*
1.	Open water areas will have no more than 15% cover of undesirable invasive species	Y	
2.	Areas of herbaceous vegetation will be dominated by more than 50% desirable herbaceous wetland species no more than 50% of the area will be dominated by one species, and they will have no more than 15% cover of invasive, undesirable species	Y	
3.	Scrub-shrub areas will have no fewer than 3 species of desirable shrubs and will have a stem density of 100 stems or greater, and will have no more than 15% cover of undesirable invasive species	Y	
4.	Forested areas will have no fewer than 3 species of desirable shrubs and will have a stem density of 100 stems or greater, and will have no more than 15% cover of undesirable invasive species	Y	
5.	Upland (Oak Savannah) will have at least Oak and other desirable tree species with a stem density of at least 25 stems per acre and at least one desirable herbaceous species that covers 50% or more of the Upland area. There will be no more than 15% cover undesirable invasive species	Y	

Remedial work recommended

Yes No X

Deed Restriction or other protection instrument attached (note: if a filed deed restriction was required as a permit condition, please attach a copy):

Yes No X

Final Monitoring Report?

Yes No X

GIS Data Submitted?

Yes No X

Requesting release or partial release of bond?

Yes No X

* see report for detailed information

Marion Mitigation Bank 2016

1.0 Regulatory Background

This is the sixteenth monitoring report for the Marion Mitigation Bank Site located 1.5 miles northeast of the community of Marion in Marion County, T9S, R2W, Sec. 27. The original banking instrument was developed and approved in 2001.

The Marion Bank is 57.82 acres, and was built in three phases. The diversity of habitats restored include Emergent, Scrub/shrub-Forested, and Upland (Oak Savannah). Potential credits produced by phase are as follows:

Phase I:

5.65 acres enhanced wetland @2:1	2.82 credits
6.16 acres restored wetland @ 1:1	6.16 credits
3.30 acres created wetland @ 1.5:1	2.20 credits
<u>0.50 acres upland buffer @ 10:1</u>	<u>0.05 credits</u>
Total Credits Produced	11.18 credits

Phase II:

1.82 acres enhanced wetland @ 3:1	0.61 credits
15.16 acres created wetland @ 1.5:1	10.11 credits
<u>2.50 acres upland buffer @ 10:1</u>	<u>0.25 credits</u>
Total Credits Produced	10.72 credits

Phase III:

2.03 acres enhanced wetland @2:1	1.02 credits
10.34 acres restored wetland @ 1:1	10.34 credits
4.61 acres created wetland @ 1.5:1	3.07 credits
<u>0.50 acres upland buffer @ 10:1</u>	<u>0.05 credits</u>
Total Credits Produced	14.43 credits

2.0 Work summary

Goals in 2017 for the Marion Bank include

1. Finalize wetland delineation
2. Maintaining management access of site by mowing berms for vetch and other plants that may hinder access
3. Improve problem vegetation areas in phase III forested area
4. Establish greater abundance and finish plantings in all buffers and upland

3.0 As-Built Plan

As- Built Plans were submitted with original instrument in 2001. Additional description of regarding was submitted in construction completion report in 2008.

4.0 Hydrology Performance standards, Methodology, and Results

4.1 Performance Standards

Wetland hydrology sufficient to meet the criteria as defined in the 1987 Corps of Engineers Wetland Delineation Manual (1987 Wetland Delineation Manual), will be present in at least three out of five years if the weather records are close to normal and no irrigation is supplied. Water depth will be evaluated throughout the site at least once a month using a series of observation wells and vernal pool pond gauges. A final delineation was submitted in 2015.

4.2 Methodology

Ground water levels were measured in 17 deep observation wells (approximately 120" below ground surface), and 1 shallow well (approximately 36" below ground surface). These wells are located on map. In addition, 10 pond gauges are located throughout the site to measure vernal pool depths throughout the year. These measurements are taken monthly, and bi-monthly between March and May to demonstrate sufficient duration of wetness to meet the 1987 Wetland Delineation Manual.

4.3 Results

This criterion continues to meet the standard despite below average precipitation. In phase I, wells S1-S4, well 11, and all ponds have a water level within 12 inches of the surface for more than 15 days during the growing season. In Phase II, well 2, 14, 17, S8-S11 and all ponds have a water level within 12 inches of the surface for more than 15 days during the growing season. In Phase III, wells 5, 6, and all ponds have a water level within 12 inches of the surface or ponded for more than 15 days during the growing season.

5.0 Vegetation Performance Standards, Methodology, and Results

5.1 Performance Standards

- 1) Open water areas will have no more than 15% cover of undesirable invasive species
- 2) Areas of herbaceous vegetation will be dominated (more than 50% cover and more than 50% frequency of occurrence) by desirable herbaceous wetland species (FAC or wetter) and plant associations, the species richness will be at least 50% as great as that of the reference; no more than 50% of the area will be dominated by one species; and they will have no more than 15% cover of invasive, undesirable herbaceous species
- 3) Scrub-shrub areas will have no fewer than 3 species of desirable shrubs and will have a stem density of planted trees and shrubs (or volunteers of desirable species) of at least 100 stems per acre or at least 50% of the density at the reference (whichever is greater); and will have no more than 15% cover of invasive, undesirable herbaceous species
- 4) Forested areas will have no fewer than 3 species of desirable shrubs and will have a stem density of planted trees and shrubs (or volunteers of desirable species) of at least 100 stems per acre or at least 50% of the density at the reference (whichever is greater); and will have no more than 15% cover of invasive, undesirable herbaceous species
- 5) Upland (Oak Savannah) will have at least Oak and other desirable tree species (with a stem density of at least 25 stems per acre) and at least one desirable herbaceous species that covers 50% or more of the upland area. There will be no more than 15% cover of undesirable invasive species. These criteria will be used to demonstrate success after the required five years.

5.2 Methodology

The original approach and rationale for the sampling strategy used can be found in the 2001 report on vegetation monitoring at the MMB. Sampling was completed at the same locations as in 2015.

In 2016, sampling locations were re-assigned to habitat types as delineated on a 2015 map prepared by Geo Resources, LLC, based in part on air photo interpretation of vegetative cover at the site. On this map no distinction was made between Forested and Scrub-Shrub habitat types, which is appropriate given the woody species composition at this site. Mature woody vegetation height, and/or woody species composition, are typically used to discriminate between these two habitat types. Woody species composition in wetland areas at this site generally includes young, rapidly growing forest species, making it difficult to define, and differentiate between, these two habitat types. Most of the areas dominated by woody vegetation at this site could legitimately be described either as young deciduous forest habitat or as scrub-shrub habitat. The three mapped upland habitat types (Upland, Upland Berms, and Upland Buffer) were combined for the purposes of vegetation monitoring as the Oak Savannah/Upland habitat type. Sampling locations that fell on the lines between mapped habitat types were assigned to a habitat type based on several factors, including amount of woody species cover, presence and depth of standing water at sampling time, and composition of the herbaceous plant community at that location. There was some inherent subjectivity in assigning sampling plots to habitat types.

Due to woody plant growth and expansion at the site, many sampling locations that were previously open water now have substantial woody cover in addition to standing water and/or emergent/aquatic herbaceous plant species. Locations at the edges of open water with aquatic or emergent wetland species and with woody species canopy overhanging them could defensibly be assigned to either the Emergent or Forested/Scrub-Shrub habitat type. In general, sampling locations on mapped Emergent vs. Forested/Scrub-Shrub habitat boundaries with the greatest amount of woody species cover and the least amount of standing water were assigned to the Forested/Scrub-Shrub habitat type, although a minimum of 10 sampling locations were assigned in the Emergent habitat type. There were 10, 27, and 2 locations in the Emergent, Forested/Scrub-Shrub, and Oak Savannah/Upland habitat types, respectively.

In the results table, “emergent” and “woody” plots were those with standing water at sampling time and greater than 30% absolute cover of woody species, respectively. Using standing water as an indication of an emergent habitat type has some error associated with it because emergent plant species may be present even in the absence of standing water, and vice versa. It is important to note that nearly all the non-emergent plots (both woody and herbaceous) were dominated by wetland vegetation (i.e., FAC or better). It also must be noted that there are drawbacks to interpreting a habitat type based solely on the attributes observed in the one-square meter sampling plot. This small area can, for example, represent a non-woody gap in an otherwise forested or scrub-shrub habitat, or an isolated woody species in an otherwise herbaceous habitat, depending on the minimum mapping unit for the habitat delineation.

Species found in a one-square meter rectangular quadrat placed at each of the sampling locations were recorded and the cover of each was estimated as a percent of the quadrat area. Estimates of bare ground and other non-vegetated space were made at each quadrat, and estimates of overstory cover (canopy) were also included, if present.

To calculate the relative proportion of typical wetland species, those with an indicator status of FAC or better were considered to be typical wetland species. Species were assigned the indicator status for the Northwest region from the USFWS 1996 list. The most conservative National indicator status was used when the indicator status for the Northwest region was “NI” or blank. In determining proportions of cover for FAC and better species, the cover of those species was calculated as a percentage of the total cover.

Calculations were also made of the percentage of the total cover comprised of native taxa, and a Soil Moisture Index (SMI). The SMI was calculated by weighting the cover of individual species by their fidelity to wetland habitats (i.e. OBL = 1, FACW = 2, FAC = 3, FACU = 4, and UPL = 5). All species not on the USFWS 1996 list, taxa identified only to genus, and unknown taxa were assigned a value of 5 for calculating the SMI. The sum of the weighted cover values for all taxa in the plot was then divided by the total un-weighted cover of all taxa in the plot. SMI values for a plant community can range from 1.0 (all plants present are obligate wetland species) to 5.0 (all plants present are upland species), and a value of 3.0 is considered to be the break-point between wetlands and uplands.

Vegetation sampling data for the different habitat types is presented in the attached tables. The following sections summarize the dominant vegetation within each of the habitat types. Unlike the reports for years prior to 2005, the wetland types were not evaluated as a combined unit in later years. Each of the habitat types is evaluated a distinct unit.

5.3 Results

5.3.1 Phase I

This data summarizes vegetation assessment and monitoring conducted at Phase I of the Marion Mitigation Bank (MMB) site on May 22nd and 24th, 2016. The following table presents a summary of the 2016 vegetation sampling results for the wetland habitat types:

MMB Phase 1 Wetland Habitats:	Emergent	Forested/Scrub-Shrub
Percent FAC and better cover	100	91
Percent native cover	85	64
Invasive species cover	0.1	1.3
Soil Moisture Index (SMI)	1.56	2.07
Percent vegetated (under canopy)	67	72
Emergent herbaceous plots	3	0
Emergent woody plots	3	2
Non-emergent woody plots	0	10
Non-emergent herbaceous plots	4	15

Emergent Habitat Type

This habitat type was dominated by *Carex obnupta* (slough sedge), *Salix sitchensis* (Sitka willow), *Hordeum brachyantherum* (meadow barley), *Mentha pulegium* (pennyroyal), and *Populus balsamifera* ssp. *trichocarpa* (black cottonwood). FAC and better species made up 100% of the total cover. Native species accounted for 85% of the total cover, and the total cover of invasive species was 0.1%. The moisture index for this habitat type was 1.56, and 67% of the area under the canopy was vegetated.

Forested/Scrub-Shrub Habitat Type

This habitat type was dominated by *Salix sitchensis* (Sitka willow), *Agrostis stolonifera* (creeping bentgrass), *Carex obnupta* (slough sedge), *Deschampsia cespitosa* (tufted hairgrass), and *Fraxinus latifolia* (Oregon ash). FAC and better species made up 91% of the total cover. Native species accounted for 64% of the total cover, and the total cover of invasive species was 1.3%. The moisture index for this habitat type was 2.07, and 72% of the area under the canopy was vegetated.

In 2008, stem density survey was conducted in forested/ scrub shrub habitat. This survey demonstrated 554 stems per acre where shrub or tree strata exist. At least three desirable shrub/ tree species were recorded.

Oak Savannah/Upland Habitat Type

This habitat type was dominated by *Vicia pannonica* (Hungarian vetch), *Equisetum arvense* (common horsetail), *Holcus lanatus* (common velvetgrass), *Festuca rubra* (red fescue), and *Cirsium vulgare* (bull thistle). Native species accounted for 25% of the total cover in this area, the total cover of invasive species was 0%, and 99.5% of the area under the canopy was vegetated. A 2016 stem density survey demonstrated 160 stems per acre, with a total number of 13 species.

5.3.2 Phase II

These data summarizes vegetation assessment and monitoring conducted at Phase II of the Marion Mitigation Bank (MMB) site on May 21st and 22nd, 2016. The following table presents a summary of the 2016 vegetation sampling results for the wetland habitat types:

MMB Phase 2 Wetland Habitats:	Emergent	Forested/Scrub-Shrub
Percent FAC and better cover	100	99
Percent native cover	94	82
Invasive species cover	3.2	22.7
Soil Moisture Index (SMI)	1.44	2.02
Percent vegetated (under canopy)	60	69
Emergent herbaceous plots	6	1
Emergent woody plots	4	9
Non-emergent woody plots	0	5
Non-emergent herbaceous plots	0	0

Emergent Habitat Type

This habitat type was dominated by *Azolla filiculoides/mexicana* (mosquito-fern), *Salix lucida* ssp. *lasiandra* (Pacific willow), *Salix sitchensis* (Sitka willow), *Polygonum hydropiperoides* (waterpepper), and *Lemna minor* (duckweed). FAC and better species made up 100% of the total cover. Native species accounted for 94% of the total cover in this area, and the total cover of invasive species was 3.2%. The moisture index for this habitat type was 1.44, and 60% of the area under the canopy was vegetated.

Forested/Scrub-Shrub Habitat Type

This habitat type was dominated by *Salix sitchensis* (Sitka willow), *Phalaris arundinacea* (reed-canary grass), *Juncus effusus* (soft rush), *Salix lucida ssp. lasiandra* (Pacific willow), and *Salix hookeriana* (Hooker willow). FAC and better species made up 99% of the total cover. Native species accounted for 82% of the total cover in this area, and the total cover of invasive species was 22.7%. The moisture index for this habitat type was 2.02, and 69% of the area under the canopy was vegetated. Stem Density conducted in 2008 demonstrated 1,363 stems per acre where shrub or tree strata exist. At least three desirable shrub/ tree species were recorded.

Oak Savannah/Upland Habitat Type

This habitat type was dominated by *Holcus lanatus* (common velvetgrass), *Salix sitchensis* (Sitka willow), *Holcus mollis* (creeping velvetgrass), *Populus balsamifera ssp. trichocarpa* (black cottonwood), and *Salix lucida ssp. lasiandra* (Pacific willow). Native species accounted for 45% of the total cover in this area, the total cover of invasive species was 0.6%, and 72% of the area under the canopy was vegetated. Stem density conducted in 2016 demonstrated 146 stems per acre with a total number of species of 18.

4.3.3 Phase III

These data summarizes vegetation assessment and monitoring conducted at Phase III of the Marion Mitigation Bank (MMB) site on May 21st and 24th, 2016. The following table presents a summary of the 2016 vegetation sampling results for the wetland habitat types:

MMB Phase 3 Wetland Habitats:	Emergent	Forested/Scrub-Shrub
Percent FAC and better cover	100	84
Percent native cover	99	64
Invasive species cover	0.7	5.2
Soil Moisture Index (SMI)	1.11	2.26
Percent vegetated (under canopy)	81	74
Emergent herbaceous plots	13	2
Emergent woody plots	0	7
Non-emergent woody plots	0	0
Non-emergent herbaceous plots	0	5

Emergent Habitat Type

This habitat type was dominated by *Azolla filliculoides/mexicana* (mosquito-fern), *Wolffia borealis* (northern watermeal), *Eleocharis palustris* (common spikerush), *Ludwigia palustris* (marsh seedbox), and *Paspalum distichum* (knotgrass). FAC and better species made up 100% of the total cover. Native species accounted for 99% of the total cover in this area, and the total cover of invasive species was 0.7%. The moisture index for this habitat type was 1.11, and 81% of the area under the canopy was vegetated.

Forested/Scrub-Shrub Habitat Type

This habitat type was dominated by *Salix lucida* ssp. *lasiandra* (Pacific willow), *Azolla filliculoides/mexicana* (mosquito-fern), *Salix sitchensis* (Sitka willow), *Wolffia borealis* (northern watermeal), and *Alopecurus geniculatus* (water foxtail). FAC and better species made up 84% of the total cover. Native species accounted for 64% of the total cover in this area, and the total cover of invasive species was 5.2%. The moisture index for this habitat type was 2.26, and 74% of the area under the canopy was vegetated. Stem density conducted in 2012 demonstrated 18,237 stems per acre with at least three desirable shrub/ tree species.

Oak Savannah/Upland Habitat Type

This habitat type was dominated by *Vicia pannonica* (Hungarian vetch), *Agrostis capillaris/castellana* (colonial/dryland bentgrass), *Bromus hordeaceus* ssp. *hordeaceus* (soft brome), *Vicia villosa* (winter vetch), and *Bromus sitchensis* (Alaska brome). Native species accounted for 24% of the total cover in this area, the total cover of invasive species was 0.3%, and 93% of the area under the canopy was vegetated. A stem density conducted in 2016 demonstrated 45 stems per acre with a total number of 13 species.

***Stem Density**

In 2016, stem density survey was conducted in Oak savannah habitat for all three phases. Data for 2016 Stem density is attached. Allen Martin calculated total number of acreage of oak savannah habitat per phase. All woody species were counted for upland/ buffer areas.

6.0 Credit Sales

Journal of credit sales in appendix 3

Stem Density 2016**Upland (Oak Savannah)****Phase I**

Species:

Oregon Ash	Clustered Rose	Hawthorne	Sitka Willow	D. Spirea	Cascara	Oak	Ocean Spray	Nootka Rose	Snowberry	Red Alder
79	8	144	18	56	6	36	8	18	2	3

Total Stems = 382

Total number of Species=13

Acreage of upland= 2.39

Stems per acre= 160

Phase II

Species:

Oregon Ash	Nootka Rose	Hawthorne	Sitka Willow	D. Spirea	Cascara	Oak	Hooker willow	Red Willow	White Alder	Red Alder
32	10	85	55	8	9	9	16	4	230	5
Doug Fir	Poison Oak	Indian Plum	Oregon Grape	Cottonwood	Horse Chesnut					
5	10	12	57	2	1					

Total Stems= 575

Total number of species= 18

Acreage of Upland= 3.93

Stems per acre=146

Phase III

Species:

Oregon Ash	Nootka Rose	Hawthorne	Sitka Willow	D. Spirea	Dogwood	Oak	Snowberry	Mock Orange	Red Alder	Twinberry
41	30	109	3	45	7	34	5	3	19	1
Salmonberry	Cottonwood									
2	3									

Total Stems= 302

Total number of species= 13

Acreage of Upland= 6.68

Stems Per Acre= 45

Dogwood
4

Dogwood
25