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2012 MONITORING REPORT
for
MARION MITIGATION BANK
MARION, OR

(Phases I, II and III)

Submitted to:
Oregon Department of State Lands
U.S. Army Corps of Engineers

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January 31, 2013

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Performance Standard	Phase I	Phase II	Phase III	Met: Yes/No
Areas of herbaceous vegetation dominated by more than 50% cover of FAC or wetter vegetation	Yes (all habitats)	Yes (all habitats)	Yes (all habitats)	
Scrub-shrub and forested areas will have no fewer than 3 woody species and will have a stem density of at least 100 stems per acre	554 plants per acre (2008)	1363 plants per acre (2008)	18237 plants per acre (2012)	
No more than 15% cover of invasive, undesireable species	Yes	Yes	Yes	

Percent FAC and better	78	Forested	84	Forested		
	91	Scrub-shrub	95	Scrub-shrub		
	100	Emergent	99	Emergent	100	Emergent
Percent Native	55	Forested	60	Forested		
	59	Scrub-shrub	82	Scrub-shrub		
	70	Emergent	95	Emergent	87	Emergent

Marion Mitigation Bank Cover Sheet 2012

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2012 MONITORING REPORT
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This is the twelfth monitoring report for the Marion Mitigation Bank Site near Marion, OR. Construction of Phase I of the site restoration was completed in 2001, Phase II was completed in 2003, and Phase III was completed in October of 2008. Maureen Stellrecht and Richard Novitzki prepared this report and designed and participated in monitoring activities. Maureen Stellrecht conducted or supervised weed management and other site maintenance and the routine monitoring of pond, and ground water levels. Ground water levels were measured at least once per month and the depth of water in selected ponds was measured when ponding occurred. Michael Bollman conducted the vegetation monitoring in May and June. Reed canary grass was sprayed heavily in Sept. and Oct. 2012 by contract sprayers.

Phase I Phase II, and Phase III achieved and exceeded hydrology and vegetation performance standards in each habitat type. An aggressive weed management program, initiated in 2005 was continued through 2012. Reed canary grass was a primary focus of weed management efforts this year. Velvet grass, blackberry, scott's broom, Canadian thistle, and other non-natives were sprayed, pulled, or mowed, as appropriate.

Hydrology Monitoring

Ground water levels were measured in 17 observation wells (Figure 1) and data are presented in Table 1. Wells 1 through 9 have been measured since December 1999. Wells 10 through 13 have been measured since January 2003, and Wells 14 through 17 have been measured since January 2004. Shallow wells S1 through S7 have been measured since April 2003. Shallow wells S8 through S11 have been measured since March 2005. Data from the shallow well measurements taken throughout 2012 are presented in Table 2.

Wells 7-13 are located in Phase I and of these, wells 7, 9, 10, 11, 12, and 13 have a water level within 12 inches of the surface for more than 15 days during the growing season, thus meeting wetland hydrology criteria (they are highlighted in Table 1). Shallow wells S1-S7 are also within Phase I and wells S2, S3, and S4 also meet hydrology criteria (they are highlighted in Table 2). The areas represented by these wells are meeting wetland hydrology criteria. The boundary of the area meeting wetland hydrological criteria in Phase I (10.06 acres) as well as the remedial area of Phase I are shown on Figure 2.

Wells 1-3 and 14-17 are located in Phase II and of these, wells 2, 3, 14, 15, 16, and 17 have a water level within 12 inches of the surface for more than 15 days during the growing season, thus meeting wetland hydrology criteria (they are highlighted in Table 1). Shallow wells S8-S11 are also within Phase II and all four of these meet hydrology criteria (they are highlighted in Table 2). The boundary of the area meeting wetland hydrology criteria in Phase II (16.80 acres) is shown on Figure 3.

Need map that clearly labels wells referred to in text w/ Phases labeled!

?

Figure 1. Ariel photo of Marion Mitigation Bank, taken in 2012, showing preliminary wetland boundaries, vegetative monitoring plots, and observation well locations

	Observation Well Number																
Date	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**
1/14/12	42	5	15	21	12	+5	9	41	7	18	13	11	7	3	1	10	+4
2/15/12	33	2	8	14	11	+4	3	30	5	10	9	4	0	6	5	8	+4
3/16/12	26	+7	6	11	8	+7	+1	21	3	2	4	0	+1	+2	2	5	+4
4/16/12	37	6	11	16	9	+6	+1	30	2	8	2	0	+3	1	6	7	+4
5/15/12	38	8	12	22	11	+2	4	32	18	16	12	7	8	4	3	8	+4
6/4/12	41	10	14	20	10	+7	5	48	20	24	17	20	13	2	8	9	+4
6/15/12	44	12	17	20	12	+4	45	62	33	8	26	30	25	4	7	10	+4
7/15/12	50	13	22	17	9	18	43	56	28	27	22	23	24	7	9	15	2
8/14/12	51	16	31	26	23	31	74	77	52	47	48	32	52	13	19	20	4
9/15/12	62	18	36	38	40	35	79	80	64	49	53	46	57	19	22	31	5
10/15/12	41	17	30	35	28	30	68	60	52	47	50	43	46	17	19	15	8
10/31/12	26	10	15	19	13	+6	41	55	27	30	20	24	18	2	6	10	+4
11/15/12	38	6	12	12	8	+ 4	8	46	17	+ 5	41	18	11	1	9	10	+ 2
12/16/12	**35**	**5**	**9**	**14**	**8**	**+7**	**+3**	**28**	**1**	**6**	**5**	**0**	**+3**	**1**	**3**	**7**	**+6**

Table 1. Depth to water (in inches) below land surface in observation wells (figure 1).

	Shallow Well Number										
Date	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11
1/14/12	9	10	7	_	14	21	_	6	6	5	1
2/15/12	4	8	2	6	10	18	15	7	4	5	2
3/16/12	0	6	3	+3	+3	10	5	3	1	2	+1
4/16/12	0	7	+1	4	4	10	10	3	1	2	2
5/15/12	2	5	4	5	4	9	7	6	3	2	1
6/4/12	9	9	6	4	_	_	_	5	4	3	0
6/15/12	21	11	16	4	_	_	_	6	8	2	3
7/15/12	21	11	18	4	27	26	_	13	12	9	8
8/14/12	21	10	25	3	20	26	13	14	13	10	9
9/15/12	20	11	25	8	20	26	12	13	12	11	8
10/15/12	19	12	18	8	20	26	12	12	12	10	8
10/31/12	10	7	4	3	18	26	14	4	6	4	1
11/15/12	6	9	3	3	20	27	14	4	4	0	+ 2
12/16/12	0	5	4	2	3	11	4	3	1	3	0

Table 2. Depth to water (in inches) below land surface in shallow observation wells (figure 1).

Water levels have been measured in the reference pond (renumbered "2-1") since May 2000. The Phase I regrading created seven small depressions and water levels in 5 of the 7 resulting ponds have been recorded since July, 2001. The Phase II regrading created three major ponds. One pond includes the former reference pond and the staff gage at that location has been renumbered "2-1". A new staff gage was installed in in the larger pond to the west (2-2 on Figure 1) in December 2003. The completion of construction of phase III in 2008 created three new ponds (3-1, 3-2, 3-3). Water levels for these ponds has been collected since November 2008. The water level data are presented in Table 3.

	Pond Number									
Date	**1-1**	**1-2**	**1-3**	**1-4**	**1-5**	**2-1**	**2-2**	**3-1**	**3-2**	**3-3**
1/14/12	1.3	0.95	3.02	2.54	2.62	0.92	2.34	1.52	1.2	1.5
2/15/12	1.4	2.02	2.8	2.43	2.5	1.7	2.2	1.83	1.85	2.1
3/16/12	1.53	3.05	2.72	2.15	2.53	2.6	2.55	1.8	2.4	2.25
4/16/12	1.58	2.12	2.76	2.43	2.5	1.86	2.46	2.18	2.22	2.2
5/15/12	1.02	2.14	2.48	2.02	2.3	1.98	2.46	1.7	2.14	2.05
6/4/12	0.88	2	1.82	1.98	2.08	2.45	2.4	1.54	1.76	2.16
6/15/12	0.86	1.74	1	1.48	1.55	2.5	2.15	1.45	1.68	2
7/15/12	0.3	1.65	_	_	_	2.06	2.1	1.38	1.68	1.88
8/14/12	_	_	_	_	_	1.96	2.13	_	1.68	0.86
9/15/12	_	_	_	_	_	1.98	2.12	0.45	1.26	1
10/15/12	_	0.64	0.45	0.84	0.75	1.92	2.15	0.88	1.45	1.5
10/31/12	0.24	2	1.32	1.54	1.48	2.6	2.36	1.5	1.78	1.62
11/15/2012	0.98	2.12	2.02	2.02	1.94	2.64	2.8	0.72	1.84	2.18
12/16/2012	1.45	3	1.15	3.2	3.3	2.4	2.55	1.8	2.35	2.3

Table 3. Depth of Water (in feet) in ponds in 2012 at the Marion Bank. Ponds (Figure 1) are identified by two digits: the first refers to phase 1, 2, or 3; the second is the relative position west of Woodpecker Drive (1 is closest and 5 is furthest to the west).

Precipitation was above average for much of the year (Table 4). In response to this precipitation pattern, the ponds contained water until mid-July, later than usual. Ponds 2-1, 2-2, 3-2, and 3-3 contained water through out the year. The rest of the ponds began to refill in October and November. These data confirm the success of the hydrologic restoration. Hydrologic performance criteria (Novitzki 2001 a, page 16) require that "...in most years (i.e., 3 out of 5) ...emergent habitats shall be saturated or shallowly ponded for more than 60 days (i.e., end of April) into the growing season" (that begins March 1--Morlan, 1999). The ponded conditions observed in 2012 comfortably exceed performance standards.

Table 4. Monthly Precipitation in inches in 2009 at the National Weather Service Station in Salem, OR.

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
Observed	10.32	4.14	9.98	3.08	2.31	2.26	0.07	0.00	0.04	5.94	8.92	7.40	54.56
Normal	5.96	4.56	3.99	2.81	2.22	1.55	0.46	0.45	1.28	3.03	6.50	6.86	39.67

(Based on 1981-2010 period)

Vegetation Monitoring - Phase I

The plant community observed in 2012 is indicative of the continued transition from grass seed production to restored wetland. The boundaries of the habitat types were revised in October 2005 as suggested by the MBRT to better reflect the as-built conditions achieved in Phase I (Figure 2). Sample plot locations have been marked with a permanent identification tag as well as located with GPS and documented for future management of the site. This will allow the IRT to locate and identify each sample plot during the annual field inspection. The plant species in each habitat type are presented in Appendix 1. The percentage of FAC or wetter cover in each habitat type was: Emergent - 100%; Scrub-shrub - 91%; and Forested - 78%. The percentage native cover in each habitat type was: 70% Emergent, 59% Scrub-shrub, and 55% forested. The dominant plant species in Phase I were: Slough sedge (*Juncus obnupta*), jointed rush (*Juncus articulates*), marsh seedbox (*Ludwiga palustris*), common spike rush (*Eliocharis palustris*), Sitka willow (*Salix sitchensis*), and Tufted hairgrass (*Deschampsia cespitosa*).

The plant community in the emergent habitat remained excellent. The plant community in both the scrub-shrub and forested habitats improved significantly since 2010, apparently responding to wetness that persisted throughout much of the year as well as continued management of blackberry and other undesirable species. The herbaceous community in the scrub shrub habitat has improved significantly due to the increase in woody vegetation. A stem density count was initiated in 2008 and will continue to be done every 5 years in order to better document this change in density (Table 5).

Percentage of Plant Community FAC or wetter in Phase I

Habitat	New	2004	2005	2006	2007	2008	2009	2010	2011	2012
Emergent		54	93	91	88	98	91	100	99	100
Scrub/shrub		48	68	80	84	90	85	90	97	91
Forested		27	49	57	58	72	75	63	77	78

We discussed with the MBRT the failure of the extreme southeast corner of Phase I to achieve performance standards. Through the course of several meetings, including two on-site inspections, we developed a remedial design that was completed in summer/ fall of 2009.

After excavation was completed in August 2009, we distributed a layer of wood compost. In October 2009, the area was seeded with a mix of slough grass, toad rush, and meadow barley. Already we have seen growth of many of the desirable grasses which were planted. In 2011, we planted a mix of spirea, alders, willows, and nootka rose, for a total of 1,000 trees and shrubs. We plan to make a survival count of these in 2013 and plant additional trees if needed.

Vegetation Monitoring - Phase II

The plant communities observed in each habitat in 2012 represents a dramatic change from grass seed production to wetland. The boundaries of the habitat types were revised in October 2005 as suggested by the MBRT to better reflect the as-built conditions achieved in Phase II (Figure 3). In 2012 the percentage of FAC or better cover in each habitat type was: Emergent - 99%; Scrub-shrub - 95%; and Forested - 84%. The percentage native cover in each habitat type was: 95% Emergent, 82% Scrub-shrub, and 60% forested. Many desirable species are well established including soft rush (*Juncus effuses*), mexican mosquito-fern (*Azolla Mexicana*), common spike rush (*Eleocharis palustris*), marsh seed box (*Ludwigia palustris*), and spotted lady's thumb (*Polygonum persicaria*).

Percentage of Plant Community FAC or wetter in Phase II

Habitat	New 2004	2005	2006	2007	2008	2009	2010	2011	2012
Emergent	83	70	88	90	96	98	99	100	99
Scrub/shrub	66	70	66	67	79	87	94	92	95
Forested	61	53	83	80	78	99	75	77	84

Vegetation Monitoring- Phase III

Vegetation sampling in Phase III began in 2010. The majority of this phase (other than the hill upland) is emergent with open water. As a preliminary result of the 2012 delineation of phase III, habitat boundaries between upland and wetland were modified. For 2012, we will consider all wetland sampling stations as emergent, including most of the previous scrub-shrub sample plots. No forested plots were sampled at this time. The FAC and wetter species made up 100% of the emergent cover. The native cover made up 87% of the emergent habitat. The emergent habitat was dominated by soft rush (*Juncus effuses*), mexican mosquito-fern (*Azolla Mexicana*), common spike rush (*Eleocharis palustris*), and duckweed (*Lema Minor*). Also in 2012, a woody species density survey was conducted in Phase III. Seven sample plots were surveyed for an average of 18,237 stems per acre- far exceeding the goal of 100 stems per acre. Results of this survey are displayed in Table 5.

Percentage of Plant Community FAC or wetter in Phase III

Habitat	New 2010	2011	2012
Emergent	100%	100%	100%

Summary

Emergent habitats (ponds) at the Marion Mitigation Bank site contained water through July. This meets (and exceeds) hydrologic performance criteria (Novitzki 2001 a, page 16) that "...in most years (i.e. 3 out of 5) ... emergent habitats shall be saturated or shallowly ponded for more than 60 days (i.e. end of April) into the growing season". Scrub-shrub and forested habitats also meet hydrologic criteria, exhibited by ground water levels within 12 inches of the surface for more than 15 days during the growing season. Ground water levels at the site fluctuated much like previous years.

In the Phase I restoration the emergent habitat plant community is 100% FAC or wetter, the scrub-shrub habitat is 91%, and forested habitat is 78%. We regraded an area in the southeast corner of Phase I to assure wetland hydrology as specified in the Banking Instrument as discussed with the MBRT.

In the Phase II restoration the emergent habitat is 99% FAC or wetter, the scrub-shrub habitat is 95%, and the forested habitat is 84%.

In the Phase III restoration, the emergent habitat is 100% FAC or wetter. Percent Native in the emergent habitat is 87%.

We initiated an aggressive weed management plan in 2005 to focus on reed canary grass, velvet grass, Himalayan blackberry, oxeye daisy and other non-natives. This has greatly increased FAC or wetter values shown in all 3 phases of the bank. We will continue to spray, cut, or pull non-natives until the native plant community is well established and less vulnerable to invasion by exotics. We have completed Phase III and regraded a small part of Phase I and Phase II to assure that we achieve wetland hydrology. We have introduced a stem density survey, which we will continue to conduct every five years, to more accurately document the maturation of the site. We will continue to strive to exceed the performance standards established with the MBRT in the banking instrument in 2001.

The completion of construction of phase III along with the regarding of some portions of phases I and II will give us the opportunity to continue with successful remediation of this site.

2008

Phase 1

Sample Location	Alder	Ash	Cottonwood	Dogwood	Hawthorn	Spirea	Twinberry	Willow_1	Willow_2	Willow_3	Total
F-009	9	16	0	1	13	16	0	10	2	2	58
F-033	3	0	2	0	3	9	0	11	8	2	33
F-097	0	0	1	0	0	5	0	3	4	4	13
F-109	0	33	0	0	0	10	0	0	1	0	44
F-205	0	34	0	0	0	9	0	0	2	1	45
S-020	0	5	21	0	0	12	0	8	3	0	49
S-040	0	0	14	0	0	10	0	8	2	0	34
S-056	0	0	2	0	0	23	0	0	1	1	26
S-116	0	18	5	0	0	8	0	40	5	0	76
S-119	0	38	0	0	0	12	0	1	1	0	52
total:	12	144	45	1	16	114	0	81	29	10	430
plants per hectare:	38	458	143	3	51	363	0	258	92	32	1369
plants per acre:	15	185	58	1	21	147	0	104	37	13	554

Phase 2

Sample Location	Alder	Ash	Cottonwood	Dogwood	Elderberry	Spirea	Twinberry	Willow_1	Willow_2	Willow_3	Total
F-083	0	47	6	0	0	4	1	12	8	0	78
F-076	0	22	7	0	0	7	0	7	6	0	49
F-090	4	39	4	3	0	6	0	14	50	0	116
S-022	0	10	5	1	0	4	0	5	8	0	33
S-036	0	0	1	0	0	5	0	5	4	3	15
S-227	162	0	0	0	0	0	0	0	6	1	6
S-195	217	4	2	0	0	0	0	0	2	0	8
F-103	3	4	28	0	0	13	0	36	258	1	339
S-073	0	0	15	0	0	4	0	10	362	12	391
E-112	16	1	0	0	3	0	0	19	0	0	23
total:	402	127	68	4	3	43	1	108	704	17	1058
plants per hectare:	1280	404	216	13	10	137	3	344	2241	54	3368
plants per acre:	518	164	88	5	4	55	1	139	907	22	1363

Phase III			Stem Density Count			Fall 2012
Sample Location	Black Cottonwood	Willow1	Willow2	Willow3	Total	Stems/ Acre
e51	4	48	311	0	367	22655
e52	12	60	572	10	654	40371
e138	2	104	248	28	382	23581
e269	0	7	0	0	7	432
e315	0	79	35	18	132	8148
e327	0	0	90	55	125	7716
s28	19	28	354	0	401	24754
				average		18237

Table 5. Woody Species Density for MMB Phase I, II, and III

NO CREDIT SALES---2012

References

Morlan, Janet, Oregon Division of State Lands, personal communication, 1999.

Novitzki, R.P., 2001 a. Wetland Mitigation Banking Instrument for the Marion Mitigation Bank, Marion, OR, 2001. Unpublished report submitted to the Oregon Division of State Lands, Salem, OR, 93701-1279.

Novitzki, R. P., 2001 b. Construction Completion Report for Phase I the Marion Mitigation Bank, Marion, OR. Unpublished report submitted to Oregon Division of State Lands, Salem OR, 93701-1279.

Novitzki, R. P., 2002. 2001 monitoring report for Marion Mitigation Bank, Marion, OR. Unpublished report submitted to Oregon Division of State Lands, Salem OR, 93701.

Novitzki, R. P., 2003. 2002 monitoring report for Marion Mitigation Bank, Marion, OR. Unpublished report submitted to Oregon Division of State Lands, Salem OR, 93701.

Novitzki, R. P., 2004. 2003 monitoring report for Marion Mitigation Bank, Marion, OR. Unpublished report submitted to Oregon Department of State Lands, Salem OR, 93701.

Novitzki, R. P., 2004b. Construction completion report for Phase II of the Marion Mitigation Bank, Marion, OR. Unpublished report submitted to Oregon Department of State Lands, Salem OR, 93701.

Novitzki, R. P., 2005. 2004 monitoring report for Marion Mitigation Bank, Marion, OR. Unpublished report submitted to Oregon Department of State Lands, Salem OR, 93701-1279.

Novitzki, R. P., 2006. 2005 monitoring report for Marion Mitigation Bank, Marion, OR. Unpublished report submitted to Oregon Department of State Lands, Salem OR, 93701-1279.

Novitzki, R. P., 2007. 2006 monitoring report for Marion Mitigation Bank, Marion, OR. Unpublished report submitted to Oregon Department of State Lands, Salem OR, 93701-1279.

Novitzki, R. P., 2008. 2007 monitoring report for Marion Mitigation Bank, Marion, OR. Unpublished report submitted to Oregon Department of State Lands, Salem OR, 93701-1279.

Novitzki, R. P., 2009. 2008 monitoring report for Marion Mitigation Bank, Marion, OR. Unpublished report submitted to Oregon Department of State Lands, Salem OR, 93701-1279.

Novitzki, R. P., 2010. 2009 monitoring report for Marion Mitigation Bank, Marion, OR. Unpublished report submitted to Oregon Department of State Lands, Salem OR, 93701-1279.

Novitzki, R. P., 2011. 2010 monitoring report for Marion Mitigation Bank, Marion, OR. Unpublished report submitted to Oregon Department of State Lands, Salem OR, 93701-1279.

Novitzki, R. P., 2012. 2011 monitoring report for Marion Mitigation Bank, Marion, OR. Unpublished report submitted to Oregon Department of State Lands, Salem OR, 93701-1279.

Marion Mitigation Bank Phase I Vegetation Monitoring - 2012

Introduction, Summary, and Methods

This report summarizes vegetation assessment and monitoring conducted at Phase I of the Marion Mitigation Bank (MMB) site on May 29th and 30th, and June 6th, 2012. The following table presents a summary of the 2012 vegetation sampling results:

MMB Phase 1 Habitats	Emergent	Scrub/Shrub	Forested
Percent FAC and better cover	100	91	78
Percent native cover	70	59	55
Percent non-vegetated (under canopy)	34	20	25

The 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 2011. There were 10, 13, and 12 locations in the Emergent, Scrub/Shrub, and Forested habitat types, respectively. 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. 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 which included: 1) the percentage of the total cover comprised of native taxa, and 2) 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 in the Habitat Types in the Phase I Restoration Unit at the MMB

Vegetation sampling data for the different habitat types is 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 three wetland types were not evaluated as a combined unit in later years. Each of the habitat types is evaluated only as a distinct unit.

Emergent Habitat Type

This habitat type was dominated by *Carex obnupta* (slough sedge), *Agrostis stolonifera* (creeping bentgrass), *Salix sitchensis* (Sitka willow), *Mentha pulegium* (pennyroyal), *Polygonum hydropiperoides* (waterpepper), *Eleocharis palustris* (common spike-rush), and *Populus balsamifera* ssp. *trichocarpa* (black cottonwood). FAC and better species made up 100% of the total cover. Native species accounted for about 70% of the total cover in this area. The moisture index for this habitat type was 1.52, and 34% of the area was not vegetated.

Scrub/Shrub Habitat Type

This habitat type was dominated by *Salix sitchensis* (Sitka willow), *Agrostis stolonifera* (creeping bentgrass), *Carex obnupta* (slough sedge), *Eleocharis acicularis* (needle spike-rush), *Mentha pulegium* (pennyroyal), *Spiraea douglasii* (Douglas' spiraea), and *Poa compressa* (Canada bluegrass). FAC and better species made up 91% of the total cover. Native species accounted for about 59% of the total cover in this area. The moisture index for this habitat type was 1.86, and 20% of the area was not vegetated.

Forested Habitat Type

This habitat type was dominated by *Deschampsia cespitosa* (tufted hairgrass), *Salix sitchensis* (Sitka willow), *Equisetum arvense* (common horsetail), *Agrostis castellana/capillaris* (dryland/colonial bentgrass), *Holcus lanatus* (common velvetgrass), and *Fraxinus latifolia* (Oregon ash). FAC and better species made up 78% of the total cover. Native species accounted for about 55% of the total cover in this area. The moisture index for this habitat type was 2.63, and 25% of the area was not vegetated.

Marion Mitigation Bank Plant Monitoring, 2012 Phase 1

		Percent FAC and better									Percent native								
Habitat	Station	2005	2006	2007	2008	2009	2010	2011	2012	2013	2005	2006	2007	2008	2009	2010	2011	2012	2013
E	E-003	86	100	100	100	100	100	100	100		85	89	56	80	95	55	71	100	
E	E-053	80	60	100	100	100	100	100	100		64	84	98	99	98	99	99	99	
E	E-066	99	100	100	100	100	100	100	100		43	48	50	56	29	52	35	50	
E	E-079	100	100	99	99	100	100	100	100		32	47	86	97	94	97	94	97	
E	E-080	100	100	96	99	100	99	100	100		39	60	78	82	72	69	55	92	
E	EN-008	M	100	58	100	100	100	100	100		M	82	31	76	61	41	40	64	
E	EN-052	M	100	68	100	100	100	100	100		M	98	64	83	69	58	54	66	
E	EN-070	M	82	99	90	36	99	90	97		M	48	90	68	27	14	27	66	
E	EN-076	M	87	100	100	R	100	100	100		M	48	95	23	R	8	2	1	
E	S-116	100	87	56	100	100	100	100	100		94	12	36	77	40	76	30	29	
F	E-082	M	90	86	91	98	93	99	100		M	63	57	72	68	73	82	74	
F	F-033	87	95	81	97	99	100	100	100		12	75	72	95	97	98	99	100	
F	F-034	81	87	93	100	98	98	100	99		42	91	90	98	98	98	100	100	
F	F-071	33	44	18	54	S	35	59	73		1	1	0	1	S	0	3	2	
F	F-096	53	50	67	55	63	59	91	97		14	26	28	29	43	55	86	94	
F	F-097	76	73	72	84	74	84	98	100		44	57	50	61	68	73	78	91	
F	F-103	38	59	62	95	R	22	38	16		1	1	0	0	R	2	1	0	
F	F-144	9	16	40	21	R	31	40	42		3	1	1	3	R	2	0	0	
F	F-149	77	65	63	61	R	45	81	87		42	62	11	54	R	50	74	82	
F	F-205	47	58	56	74	57	76	69	61		6	7	7	10	11	17	27	34	
F	S-056	13	69	68	88	72	84	95	97		0	18	29	27	31	62	61	66	
F	S-119	77	42	46	65	50	78	85	89		11	15	5	8	7	8	16	46	
S	E-035	26*	82	94	97	75	79	89	97		4	17	70	12	29	11	30	57	
S	E-052	100	98	100	100	89	100	100	100		61	22	83	73	81	79	85	94	
S	E-086	100	100	99	100	100	100	100	100		56	66	72	48	53	71	75	85	
S	E-109	100	86	99	99	90	93	99	100		33	16	39	43	52	37	31	44	
S	E-123	71	96	70	97	93	81	98	100		60	57	36	20	21	17	3	11	
S	F-009	***21***	***39***	95	95	97	99	98	67		3	14	39	47	53	48	49	52	
S	S-011	45	27	12	17	7	41	76	42		10	2	4	0	3	2	9	34	
S	S-020	80	90	99	100	100	100	100	100		88	47	81	65	83	31	48	65	
S	S-021	100	99	92	97	99	100	100	100		28	43	59	46	31	48	45	60	
S	S-040	100	98	99	100	100	100	100	100		42	42	81	59	50	53	48	63	
S	S-046	84	94	100	100	100	100	100	100		65	41	80	83	94	92	87	98	
S	S-058	68	97	89	100	100	100	100	100		59	20	78	34	76	51	24	63	
S	S-155	M	99	87	96	98	90	98	100		M	66	57	41	67	15	6	16	
	Means:	71	79	79	88	86	85	91	90		36	42	52	51	57	48	48	60	possible error

*location error? M = missing data R = remediated S = sprayed

difference in part due to Salix sp. (NOL) vs. S. sitchensis (FACW)

(μ = 49.75%)

Trending upward native.

Marion Mitigation Bank Plant Monitoring, 2012 Phase 1

Emergent Habitat Type

Cover (%)

						Sample Station											
Species	**Common Name**	**Native**	**Indicator**	**MTI**	**Wet**	**E-003**	**E-053**	**E-066**	**E-079**	**E-080**	**EN-008**	**EN-052**	**EN-070**	**EN-076**	**S-116**	**Mean**	**MTI_m**
Agrostis stolonifera	creeping bentgrass		FACW	2	y					5	22		2	85		11.4	22.8
Alisma gramineum	narrowleaf water plantain	yes	OBL	1	y	1										0.1	0.1
Alopecurus geniculatus	water foxtail		OBL	1	y			1		1						0.2	0.2
Bidens frondosa	leafy beggar's-tick	yes	FACW+	2	y								2			0.2	0.4
Brassica rapa	field [common] [birdsrape] mustard		NOL	5	u								2			0.2	1.0
Carex obnupta	slough sedge	yes	OBL	1	y		60		55	45		23				18.3	18.3
Eleocharis acicularis	needle spike-rush	yes	OBL	1	y										3	0.3	0.3
Eleocharis palustris	common [creeping] spike-rush	yes	OBL	1	y	1		15	1	2	2	15			20	5.6	5.6
Fraxinus latifolia	Oregon ash	yes	FACW	2	y								45			4.5	9.0
Gratiola ebracteata	bractless hedgehyssop	yes	OBL	1	y										1	0.1	0.1
Juncus articulatus	jointed rush	yes	OBL	1	y			3	2	3	2	12				2.2	2.2
Juncus effusus	soft rush	yes	FACW	2	y						10			1		1.1	2.2
Ludwigia palustris	marsh seedbox	yes	OBL	1	y	5	2	1	2		2	13				2.5	2.5
Lythrum hyssopifolia	hyssop loosestrife		OBL	1	y										3	0.3	0.3
Lythrum portula	spatulaleaf loosestrife		OBL	1	y							1	20		10	3.1	3.1
Mentha pulegium	pennyroyal		OBL	1	y		1	18	2	4	5	20			47	9.7	9.7
Phalaris arundinacea	reed-canary grass	invasive	FACW	2	y							12	1	3		1.6	3.2
Plagiobothrys scouleri	Scouler's popcornflower	yes	FACW	2	y								1			0.1	0.2
Polygonum hydropiperoides	waterpepper	yes	OBL	1	y	60					3					6.3	6.3
Populus balsamifera ssp. trichocarpa	black cottonwood	yes	FAC	3	y					50	5					5.5	16.5
Salix hookeriana	Hooker willow	yes	FACW	2	y						25					2.5	5.0
Salix lucida ssp. lasiandra	Pacific [red] willow	yes	FACW+	2	y					18						1.8	3.6
Salix sitchensis	Sitka willow	yes	FACW	2	y		95		10							10.5	21.0
Spiraea douglasii	Douglas' spiraea	yes	FACW	2	y		10									1.0	2.0
bare (soil, mud, rock)	DOES NOT INCLUDE CANOPY, IF ANY					5	1	0	0	0			65		5	7.6	
algae, moss, duff, dead vegetation, etc. (incl. sprayed veg.)	"					30	2	65	35	40	25	25	10	15	20	26.7	34.3
standing water (inches)						24	8	12	6	1	1	10			2		
			Total cover:			67	168	38	72	128	76	96	73	89	84	89	136
			FAC and better cover:			67	168	38	72	128	76	96	71	89	84	89	
P.S. "desirable	wetland spp" >50%		Native cover:			67	167	19	70	118	49	63	48	1	24	63	
			Percent FAC and better of total:			100	100	100	100	100	100	100	97	100	100	100	
			Percent native of total:			100	99	50	97	92	64	66	66	1	29	70	66
													Soil Moisture Index:			1.52	

Marion Mitigation Bank Plant Monitoring, 2012 Phase 1																			
Scrub-Shrub Habitat Type																			
Cover (%)																			
						Sample Station													
Species	**Common Name**	**Native**	**Indicator**	**MTI**	**Wet**	**E-035**	**E-052**	**E-086**	**E-109**	**E-123**	**F-009**	**S-011**	**S-020**	**S-021**	**S-040**	**S-046**	**S-058**	**S-155**	**Mean**
Agrostis castellana/capillaris	dryland/colonial bentgrass		FAC	3	y						15	10							1.9
Agrostis stolonifera	creeping bentgrass		FACW	2	y				60	62			12	4	18			30	14.3
Alisma gramineum	narrowleaf water plantain	yes	OBL	1	y													1	0.1
Alopecurus geniculatus	water foxtail		OBL	1	y	3											15	10	2.2
Beckmannia syzigachne	American slough grass	yes	OBL	1	y								27				5	3	2.7
Callitriche sp.	water starwort	NA	OBL	1	y								25	1					2.0
Carex feta	green-sheathed sedge	yes	FACW	2	y					8				10					1.4
Carex obnupta	slough sedge	yes	OBL	1	y	18	50	75											11.0
Deschampsia cespitosa	tufted hairgrass	yes	FACW	2	y	1						10					30		3.2
Eleocharis acicularis	needle spike-rush	yes	OBL	1	y	25									28	80	2		10.4
Eleocharis palustris	common [creeping] spike-rush	yes	OBL	1	y	5	2	1	18				1	1		1		10	3.0
Epilobium ciliatum	fringed willowherb	yes	FACW-	2	y							1							0.1
Fraxinus latifolia	Oregon ash	yes	FACW	2	y				50		1								3.9
Galium aparine	catchweed bedstraw/ cleavers	yes	FACU	4							1								0.1
Geranium carolinianum	Carolina geranium	yes	NOL	5	u							1							0.1
Gratiola ebracteata	bractless hedgehyssop	yes	OBL	1	y										4				0.3
Holcus lanatus	common velvetgrass		FAC	3	y						15								1.2
Holcus mollis	creeping velvetgrass		FACU	4							55								4.2
Hordeum brachyantherum	meadow barley	yes	FACW-	2	y							28							2.2
Hypochaeris radicata	hairy cat's ear		FACU	4		3						1							0.3
Juncus articulatus	jointed rush	yes	OBL	1	y	2													0.2
Juncus effusus	soft rush	yes	FACW	2	y									1					0.1
Lolium arundinacea	tall fescue		FAC-	3							5								0.4
Lotus corniculatus	birdsfoot trefoil		FAC	3	y					2									0.2
Ludwigia palustris	marsh seedbox	yes	OBL	1	y		1												0.1
Lythrum portula	spatulaleaf loosestrife		OBL	1	y	8			6								7		1.6
Mentha pulegium	pennyroyal		OBL	1	y	25	6	22	15	2			1	3	10	3	1	33	9.3
Phalaris arundinacea	reed-canary grass	invasive	FACW	2	y								4	60					4.9
Plagiobothrys scouleri	Scouler's popcornflower	yes	FACW	2	y												1		0.1
Plantago major	broadleaf plantain		FAC	3	y				5										0.4
Poa compressa	Canada bluegrass		FACU+	4								65							5.0
Polygonum hydropiperoides	waterpepper	yes	OBL	1	y								5						0.4
Populus balsamifera ssp. trichocarpa	black cottonwood	yes	FAC	3	y		22									18			3.1
Salix lucida ssp. lasiandra	Pacific [red] willow	yes	FACW+	2	y		20												1.5
Salix sitchensis	Sitka willow	yes	FACW	2	y			35			98			50		27			16.2
Spiraea douglasii	Douglas' spiraea	yes	FACW	2	y			10					45	40	15				8.5
Veronica peregrina ssp. xalapense	hairy purslane speedwell	yes	OBL	1	y												1		0.1

Marion Mitigation Bank Plant Monitoring, 2012 Phase 1																			
Scrub-Shrub Habitat Type																			
Cover (%)																			
						Sample Station													
Species	**Common Name**	**Native**	**Indicator**	**MTI**	**Wet**	**E-035**	**E-052**	**E-086**	**E-109**	**E-123**	**F-009**	**S-011**	**S-020**	**S-021**	**S-040**	**S-046**	**S-058**	**S-155**	**Mean**
Vicia hirsuta	tiny vetch		NOL	5	u							1							0.1
Vicia sativa	common vetch		UPL	5							2								0.2
bare (soil, mud, rock)	DOES NOT INCLUDE CANOPY, IF ANY					15	2	1	2	1		1		3	15	5			3.5
algae, moss, duff, dead vegetation, etc. (incl. sprayed veg.)	"					10	40	4	18	35		4	15	12	7	10	40	18	16.4
standing water (inches)							8	10					4		1	8			
			Total cover:			90	101	143	154	74	192	117	120	170	75	129	62	87	116
			FAC and better cover:			87	101	143	154	74	129	49	120	170	75	129	62	87	106
			Native cover:			51	95	121	68	8	100	40	78	102	47	126	39	14	68
			Percent FAC and better of total:			97	100	100	100	100	67	42	100	100	100	100	100	100	91
			Percent native of total:			57	94	85	44	11	52	34	65	60	63	98	63	16	59
																Soil Moisture Index:			1.86

Marion Mitigation Bank Plant Monitoring, 2012 Phase 1																			
Forested Habitat Type																			
Cover (%)																			
									Sample Station										
Species	**Common Name**	**Native**	**Indicator**	**MTI**	**Wet**	**E-082**	**F-033**	**F-034**	**F-071**	**F-096**	**F-097**	**F-103**	**F-144**	**F-149**	**F-205**	**S-056**	**S-119**	**Mean**	**MTI_m**
Agrostis	dryland/colonial bentgrass		FAC	3	y				3			15	45		25		3	7.6	22.8
Agrostis stolonifera	creeping bentgrass		FACW	2	y	12											28	3.3	6.7
Aira caryophyllea	silver hairgrass		FACU	4									2					0.2	0.7
Bidens frondosa	leafy beggar's-tick	yes	FACW+	2	y	1											2	0.3	0.5
Bromus catharticus	rescuegrass		NOL	5	u									7				0.6	2.9
Bromus hordeaceus ssp. hordeaceus	soft brome		FACU	4								15	10	3				2.3	9.3
Carex feta	green-sheathed sedge	yes	FACW	2	y			2										0.2	0.3
Carex leptopoda	Dewey's sedge	yes	FAC	3	y		5	1										0.5	1.5
Carex obnupta	slough sedge	yes	OBL	1	y						35							2.9	2.9
Carex sp.	sedge	yes	---	5	u			1										0.1	0.4
Centaurium erythraea	European centaury		FAC	3	y								8					0.7	2.0
Cornus sericea	redosier dogwood	yes	FACW	2	y			1										0.1	0.2
Daucus carota	wild carrot/ Queen Anne's		NOL	5	u				2				6					0.7	3.3
Deschampsia cespitosa	tufted hairgrass	yes	FACW	2	y	65	8	1		60	32					50		18.0	36.0
Epilobium ciliatum	fringed willowherb	yes	FACW-	2	y			1										0.1	0.2
Equisetum arvense	common [field] horsetail	yes	FAC	3	y				2					95				8.1	24.3
Festuca rubra	red fescue		FAC+	3	y				28									2.3	7.0
Fraxinus latifolia	Oregon ash	yes	FACW	2	y										20		40	5.0	10.0
Galium aparine	catchweed bedstraw/	yes	FACU	4										3				0.3	1.0
Geranium carolinianum	Carolina geranium	yes	NOL	5	u									1				0.1	0.4
Holcus lanatus	common velvetgrass		FAC	3	y				58			3	1	10	1			6.1	18.3
Holcus mollis	creeping velvetgrass		FACU	4								2						0.2	0.7
Hordeum brachyantherum	meadow barley	yes	FACW-	2	y					1	1							0.2	0.3
Hypochaeris radicata	hairy cat's ear		FACU	4						1			1		2	1	8	1.1	4.3
Juncus articulatus	jointed rush	yes	OBL	1	y			5			11							1.3	1.3
Juncus bufonius	toad rush	yes	FACW	2	y											1		0.1	0.2
Juncus effusus	soft rush	yes	FACW	2	y	10	8	12			1							2.6	5.2
Juncus ensifolius	dagger-leaf rush	yes	FACW	2	y	1												0.1	0.2
Juncus patens	spreading rush	yes	FACW	2	y			27							8			2.9	5.8
Juncus tenuis	slender rush	yes	FACW-	2	y	1		3							5			0.8	1.5
Leucanthemum vulgare	oxeye daisy		UPL	5								4						0.3	1.7
Lolium arundinacea	tall fescue		FAC-	3					13	1		7			35			4.7	14.0
Lotus corniculatus	birdsfoot trefoil		FAC	3	y						1							0.1	0.3
Lotus unifoliolatus var. unifoliolatus	Spanish clover	yes	UPL	5												1	3	0.3	1.7
Lythrum portula	spatulaleaf loosestrife		OBL	1	y											1		0.1	0.1
Mentha pulegium	pennyroyal		OBL	1	y					1	2					25	3	2.6	2.6
Parentucellia viscosa	parentucellia		FAC-	3									5					0.4	1.3
Phalaris arundinacea	reed-canary grass	invasive	FACW	2	y	15				1	5						10	2.6	5.2
Poa compressa	Canada bluegrass		FACU+	4								40						3.3	13.3

Marion Mitigation Bank Plant Monitoring, 2012 Phase 1																			
Forested Habitat Type																			
Cover (%)																			
						Sample Station													
Species	**Common Name**	**Native**	**Indicator**	**MTI**	**Wet**	**E-082**	**F-033**	**F-034**	**F-071**	**F-096**	**F-097**	**F-103**	**F-144**	**F-149**	**F-205**	**S-056**	**S-119**	**Mean**	**MTI_m**
Rumex acetosella	sheep [red] sorrel		FACU+	4								1						0.1	0.3
Salix lucida ssp. lasiandra	Pacific [red] willow	yes	FACW+	2	y			50										4.2	8.3
Salix sitchensis	Sitka willow	yes	FACW	2	y		95	25										10.0	20.0
Senecio jacobaea	tansy ragwort	invasive	FACU	4											1			0.1	0.3
Spiraea douglasii	Douglas' spiraea	yes	FACW	2	y		7											0.6	1.2
Trifolium repens	white clover		FAC-	3								10						0.8	2.5
Typha latifolia	cattail	yes	OBL	1	y		1	3										0.3	0.3
Vicia hirsuta	tiny vetch		NOL	5	u								25					2.1	10.4
Vicia pannonica	Hungarian vetch		NOL	5	u				10			18	5					2.8	13.8
Vicia sativa	common vetch		UPL	5					8				1	2				0.9	4.6
Vulpia bromoides	barren fescue		UPL	5									20					1.7	8.3
bare (soil, mud, rock)	DOES NOT INCLUDE CANOPY, IF ANY					5	1	5	1	15	5	4				10	5	4.3	
algae, moss, duff, dead vegetation, etc. (incl. sprayed veg.)	"					5	70	60	10	20	12.0	15	5		27	12	15	20.9	25.2
			Total cover:			105	124	132	124	65	88	115	129	121	97	79	97	106	280
			FAC and better cover:			105	124	131	91	63	88	18	54	105	59	77	86	83	
			Native cover:			78	124	132	2	61	80	0	0	99	33	52	45	59	
			Percent FAC and better of total:			100	100	99	73	97	100	16	42	87	61	97	89	78	
			Percent native of total:			74	100	100	2	94	91	0	0	82	34	66	46	55	57.4
															Soil Moisture Index:			2.63	

Marion Mitigation Bank Phase II Vegetation Monitoring - 2012

Introduction, Summary, and Methods

This report summarizes vegetation assessment and monitoring conducted at Phase II of the Marion Mitigation Bank (MMB) site on May 29th and 31st, and June 6th, 2012. The following table presents a summary of the 2012 vegetation sampling results:

MMB Phase 2 Habitats	Emergent	Scrub/Shrub	Forested
Percent FAC and better cover	99	95	84
Percent native cover	95	82	60
Percent non-vegetated (under canopy)	37	48	40

The 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 2011. Species found in a one-square meter rectangular quadrat placed at each of the sampling stations 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. 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 which included: 1) the percentage of the total cover comprised of native taxa, and 2) 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 in the Habitat Types in the Phase II Restoration Unit at the MMB

Vegetation sampling data for the different habitat types is 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 three wetland types were not evaluated as a combined unit in later years. Each of the habitat types is evaluated only as a distinct unit.

Emergent Habitat Type

This habitat type was dominated by *Juncus effusus* (soft rush), *Polygonum hydropiperoides* (waterpepper), *Lemna minor* (duckweed), *Ludwigia palustris* (marsh seedbox), and *Salix lucida* ssp. *lasiandra* (Pacific willow). FAC and better species made up 99% of the total cover. Native species accounted for about 95% of the total cover in this area. The moisture index for this habitat type was 1.51, and 37% of the area was not vegetated.

Scrub/Shrub Habitat Type

This habitat type was dominated by *Salix sitchensis* (Sitka willow), *Salix hookeriana* (Hooker willow), *Equisetum arvense* (common horsetail), *Holcus lanatus* (common velvetgrass), *Juncus effusus* (soft rush), *Salix lucida* ssp. *lasiandra* (Pacific willow), and *Alnus rhombifolia* (white alder). The *Salix lucida* and *Alnus* were only in one quadrat each. FAC and better species made up 95% of the total cover. Native species accounted for about 82% of the total cover in this area. The moisture index for this habitat type was 2.31, and 48% of the area was not vegetated.

Forested Habitat Type

This habitat type was dominated by *Holcus lanatus* (common velvetgrass), *Alnus rhombifolia* (white alder), *Salix sitchensis* (Sitka willow), *Holcus mollis* (creeping velvetgrass), *Spiraea douglasii* (Douglas' spiraea), *Salix lucida* ssp. *lasiandra* (Pacific willow), *Lemna minor* (duckweed), *Eleocharis palustris* (common spikerush), and *Phalaris arundinacea* (reed-canary grass). The *Holcus mollis*, *Salix lucida*, and *Eleocharis* were in only one quadrat each. FAC and better species made up 84% of the total cover. Native species accounted for about 60% of the total cover in this area. The moisture index for this habitat type was 2.29, and 40% of the area was not vegetated.

Marion Mitigation Bank Plant Monitoring, 2012 Phase 2

		Percent FAC and better								Percent native							
Habitat	**Station**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
E	E-020	100	100	100	100	100	100	100	100	40	90	56	39	29	44	57	98
E	E-143	100	100	100	100	100	100	100	100	19	100	95	95	94	92	60	100
E	E-160	100	100	100	100	100	100	100	100	52	89	98	95	95	81	64	100
E	E-162	100	99	100	100	100	100	100	100	88	98	88	92	66	72	88	100
E	F-083	15	38	34	64	72	85	90	86	3	8	5	6	4	21	50	47
E	F-090	32	84	82	100	100	100	100	100	16	78	78	100	100	99	99	100
E	F-103	98	100	95	100	100	100	100	97	50	85	79	99	99	94	99	99
E	S-073	37	100	91	100	100	100	100	100	27	98	94	100	97	94	95	100
E	S-140	100	100	100	100	100	100	100	100	85	97	98	53	49	26	28	100
E	S-195	98	100	100	100	100	100	100	100	94	97	97	95	92	81	66	95
F	E-014	100	100	100	100	100	100	100	100	84	100	98	100	100	100	100	100
F	E-055	16	65	80	100	R	100	100	100	1	6	35	58	R	71	96	88
F	E-081	76	98	100	100	100	100	87	92	57	96	58	65	56	98	83	82
F	E-091	87	91	99	97	100	100	97	100	75	94	71	67	77	83	87	80
F	E-112	84	93	100	100	100	100	100	100	53	63	79	47	48	26	95	99
F	E-189	100	100	100	94	100	100	100	100	100	100	100	100	88	46	97	100
F	F-006	13	79	58	67	R	4	32	76	0	0	0	3	R	2	0	15
F	F-028	15	44	38	23	R	27	45	64	18	9	19	4	R	0	3	12
F	F-049	20	74	49	22	R	1	4	34	0	0	0	0	R	2	6	34
F	S-245	75	99	98	99	97	100	100	99	63	99	98	100	86	85	49	45
S	F-070	68	52	81	57	81	95	100	99	15	28	9	24	19	75	84	73
S	F-076	37	55	33	63	55	86	89	96	16	40	16	49	30	76	89	95
S	F-106	66	89	93	100	100	100	100	98	32	82	72	100	100	100	100	100
S	F-112	67	63	63	63	77	77	60	100	34	38	38	38	46	46	60	99
S	S-022	89	82	100	100	100	100	100	100	52	81	80	83	75	53	87	80
S	S-036	89	***44***	***17***	98	100	100	100	100	50	***25***	***19***	97	99	98	90	89
S	S-056	38	57	66	87	92	96	99	98	1	15	30	48	71	80	73	75
S	S-106	89	58	16	48	71	89	90	91	10	5	4	19	23	55	65	64
S	S-153	100	99	100	100	100	100	100	100	93	99	100	97	89	52	100	100
S	S-227	84	64	95	97	99	100	100	80	58	26	59	66	78	88	83	79
	Means:	70	81	80	86	94	89	90	94	43	61	59	65	70	65	72	82

possible error

location error?

R = remediated

Marion Mitigation Bank Plant Monitoring, 2012 Phase 2																
Emergent Habitat Type																
Cover (%)																
						Sample Station										
Species	**Common Name**	**Native**	**Indicator**	**MTI**	**Wet**	**E-020**	**E-143**	**E-160**	**E-162**	**F-083**	**F-090**	**F-103**	**S-073**	**S-140**	**S-195**	**Mean**
Alisma gramineum	narrowleaf water plantain	yes	OBL	1	y										2	0.2
Alnus rhombifolia	white alder	yes	FACW	2	y										4	0.4
Azolla mexicana	mexican mosquito-fern [water-fern]	yes	OBL	1	y							1	1			0.2
Bidens frondosa	leafy beggar's-tick	yes	FACW+	2	y						1					0.1
Deschampsia cespitosa	tufted hairgrass	yes	FACW	2	y					3						0.3
Eleocharis ovata	ovate spikerush	yes	OBL	1	y					3						0.3
Eleocharis palustris	common [creeping] spikerush	yes	OBL	1	y	20	2			1				7		3.0
Epilobium ciliatum	fringed willowherb	yes	FACW-	2	y					1						0.1
Equisetum arvense	common [field] horsetail	yes	FAC	3	y						1					0.1
Fraxinus latifolia	Oregon ash	yes	FACW	2	y	1				8	15				8	3.2
Holcus lanatus	common velvetgrass		FAC	3	y					28						2.8
Juncus effusus	soft rush	yes	FACW	2	y			2	50	5	82	12	4		20	17.5
Juncus ensifolius	dagger-leaf rush	yes	FACW	2	y					2						0.2
Lemna minor	duckweed	yes	OBL	1	y	15	40	12	15		2	20	15	5	1	12.5
Lotus micranthus	small-flowered deervetch	yes	NOL	5	u							3				0.3
Ludwigia palustris	marsh seedbox	yes	OBL	1	y	58			55				5	2	1	12.1
Mentha pulegium	pennyroyal		OBL	1	y	3										0.3
Myriophyllum hippuroides	western watermilfoil	yes	OBL	1	y		40									4.0
Phalaris arundinacea	reed-canary grass	invasive	FACW	2	y							1			2	0.3
Polygonum hydropiperoides	waterpepper	yes	OBL	1	y	32		2	25			5	28	72		16.4
Salix hookeriana	Hooker willow	yes	FACW	2	y						45					4.5
Salix lucida ssp. lasiandra	Pacific [red] willow	yes	FACW+	2	y						20	50	50			12.0
Salix sitchensis	Sitka willow	yes	FACW	2	y					11				10		2.1
Schoenoplectus acutus	hardstem bulrush	yes	OBL	1	y	1										0.1
Sparganium emersum	European bur-reed	yes	OBL	1	y		2	3	12					8		2.5
Trifolium repens	white clover		FAC-	3						10						1.0
Wolffia borealis	northern watermeal	yes	OBL	1	y			2								0.2
bare (soil, mud, rock)	DOES NOT INCLUDE CANOPY, IF ANY									5						0.5
algae, moss, duff, dead vegetation, etc. (incl. sprayed veg.)	"					3	35	80	8	40	18	55	47	10	65	36.1
standing water (inches)						12	24	12	14	tr	4	16	24	14	6	
		Total cover:				130	84	21	157	72	166	92	103	104	38	96.7
		FAC and better cover:				130	84	21	157	62	166	89	103	104	38	95.4
		Native cover:				127	84	21	157	34	166	91	103	104	36	92
		Percent FAC and better of total:				100	100	100	100	86	100	97	100	100	100	99
Identified as P. persicaria in 2011 - changes % native		Percent native of total:				98	100	100	100	47	100	99	100	100	95	95
														Moisture Index:		1.51

Marion Mitigation Bank Plant Monitoring, 2012 Phase 2																	
Emergent Habitat Type																	
Cover (%)																	
						Sample Station											
Species	**Common Name**	**Native**	**Indicator**	**MTI**	**Wet**	**E-020**	**E-143**	**E-160**	**E-162**	**F-083**	**F-090**	**F-103**	**S-073**	**S-140**	**S-195**	**Mean**
Alisma gramineum	narrowleaf water plantain	yes	OBL	1	y										2	0.2
Alnus rhombifolia	white alder	yes	FACW	2	y										4	0.4
Azolla mexicana	mexican mosquito-fern [water-fern]	yes	OBL	1	y							1	1			0.2
Bidens frondosa	leafy beggar's-tick	yes	FACW+	2	y						1					0.1
Deschampsia cespitosa	tufted hairgrass	yes	FACW	2	y					3						0.3
Eleocharis ovata	ovate spikerush	yes	OBL	1	y					3						0.3
Eleocharis palustris	common [creeping] spikerush	yes	OBL	1	y	20	2			1				7		3.0
Epilobium ciliatum	fringed willowherb	yes	FACW-	2	y					1						0.1
Equisetum arvense	common [field] horsetail	yes	FAC	3	y						1					0.1
Fraxinus latifolia	Oregon ash	yes	FACW	2	y	1				8	15				8	3.2
Holcus lanatus	common velvetgrass		FAC	3	y					28						2.8
Juncus effusus	soft rush	yes	FACW	2	y			2	50	5	82	12	4		20	17.5
Juncus ensifolius	dagger-leaf rush	yes	FACW	2	y					2						0.2
Lemna minor	duckweed	yes	OBL	1	y	15	40	12	15		2	20	15	5	1	12.5
Lotus micranthus	small-flowered deervetch	yes	NOL	5	u							3				0.3
Ludwigia palustris	marsh seedbox	yes	OBL	1	y	58			55				5	2	1	12.1
Mentha pulegium	pennyroyal		OBL	1	y	3										0.3
Myriophyllum hippuroides	western watermilfoil	yes	OBL	1	y		40									4.0
Phalaris arundinacea	reed-canary grass	invasive	FACW	2	y							1			2	0.3
Polygonum hydropiperoides	waterpepper	yes	OBL	1	y	32		2	25			5	28	72		16.4
Salix hookeriana	Hooker willow	yes	FACW	2	y						45					4.5
Salix lucida ssp. lasiandra	Pacific [red] willow	yes	FACW+	2	y						20	50	50			12.0
Salix sitchensis	Sitka willow	yes	FACW	2	y					11				10		2.1
Schoenoplectus acutus	hardstem bulrush	yes	OBL	1	y	1										0.1
Sparganium emersum	European bur-reed	yes	OBL	1	y		2	3	12					8		2.5
Trifolium repens	white clover		FAC-	3						10						1.0
Wolffia borealis	northern watermeal	yes	OBL	1	y			2								0.2
bare (soil, mud, rock)	DOES NOT INCLUDE CANOPY, IF ANY									5						0.5
algae, moss, duff, dead vegetation, etc. (incl. sprayed veg.)	"					3	35	80	8	40	18	55	47	10	65	36.1
standing water (inches)						12	24	12	14	tr	4	16	24	14	6	
		Total cover:				130	84	21	157	72	166	92	103	104	38	96.7
		FAC and better cover:				130	84	21	157	62	166	89	103	104	38	95.4
		Native cover:				127	84	21	157	34	166	91	103	104	36	92
		Percent FAC and better of total:				100	100	100	100	86	100	97	100	100	100	99
Identified as P. persicaria in 2011 - changes % native		Percent native of total:				98	100	100	100	47	100	99	100	100	95	95
														Moisture Index:		1.51

ditto from p. 11

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Marion Mitigation Bank Plant Monitoring, 2012 Phase 2																		
Scrub/Shrub Habitat Type																		
Cover (%)																		
						Sample Station												
Species	**Common Name**	**Native**	**Indicator**	**MTI**	**Wet**	**F-070**	**F-076**	**F-106**	**F-112**	**S-022**	**S-036**	**S-056**	**S-106**	**S-153**	**S-227**	**Mean**	**MTI_m**	
Agrostis castellana/capillaris	dryland/colonial bentgrass		FAC	3	y							10	5			1.5	4.5	
Alisma gramineum	narrowleaf water plantain	yes	OBL	1	y			3								0.3	0.3	
Alnus rhombifolia	white alder	yes	FACW	2	y										95	9.5	19.0	
Carex leptopoda	Dewey's sedge	yes	FAC	3	y		1									0.1	0.3	
Eleocharis palustris	common [creeping] spikerush	yes	OBL	1	y									15		1.5	1.5	
Elodea canadensis	Canadian waterweed	yes	OBL	1	y									3		0.3	0.3	
Epilobium ciliatum	fringed willowherb	yes	FACW-	2	y						2					0.2	0.4	
Equisetum arvense	common [field] horsetail	yes	FAC	3	y	90	1			25					28	14.4	43.2	
Fraxinus latifolia	Oregon ash	yes	FACW	2	y			2								0.2	0.4	
Holcus lanatus	common velvetgrass		FAC	3	y	60	2			30		10	35			13.7	41.1	
Holcus mollis	creeping velvetgrass		FACU	4											35	3.5	14.0	
Hypochaeris radicata	hairy cat's ear		FACU	4									1			0.1	0.4	
Juncus effusus	soft rush	yes	FACW	2	y		25	75			12	5			10	12.7	25.4	
Juncus ensifolius	dagger-leaf rush	yes	FACW	2	y		6									0.6	1.2	
Lemna minor	duckweed	yes	OBL	1	y			1			1			1		0.3	0.3	
Lotus corniculatus	birdsfoot trefoil		FAC	3	y							12				1.2	3.6	
Lotus micranthus	small-flowered deervetch	yes	NOL	5	u			2								0.2	1.0	
Myosotis laxa	small-flowered forget-me-not	yes	OBL	1	y			1							1	0.2	0.2	
Phalaris arundinacea	reed-canary grass	invasive	FACW	2	y				1		4					0.5	1.0	
Poa trivialis	rough [roughstalk] bluegrass		FACW	2	y										1	0.1	0.2	
Polygonum hydropiperoides	waterpepper	yes	OBL	1	y									20		2.0	2.0	
Populus balsamifera ssp. trichocarpa	black cottonwood	yes	FAC	3	y		2									0.2	0.6	
Rubus discolor	Himalayan blackberry	invasive	FACU	4			4						3			0.7	2.8	
Salix hookeriana	Hooker willow	yes	FACW	2	y	80					18		95			19.3	38.6	
Salix lucida ssp. lasiandra	Pacific [red] willow	yes	FACW+	2	y				98							9.8	19.6	
Salix sitchensis	Sitka willow	yes	FACW	2	y		70	7		98		98				27.3	54.6	
Senecio jacobaea	tansy ragwort	invasive	FACU	4									2			0.2	0.8	
Sparganium emersum	European bur-reed	yes	OBL	1	y									2		0.2	0.2	
Spiraea douglasii	Douglas' spiraea	yes	FACW	2	y			1								0.1	0.2	
Trifolium pratense	red clover		FACU	4									6			0.6	2.4	
Veronica americana	American speedwell	yes	OBL	1	y			6							5	1.1	1.1	
Vicia hirsuta	tiny vetch		NOL	5	u	2										0.2	1.0	
Vicia sativa	common vetch		UPL	5								3	2			0.5	2.5	
bare (soil, mud, rock)	DOES NOT INCLUDE CANOPY, IF ANY						2		20							2.2		
algae, moss, duff, dead vegetation, etc. (incl. sprayed veg.)	"						40	15	80	45	80	72	45	60	25	46.2		48.4
standing water (inches)								8		tr	4			30	tr			

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Marion Mitigation Bank Plant Monitoring, 2012 Phase 2																		
Scrub/Shrub Habitat Type																		
Cover (%)																		
						Sample Station												
Species	**Common Name**	**Native**	**Indicator**	**MTI**	**Wet**	**F-070**	**F-076**	**F-106**	**F-112**	**S-022**	**S-036**	**S-056**	**S-106**	**S-153**	**S-227**	**Mean**	**MTI_m**	
			Total cover:			232	111	98	99	153	37	138	149	41	175	123.3	284.7	
			FAC and better cover:			230	107	96	99	153	37	135	135	41	140	117.3		
			Native cover:			170	105	98	98	123	33	103	95	41	139	100.5		
			Percent FAC and better of total:			99	96	98	100	100	100	98	91	100	80	95		
			Percent native of total:			73	95	100	99	80	89	75	64	100	79	82	85.4	
															Moisture Index:	2.31		

1 A

Marion Mitigation Bank Plant Monitoring, 2012 Phase 2																		
Forested Habitat Type																		
Cover (%)																		
									Sample Station									
Species	**Common Name**	**Native**	**Indicator**	**MTI**	**Wet**	**E-014**	**E-055**	**E-081**	**E-091**	**E-112**	**E-189**	**F-006**	**F-028**	**F-049**	**S-245**	**Mean**	**MTI_m**	
Agrostis castellana/capillaris	dryland/colonial bentgrass		FAC	3	y							2	2			0.4	1.2	
Alisma gramineum	narrowleaf water plantain	yes	OBL	1	y		3									0.3	0.3	
Alnus rhombifolia	white alder	yes	FACW	2	y			100							50	15.0	30.0	
Alopecurus geniculatus	water foxtail		OBL	1	y		5									0.5	0.5	
Bromus hordeaceus ssp. hordeaceus	soft brome		FACU	4								3				0.3	1.2	
Daucus carota	wild carrot/ Queen Anne's lace		NOL	5	u							1	1			0.2	1.0	
Deschampsia cespitosa	tufted hairgrass	yes	FACW	2	y							13	4			1.7	3.4	
Eleocharis palustris	common [creeping] spikerush	yes	OBL	1	y		60									6.0	6.0	
Elodea canadensis	Canadian waterweed	yes	OBL	1	y	5										0.5	0.5	
Equisetum arvense	common [field] horsetail	yes	FAC	3	y			5					3			0.8	2.4	
Galium aparine	catchweed bedstraw/ cleavers	yes	FACU	4										1		0.1	0.4	
Geranium carolinianum	Carolina geranium	yes	NOL	5	u								1			0.1	0.5	
Holcus lanatus	common velvetgrass		FAC	3	y							48	55	1	48	15.2	45.6	
Holcus mollis	creeping velvetgrass		FACU	4										98		9.8	39.2	
Hordeum brachyantherum	meadow barley	yes	FACW-	2	y								2		18	2.0	4.0	
Hypericum perforatum	St. John'swort/ Klamathweed		NOL	5	u							1	1			0.2	1.0	
Hypochaeris radicata	hairy cat's ear		FACU	4								4	12			1.6	6.4	
Leersia oryzoides	rice cut-grass	yes	OBL	1	y		3									0.3	0.3	
Lemna minor	duckweed	yes	OBL	1	y	1	48			25	3				1	7.8	7.8	
Leucanthemum vulgare	oxeye daisy		UPL	5								3	1			0.4	2.0	
Lolium arundinacea	tall fescue		FAC-	3								1				0.1	0.3	
Ludwigia palustris	marsh seedbox	yes	OBL	1	y		18			3						2.1	2.1	
Parentucellia viscosa	parentucellia		FAC-	3									1			0.1	0.3	
Phalaris arundinacea	reed-canary grass	invasive	FACW	2	y		15	4	40							5.9	11.8	
Plantago lanceolata	buckhorn plantain		FACU+	4								1		1		0.2	0.8	
Poa trivialis	rough [roughstalk] bluegrass		FACW	2	y			10				2	2		35	4.9	9.8	
Populus balsamifera ssp. trichocarpa	black cottonwood	yes	FAC	3	y								3			0.3	0.9	
Rubus discolor	Himalayan blackberry	invasive	FACU	4				10								1.0	4.0	
Rubus ursinus	trailing blackberry	yes	FACU	4					1							0.1	0.4	
Rumex acetosella	sheep [red] sorrel		FACU+	4								2	1			0.3	1.2	
Salix lucida ssp. lasiandra	Pacific [red] willow	yes	FACW+	2	y				80							8.0	16.0	
Salix sitchensis	Sitka willow	yes	FACW	2	y					65				45		11.0	22.0	
Senecio jacobaea	tansy ragwort	invasive	FACU	4									3		2	0.5	2.0	
Solanum dulcamara	bittersweet nightshade		FAC+	3	y					1						0.1	0.3	
Sparganium emersum	European bur-reed	yes	OBL	1	y	3										0.3	0.3	
Spiraea douglasii	Douglas' spiraea	yes	FACW	2	y				80					10		9.0	18.0	

Marion Mitigation Bank Plant Monitoring, 2012 Phase 2																		
Forested Habitat Type																		
Cover (%)																		
						Sample Station												
Species	**Common Name**	**Native**	**Indicator**	**MTI**	**Wet**	**E-014**	**E-055**	**E-081**	**E-091**	**E-112**	**E-189**	**F-006**	**F-028**	**F-049**	**S-245**	**Mean**	**MTI_m**	
Trifolium repens	white clover		FAC-	3								5	17			2.2	6.6	
Typha latifolia	cattail	yes	OBL	1	y		12									1.2	1.2	
Veronica americana	American speedwell	yes	OBL	1	y		5	1								0.6	0.6	
Vicia hirsuta	tiny vetch		NOL	5	u									1		0.1	0.5	
Vicia pannonica	Hungarian vetch		NOL	5	u									4		0.4	2.0	
Vicia sativa	common vetch		UPL	5									1	2		0.3	1.5	
Vulpia bromoides	barren fescue		UPL	5									1			0.1	0.5	
Wolffia borealis	northern watermeal	yes	OBL	1	y		1									0.1	0.1	
bare (soil, mud, rock)	DOES NOT INCLUDE CANOPY, IF ANY					91		10				1	1		1	10.4		
algae, moss, duff, dead vegetation, etc. (incl. sprayed veg.)	"					0	1	70	5	72	97	35	10		2	29.2		39.6
standing water (inches)						36	4	2	18	10	16							
			Total cover:			9	170	130	201	94	3	86	111	163	154	112.1	256.9	
			FAC and better cover:			9	170	120	200	94	3	65	71	56	152	94		
			Native cover:			9	150	106	161	93	3	13	13	56	69	67		
			Percent FAC and better of total:			100	100	92	100	100	100	76	64	34	99	84		
			Percent native of total:			100	88	82	80	99	100	15	12	34	45	60	65	
									80.39					Moisture Index:		2.29		
									90									
		the original way best describes the proportion of the vegetation, independent of its spatial distribution																

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Marion Mitigation Bank Phase III Vegetation Monitoring - 2012

Introduction, Summary, and Methods

This report summarizes the vegetation assessment conducted at the Marion Mitigation Bank (MMB) Phase 3 site on May 31st, June 1st and 6th, and July 4th, 2012. Vegetation monitoring at MMB Phase 3 followed the sampling design implemented in 2010. In order to better represent the habitat boundaries established through the delineation of phase III in 2012, the ten Scrub/Shrub habitat sampling stations were re-identified as either Emergent habitat (3 stations) or upland berms (7 stations). The original Scrub/Shrub habitat was essentially narrow bands around the perimeter of the ponds, but over time those areas developed vegetation that was indistinguishable from either the upland berms or the emergent ponds themselves, depending on the exact position of the sampling stations on the pond banks. Accordingly, all the wetland areas at the MMB Phase 3 site were considered to be emergent wetland. The following table presents a summary of the 2012 wetland vegetation sampling results:

MMB Phase 3 Habitats	Emergent
Percent FAC and better cover	100
Percent native cover	87
Percent non-vegetated	36

Vegetative cover for two of the Emergent sampling stations was not assessed because they were still under deep water (more than about three feet) at the time of sampling; no emergent or floating vegetation was observed at these locations.

Species found in a one-square meter rectangular quadrat placed at each of the sampling stations 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 also made at each quadrat.

To calculate the relative proportion of typical wetland species, those with an indicator status of FAC or better were considered. 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 which included: 1) the percentage of the total cover comprised of native taxa, and 2) 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 in the Habitat Types in the Phase III Restoration Unit at the MMB

Vegetation sampling data for the different habitat types is in the attached tables. The following sections summarize the dominant vegetation within each of the habitat types.

Emergent Habitat Type

This habitat type was dominated by *Azolla mexicana* (Mexican mosquito-fern), *Eleocharis palustris* (common spikerush), *Lemna minor* (duckweed), *Phalaris arundinacea* (reed-canary grass), *Juncus effusus* (soft rush), *Myriophyllum hippuroides* (western watermilfoil), and *Ludwigia palustris* (marsh seedbox). Twenty-two of the 23 sampling stations had standing water on the soil surface at the time of sampling. FAC and better species made up 100% of the total cover. Native species accounted for about 87% of the total cover. The SMI for this habitat type was 1.37, and 36% of the area was not vegetated.

Oak Savannah Habitat Type

This habitat type was dominated by *Agrostis castellana/capillaris* (dryland/colonial bentgrass), *Vicia villosa* (woolly vetch), *Holcus lanatus* (common velvetgrass), *Festuca idahoensis* ssp. *roemeri/ F. occidentalis* (Roemer's fescue/ western fescue), *Vicia pannonica* (Hungarian vetch), *Bromus sitchensis* (Alaska brome), and *Daucus carota* (wild carrot). Native species accounted for 20% of the total cover in this area, and about 1% of the area was not vegetated.

Marion Mitigation Bank Plant Monitoring, 2012 Phase 3													
		Percent FAC and better						Percent native					
Habitat	Station	2010	2011	2012	2013	2014	2015	2010	2011	2012	2013	2014	2015
E	E-031	100	100	100				100	100	98			
E	E-047	100	100	100				7	73	100			
E	E-051	100	100	100				40	92	88			
E	E-052	100	100	100				90	89	81			
E	E-070	100	100	100				32	93	69			
E	E-078	100	100	100				19	62	100			
E	E-138	100	100	100				80	94	71			
E	E-219	100	100	NA				100	100	NA			
E	E-315	100	100	100				76	100	100			
E	E-316	99	100	100				88	88	87			
E	E-327	100	100	100				98	95	100			
E	E-224	100	100	100				80	96	100			
E	E-269	NA	100	100				NA	100	100			
E	E-282	NA	NA	100				NA	NA	100			
E	E-299	NA	100	100				NA	100	93			
E	E-304	NA	100	100				NA	100	92			
E	E-348	NA	100	100				NA	100	100			
E	E-349	NA	100	100				NA	100	100			
E	E-375	NA	NA	NA				NA	NA	NA			
E	E-389	NA	100	100				NA	100	100			
S	S-002	8	68	[38]				0	65	[15]			
S	S-027	100	100	100				13	48	100			
S	S-028	100	100	100				12	40	96			
S	S-037	70	38	[51]				2	11	[0]			
S	S-055	73	88	[92]				13	10	[6]			
S	S-075	100	98	[100]				23	44	[2]			
S	S-076	46	72	[79]				10	13	[0]			
S	S-100	93	98	[99]				0	25	[5]			
S	S-103	87	85	[4]				2	18	[4]			
S	S-105	74	95	98				0	3	60			
	[X] these stations were omitted for final analyses in 2012 as they appear to be located in upland areas												

Marion Mitigation Bank Plant Monitoring, 2012 Phase 3																													
Emergent Habitat Type													w = deep water; no vegetation																
Cover (%)																													
													Sample Station																
Species	**Common Name**	**Native**	**Indicator**	**MTI**	**Wet**	**E-031**	**E-047**	**E-051**	**E-052**	**E-070**	**E-078**	**E-138**	**E-219**	**E-224**	**E-269**	**E-282**	**E-299**	**E-304**	**E-315**	**E-316**	**E-327**	**E-348**	**E-349**	**E-375**	**E-387**	**S-027**	**S-028**	**S-105**	**Mean**
Agrostis castellana/capillaris	dryland/colonial bentgrass		FAC	3	y								w										w				10	0.5
Alisma gramineum	narrowleaf water plantain	yes	OBL	1	y								w								2			w					0.1
Alopecurus geniculatus	water foxtail		OBL	1	y								w											w			2	4	0.3
Azolla mexicana	mexican mosquito-fern [water-fern]	yes	OBL	1	y			35	95	95		85	w											w		1	1		14.9
Callitriche heterophylla	twoheaded [different-leaved] water starwort	yes	OBL	1	y	15	12						w											w					1.3
Cerastium glomeratum	sticky chickweed		UPL	5									w											w				1	0.05
Eleocharis palustris	common [creeping] spikerush	yes	OBL	1	y	15		35	1		10	10	w	6	22	20	35	58	1			25	37	w	10		2		13.7
Elodea canadensis	Canadian waterweed	yes	OBL	1	y								w											w	6				0.3
Epilobium brachycarpum	tall annual willowherb	yes	UPL	5									w											w				1	0.05
Epilobium ciliatum	fringed willowherb	yes	FACW-	2	y								w											w				70	3.3
Holcus lanatus	common velvetgrass		FAC	3	y								w											w				8	0.4
Juncus effusus	soft rush	yes	FACW	2	y				8				w	10						95	58			w					8.1
Lemna minor	duckweed	yes	OBL	1	y	5	2	30		3	5	5	w	5	1	1	2	1	2	30	55	1	2	w	1	12	18		8.6
Ludwigia palustris	marsh seedbox	yes	OBL	1	y				7		3		w					1	1		2	1		w	90				5.0
Myriophyllum hippuroides	western watermilfoil	yes	OBL	1	y						5		w				3		12			2	15	w		90	20		7.0
Phalaris arundinacea	reed-canary grass	invasive	FACW	2	y	1		17	30	45		50	w		12					10	15			w					8.6
Poa trivialis	rough [roughstalk] bluegrass		FACW	2	y								w											w				25	1.2
Populus balsamifera ssp. trichocarpa	black cottonwood	yes	FAC	3	y			5				12	w											w					0.8
Ranunculus sceleratus	cursed [celery-leaved] buttercup/crowfoot	yes	OBL	1	y				2				w											w					0.1
Salix hookeriana	Hooker willow	yes	FACW	2	y								w						22		25			w					2.2
Salix lucida ssp. Lasiandra	Pacific [red] willow	yes	FACW+	2	y			9	15			12	w		50		1				3			w					4.3
Salix sitchensis	Sitka willow	yes	FACW	2	y								w								10			w			7		0.8
Sparganium emersum	European bur-reed	yes	OBL	1	y	8	1				5		w	8			35		2					w	3				3.0
Spirodela polyrrhiza	common duckmeat	yes	OBL	1	y						1		w											w					0.05
Typha latifolia	cattail	yes	OBL	1	y			10					w											w		1			0.5
Wolffia borealis	northern watermeal	yes	OBL	1	y								w	3	7	3	5	2	6		10	1	2	w	1				1.9
bare (soil, mud, rock)	DOES NOT INCLUDE CANOPY, IF ANY														10												10	2	1.0
algae, moss, duff, dead vegetation, etc. (incl. sprayed veg.)	"					60	85	12			75			85	30	77	25	38	62		2	75	55			5	40	2	34.7
standing water (inches)						18	20	10	12	14	18	8	36	12	20	30	26	20	18	3	24	32	24	?	12	28	18		
			Total cover:			44	15	141	158	143	29	174	NA	32	92	24	81	62	46	135	180	30	56	NA	111	104	50	119	87.0
			FAC and better cover:			44	15	141	158	143	29	174	NA	32	92	24	81	62	46	135	180	30	56	NA	111	104	50	117	86.9
			Native cover:			43	15	124	128	98	29	124	NA	32	80	24	81	62	46	125	165	30	56	NA	111	104	48	71	76.0
			Percent FAC and better of total:			100	100	100	100	100	100	100	NA	100	100	100	100	100	100	100	100	100	100	NA	100	100	100	98	100
			Percent native of total:			98	100	88	81	69	100	71	NA	100	87	100	100	100	100	93	92	100	100	NA	100	100	96	60	87
																								Moisture Index:					1.37

Marion Mitigation Bank Plant Monitoring, 2011 Phase 3													
Oak Savannah Habitat Type													
Cover (%)													
						Sample Station							
Species	**Common Name**	**Native**	**O-7**	**O-27**	**O-28**	**O-59**	**O-60**	**O-WB**	**O-SB**	**O-EB**	**O-NB**	**Mean**	
Agrostis castellana/capillaris	dryland/colonial bentgrass		52	20	38	17	8	55	75	85	25	41.7	
Alopecurus pratensis	meadow foxtail									1		0.1	
Anthemis cotula	mayweed chamomile/ stinking mayweed			4	3							0.8	
Bromus hordeaceus ssp. hordeaceus	soft brome		1		2							0.3	
Bromus sitchensis	Alaska brome	yes	2	5	28	20	3	4		2	3	7.4	
Daucus carota	wild carrot/ Queen Anne's lace		55			4	2				2	7.0	
Elymus glaucus	blue wildrye	yes	2	12	6	10	12			2		4.9	
Epilobium brachycarpum	tall annual willowherb	yes			1	2						0.3	
Festuca idahoensis ssp. roemeri/ F. occidentalis	Roemer's fescue/ western fescue	yes	12	5	10	28	37					10.2	
Galium aparine	catchweed bedstraw/ cleavers	yes			5	2		2				1.0	
Galium parisiense	creeping [wall] bedstraw			2								0.2	
Geranium carolinianum	Carolina geranium	yes		7	4				1			1.3	
Geranium molle	dovefoot geranium							1				0.1	
Holcus lanatus	common velvetgrass		1		3	5	3	65	10	1	25	12.6	
Hordeum brachyantherum	meadow barley	yes							12			1.3	
Lactuca serriola	prickly lettuce		1	1	5	2						1.0	
Leucanthemum vulgare	oxeye daisy		1									0.1	
Lolium arundinacea	tall fescue									15	10	2.8	
Lolium perenne	perennial ryegrass				5						10	1.7	
Parentucellia viscosa	parentucellia		1	3	9	5	2		3			2.6	
Phalaris arundinacea	reed-canary grass	invasive				2	20		7	1		3.3	
Plantago lanceolata	buckhorn plantain							8				0.9	
Poa trivialis	rough [roughstalk] bluegrass							3				0.3	
Rubus discolor	Himalayan blackberry	invasive			2							0.2	
Rumex acetosella	sheep [red] sorrel		1	20		2	20					4.8	
Rumex crispus	curly dock		1	1								0.2	
Rumex obtusifolius	broad-leaved dock							8				0.9	
Trifolium pratense	red clover		2									0.2	
Trifolium repens	white clover						13					1.4	
Vicia pannonica	Hungarian vetch		9	37	4	1	18					7.7	
Vicia villosa	winter [woolly] vetch			22	27	65						12.7	
Vulpia bromoides	barren fescue		12	3	3		2		15		5	4.4	
bare (soil, mud, rock)	DOES NOT INCLUDE CANOPY, IF ANY						1					0.1	
algae, moss, duff, dead vegetation, etc. (incl. sprayed veg.)	"		2		2		1				7	1.3	1.3
	Total cover:		153	142	155	165	140	146	123	107	80	135	
	Native cover:		16	29	54	62	52	6	13	4	3	26.6	
	Percent native of total:		10	20	35	38	37	4	11	4	4	20	18

MARION MITIGATION BANK

07/01/2009

DATE	NAME	LOCATION	PERMIT	ADD	SOLD	BALANCE
10/19/2001	DSL/COE CREDIT RELEASE	INITIAL RELEASE		10.9		10.90
[illegible]/2003	DSL	RECINDED			10.9	0.00
[illegible]/2003	DSL/COE CREDIT RELEASE	PHASE I		2.84		2.84
[illegible]/2003	WILLAMETTE ESTATES, LLC	8900 NE SANTIAM PASS WAY, SALEM,OR	25263RF/1998-00145		0.500	2.34
[illegible]/2003	OREGON DEPT OF TRANSPORTATION	I-5 N. JEFFERSON TO N.ALBANY	31156RF/2003-00622		2.330	0.010
[illegible]/2004	DSL/COE CREDIT RELEASE	PHASE II		3.21		3.220
[illegible]/2004	OREGON DEPT OF STATE LANDS	WETLAND MITIGATION BANK REVOLVING FUND			0.167	3.053
[illegible]/2004	CITY OF SALEM PUBLIC WORKS	GREEN IS. WATER TREATMENT FACILITY	RP12152/1996-01446		1.540	1.513
[illegible]/2004	WILLAMETTE DEVELOPMENT LLC.	9795 MILL CREEK RD.SE, AUMSVILLE, OR	APP32629/2004-00446		1.510	0.003
[illegible]/2005	DSL/COE CREDIT RELEASE	PHASE II		2.19		2.193
[illegible]/2005	TIMOTHY YOUNGKIN	NW 1/4 SEC.33,T13S,R01W,WM SWEETHOME, OR	FP13667/1997-00203		1.000	1.193
[illegible]/2005	RICH BRANDVOLD	T10S,R1W,SEC18,TAX LOT 100 SCIO,OR	RF33917/2005-00074		0.090	1.103
[illegible]/2005	RICH BRANDVOLD	T12S,R2W,SEC22,TAX LOT 504,LEBANON,OR	RF34107/2005-00164		1.103	0.000
[illegible]/2006	DSL CREDIT RELEASE	PHASE II		2.5		2.500
[illegible]/2008	KID INVESTMENT,LLC	11770 SUBLIMITY RD.,SUBLIMITY, OR	41232RF/2008-00504		1.845	0.655
[illegible]/2008	KNIFE RIVER	9710 WHEATLAND RD N.SALEM, OR	39879RP/2008-0067		0.007	0.648
2/5/2008	DSL/COE CREDIT RELEASE	PHASE III		4.5		5.148
2/9/2008	WOOD WASTE, LLC DBA COMPOST OR	TAX LOT 1700,8712 AUMSVILLE HWY, AUMSVILLE,,OR	39365RF/2007-00896		1.83	3.318
[illegible]/18/2010	DSL/COE CREDIT RELEASE	PHASE I		4.5		7.818
6/23/2010	ALBANY/LEBANON INVESTMENTS	560 HANSARD AVE,/LEBANON OREGON TX LTS 1900/2000	39843RF/2007-00571		3.83	3.988
11/11/2011	MOUNTAIN WEST SENIOR HOUSING	T8N,R3W.SEC12,TAX LOT 2501	ENF2501		0.21	3.78