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2013 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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Marion Mitigation Bank Cover Sheet 2013

Performance Standard			Met: Yes/No			
		Phase I		**Phase II**		**Phase III**
Areas of herbaceous vegetation dominated by more than 50% cover of FAC or wetter vegetation		Yes (all wetland habitats)		Yes (all wetland habitats)		Yes (all wetland 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)		
No more than 15% cover of invasive, undesireable species		Yes		Yes		Yes
Percent FAC and better	69	Forested	87	Forested		
	95	Scrub-shrub	95	Scrub-shrub		
	98	Emergent	100	Emergent	99	Emergent
Percent Native	47	Forested	67	Forested		
	64	Scrub-shrub	85	Scrub-shrub		
	71	Emergent	94	Emergent	89	Emergent

2013 MONITORING REPORT
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MARION MITIGATION BANK
MARION, OR
(Phases I, II & III)

This is the thirteenth 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. Wildlife data was collected by Courtenay Brasier in January and June.

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 2013. 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.

With ten out of twelve months being dryer than the 30 year average, 2013 was the fourth driest year recorded at the Hyslop weather station at Corvallis. The United States drought monitor listed the entire state of Oregon as abnormally dry for 2013. Despite the extremely dry conditions, the plant community was able to maintain itself with little or no loss from levels achieved in 2012, confirming the success of the restoration.

Main focuses of management for 2014 will be the continued improvement on reducing blackberry and Reed Canary Grass, development of buffers with planting 25+ stems/ acre and mowing twice a year as discussed with the IRT, continuation of seed & stem planting on the hill- specifically more blue wild rye and inoculated oaks, and implementing vegetation sampling of species count versus reference site data.

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 2013 are presented in Table 2.

Wells 7-13 are located in Phase I. Shallow wells S1-S7 are also within Phase I and wells S1, S2, S3, and S4 have a water level within 12 inches of the surface for more than 15 days during the growing season, thus meeting hydrology criteria (they are highlighted in Table 2).

Wells 1-3 and 14-17 are located in Phase II and of these, wells 2, 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).

Wells 4, 5, and 6 are located in phase III. Since completing construction in 2008, wells 5 and 6 are meeting hydrology criteria (highlighted in table 1).

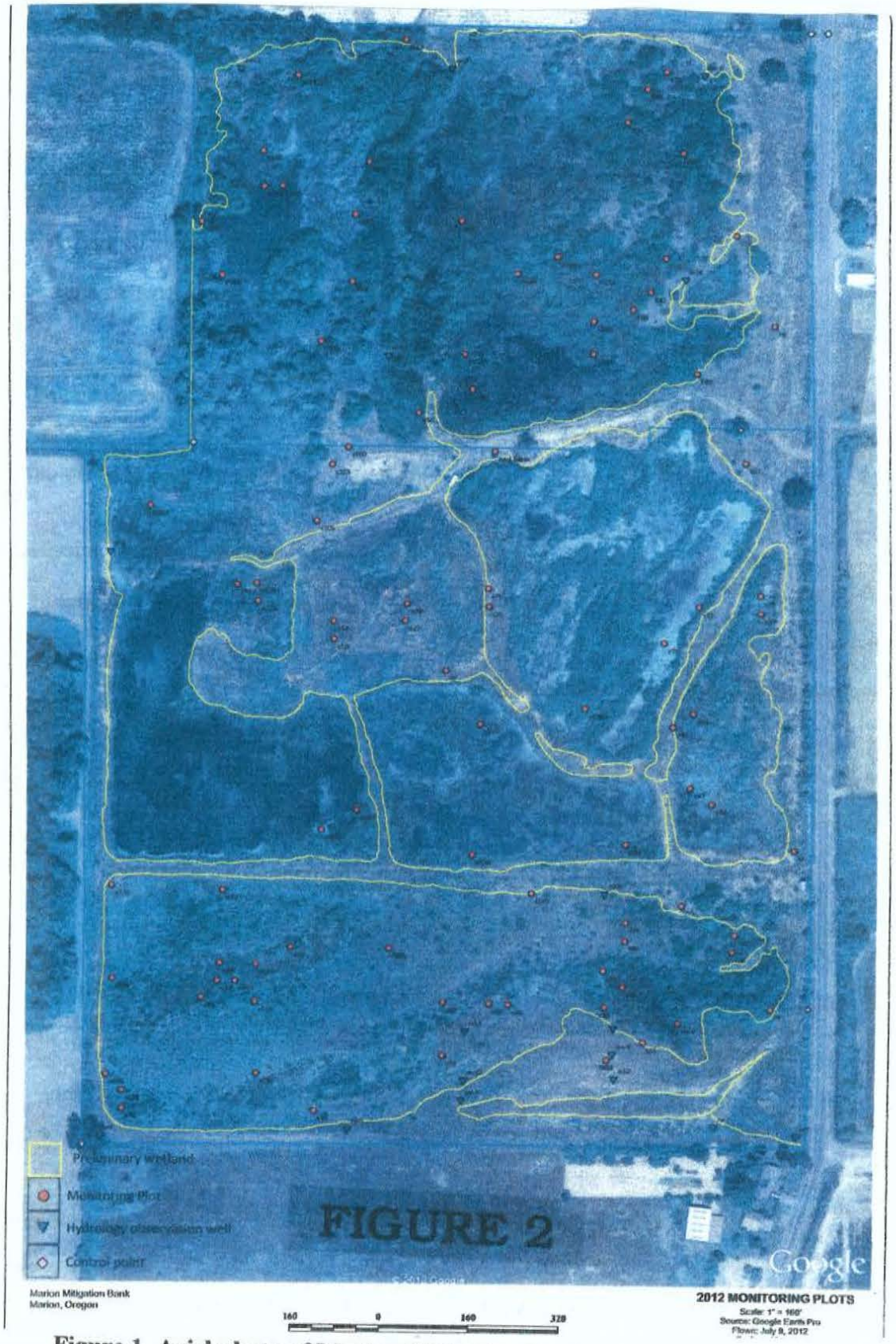

Figure 1. Ariel photo of Marion Mitigation Bank, taken in 2012, showing preliminary wetland boundaries, vegetative monitoring plots, and observation well locations

Marion Mitigation Bank

Observation Well Number

Date	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
01/14/13	41	9	14	19	9	5	8	37	4	15	10	8	4	0	7	11	+5
02/14/13	48	11	16	14	11	+6	10	43	8	24	17	11	14	22	+11	3	+4
03/14/13	45	14	16	22	11	0	15	49	16	25	18	18	12	5	11	11	+4
04/15/13	44	11	15	23	12	+6	16	57	28	33	25	25	20	3	+1	11	+4
05/16/13	41	11	21	24	12	8	67	71	41	46	41	43	41	7	10	16	0
06/15/13	48	14	29	24	19	28	70	72	50	44	45	30	50	11	17	18	2
07/15/13	52	19	2	29	27	41	81	78	59	50	48	56	49	12	15	19	0
08/16/13	53	20	23	27	29	46	87	82	59	54	51	57	58	14	17	23	8
09/17/13	48	15	18	23	19	40	79	60	41	35	29	34	34	8	12	14	1
10/15/13	41	18	16	30	20	36	65	60	46	42	43	38	42	11	13	14	7
11/14/13	42	10	15	35	28	30	68	60	52	47	50	43	46	17	19	15	8
12/02/13	38	6	7	16	11	+2	+3	39	16	15	12	13	11	1	4	8	+5
12/16/13	63	11	12	20	12	+5	4	70	22	27	16	21	14	2	6	10	+6

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

Marion	Shallow Well Number										
Date	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11
01/14/13	3	9	5	3	11	18	13	4	1	4	0
02/14/13	6	9	7	3	16	24	13	9	6	6	3
03/14/13	8	10	7	14	_	_	_	7	6	4	2
04/15/13	6	9	10	3	_	27	13	6	5	5	2
05/16/13	21	11	15	4	_	26	14	12	8	10	8
06/15/13	18	9	22	7	18	24	10	11	10	9	6
07/15/13	20	10	24	3	_	_	_	13	19	14	9
08/16/13	_	_	25	_	_	_	_	17	16	13	9
09/17/13	_	_	13	_	_	26	_	9	8	8	6
10/15/13	_	_	25	_	_	26	_	13	12	14	8
11/14/13	19	12	18	8	20	26	12	12	12	10	8
12/02/13	0	5	1	3	16	26	4	3	0	2	+1
12/16/13	3	8	5	_	_	26	13	6	6	4	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**
1/14/13	1.08	2.62	0.75	2.8	2.9	2.3	2.4	1.68	2.1	2.15
2/14/13	0.9	2.82	2.1	2.38	2.48	2.34	2.46	1.6	2.02	2.18
3/14/13	0.88	2.1	2	2.2	2.1	2.3	2.42	1.52	1.84	2.1
4/15/13	0.87	1.96	1.45	1.84	1.9	2.2	2.45	1.4	1.68	2.8
5/16/13	0.4	0.2	_	0.48	0.4	1.94	1.96	0.9	1.42	1.36
6/15/13	0.3	0.2	_	0.44	0.2	1.96	2.1	0.4	1.24	0.6
7/15/13	0.42	0.2	_	_	_	1	1.02	0.2	1.2	0.48
8/16/13	0.42	_	_	_	_	1.1	1.4	_	0.76	0.86
9/17/13	0.8	1.56	_	0.5	_	1.9	2.2	1	1.3	0.5
10/15/13	0.9	2.86	1.64	1.8	1.9	2.18	2.24	1.32	1.45	1.6
11/14/2013	_	0.64	0.45	0.84	0.75	1.92	2.15	0.88	1.45	1.5
12/2/2013	0.95	2.1	2.5	2.04	2.13	2.3	2.36	1.44	1.74	1.82
12/16/2013	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1

Table 3. Depth of Water (in feet) in ponds in 2013 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 below average for much of the year (Table 4). Despite the low precipitation, five of the ponds contained water through most of the year. 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 2013 comfortably exceed performance standards.

Table 4. Monthly Precipitation in inches in 2013 at the National Weather Service Station in Salem, OR.

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
Observed	1.63	1.42	2.21	2.39	2.94	1.02	0.00	0.35	7.05	0.64	2.68	1.27	23.59
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 2013 is indicative of a successful 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 - 98%; Scrub-shrub - 95%; and Forested - 69%. The percentage native cover in each habitat type was: 71% Emergent, 64% Scrub-shrub, and 47% foreseted. 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 continues to be done every 5 years in order to better document this change in density. Results of the 2013 survey are presented in Table 5.

Percentage of Plant Community FAC or wetter in Phase I

Habitat	New 2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Emergent	54	93	91	88	98	91	100	99	100	98
Scrub/shrub	48	68	80	84	90	85	90	97	91	95
Forested	27	49	57	58	72	75	63	77	78	69

In 2009, 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.

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.

Vegetation Monitoring - Phase II

The plant communities observed in each habitat in 2013 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 2013 the percentage of FAC or wetter cover in each habitat type was: Emergent - 100%; Scrub-shrub - 95%; and Forested - 87%. The percentage native cover in each habitat type was: 94% Emergent, 85% Scrub-shrub, and 67% foreseted. 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	2013
Emergent	83	70	88	90	96	98	99	100	99	100
Scrub/shrub	66	70	66	67	79	87	94	92	95	95
Forested	61	53	83	80	78	99	75	77	84	87

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 2013 delineation of phase III, habitat boundaries between upland and wetland were modified. For 2013, 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 99% of the emergent cover. The native cover made up 89% 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	2013
Emergent	100%	100%	100%	99

Recognizing the importance of species' diversity to a heathly ecosystem, we have listed the number in each Phase and for the bank site as a whole. Unfortunately, we do not have recent data for the reference site. In 2014 we will attempt to acquire diversity data for the reference site as a whole.

Vegetation Species Diversity

	2013
Phase I	**71**
Phase II	**57**
Phase III	**59**

Wildlife Monitoring

Wildlife monitoring had been conducted from 2001 through 2008 before it was suspended. Recognizing the value of those data for assessing the success of the wetland restoration, the monitoring program was reinstated in 2013. Five permanent wildlife observation stations at both the bank site and the USFWS N. Santiam reference site were sampled in Winter (January) and Summer (June) 2013 (Tables 2A, 2B, 2C, and 2D in Appendix 2).

During the Spring survey, 31 species were observed at the bank site and 27 at the reference stie. The abundance of birds at the bank site (250) exceeded those at the reference site (157). Not only was the number of species greater at the bank site, but some unique species (two Barn Owls, an American Kestrrel, two Northern Harriers, three Barn and two Cliff Swallows, and three (Bushtits) were observed at the bank site. In addition, six Gadwalls and two Pied-Billed Grebes were sighted on the ponds.

During the winter survey, 22 species were observed at the bank site and 23 at the reference site. The abundance of birds at the bank site (266) exceeded that at the reference site

(138). Also, several unique species, including Bald Eagle, American Kestrel, Great Blue Heron were observed at the bank site.

In every survey conducted since 2001 the number of species and abundance of birds at the bank site are comparable to or exceed those at the reference site.

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 98% FAC or wetter, the scrub-shrub habitat is 95%, and forested habitat is 69%. 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 100% FAC or wetter, the scrub-shrub habitat is 95%, and the forested habitat is 87%.

In the Phase III restoration, the emergent habitat is 99% FAC or wetter. Percent Native in the emergent habitat is 89%.

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.

Completeing construction of phase III and regrading some portions of phases I and II contributed to the successful remediation of the site.

Credit Sales

Date	Credit	Purchaser	Permit #	Impact Location
5-22-13	0.1 6	Marion County Public Works	24306GA/2001-00624	Hayesville Rd Mitigation Site
6-25-13	0.57	OR Dept. of Veteran's Affairs	53043RF/2012-00404	600 Patriot's Place Lebanon, OR
8-19-13	2.00	Hans Thygeson	7379-ENF	T115, Ro3W, Sec 8 Tax lot 1000, 1100, 1208
8-22-13	0.43	JB&B Investment Group	5361RF/2013-00160	T85, R2W, Sec 5WM, Tax lot 100

Credit Balance = 2.79

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-093	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	Black	Willow1	Willow2	Willow3	Total	Stems/ Acre
Location	Cottonwood					
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 in the Marion Mitigation Bank Phases I, II, and III.

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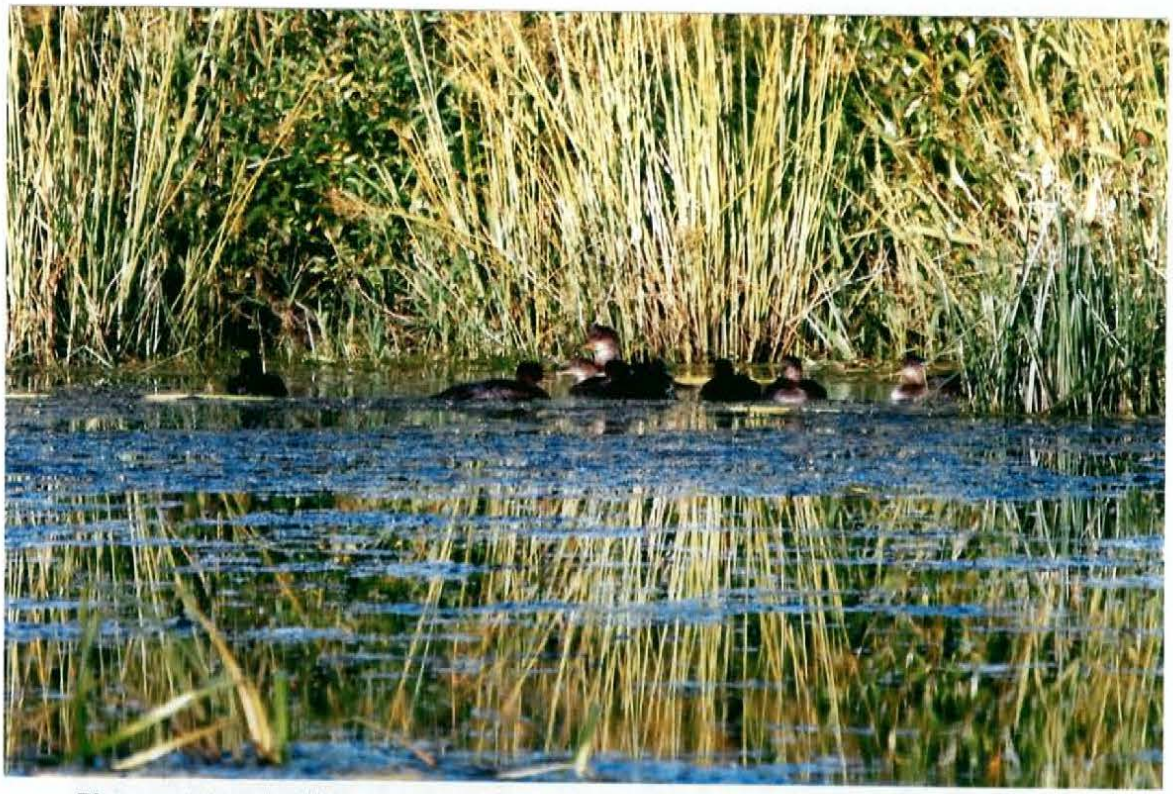
Sone photographic examples of the functioning ecosystem at the Marion Mitigation Bank site.

Picture 1. Southeastern corner of Phase I showing success of remedial design

Picture 2. Stand of native Monkey Flower (*Mimulus* guttatus) in Phase II



Picture 3. Hooded Merganser with duckling among rushes in Phase III pond 3-3

Picture 4. Native forbes growing in Phase III ponds. Among our seed list - Common Spike rush, Fragrant popcorn flower, ovate spike rush, water plantain, and downingia

Marion Mitigation Bank Phase I Vegetation Monitoring - 2013

Introduction, Summary, and Methods

This report summarizes vegetation assessment and monitoring conducted at Phase I of the Marion Mitigation Bank (MMB) site on June 1st and July 12th, 2013. The following table presents a summary of the 2013 vegetation sampling results:

MMB Phase 1 Habitats	Emergent	Scrub/Shrub	Forested
Percent FAC and better cover	98	95	69
Percent native cover	71	64	47
Percent non-vegetated (under canopy)	20	22	24

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 2012, plus an additional four locations. There were 14, 13, and 12 locations in the Emergent, Scrub/Shrub, and Forested habitat types, respectively. Four new sampling locations were placed in the emergent area toward the southeast corner of the site in 2013 (ENS-01, ENS-02, ENS-03, and ENS-04), and data from these locations was included with the Emergent habitat type. 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), *Mentha pulegium* (pennyroyal), *Hordeum brachyantherum* (meadow barley), *Salix sitchensis* (Sitka willow), *Agrostis stolonifera* (creeping bentgrass), *Eleocharis palustris* (common spike-rush), *Populus balsamifera* ssp. *trichocarpa* (black cottonwood), and *Fraxinus latifolia* (Oregon ash). FAC and better species made up 98% of the total cover. Native species accounted for about 71% of the total cover in this area. The moisture index for this habitat type was 1.61, and 20% 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 *Agrostis castellana/capillaris* (dryland/colonial bentgrass). FAC and better species made up 95% of the total cover. Native species accounted for about 64% of the total cover in this area. The moisture index for this habitat type was 1.81, and 22% of the area was not vegetated.

Forested Habitat Type

This habitat type was dominated by *Agrostis castellana/capillaris* (dryland/colonial bentgrass), *Deschampsia cespitosa* (tufted hairgrass), *Salix sitchensis* (Sitka willow), *Hypochaeris radicata* (hairy cat's ear), *Equisetum arvense* (common horsetail), and *Vicia pannonica* (Hungarian vetch). FAC and better species made up 69% of the total cover. Native species accounted for about 47% of the total cover in this area. The moisture index for this habitat type was 2.97, and 24% of the area was not vegetated.

Marion Mitigation Bank Plant Monitoring, 2013 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**	**ENS-01**	**ENS-02**	**ENS-03**	**ENS-04**	**S-116**	**Mean**
Agrostis castellana/capillaris	dryland/colonial bentgrass		FAC	3	y													1		0.1
Agrostis exarata	spike bentgrass	yes	FACW	2	y												3			0.2
Agrostis stolonifera	creeping bentgrass		FACW	2	y				5	5	50		15	93						12.0
Alopecurus geniculatus	water foxtail		OBL	1	y									3						0.2
Ambrosia artemisiifolia	annual ragweed		FACU+	4									1	1						0.1
Anthemis cotula	mayweed chamomile/ stinking mayweed		FACU	4									24	1						1.8
Beckmannia syzigachne	American slough grass	yes	OBL	1	y								1		20	25	7			3.8
Bidens frondosa	leafy beggar's-tick	yes	FACW+	2	y								5							0.4
Carex obnupta	slough sedge	yes	OBL	1	y		65		57	85	6									15.2
Convolvulus arvensis	field bindweed		NOL	5	u														1	0.1
Deschampsia cespitosa	tufted hairgrass	yes	FACW	2	y													2		0.1
Eleocharis palustris	common [creeping] spike-rush	yes	OBL	1	y	28	2	12	5		8	57							22.0	9.6
Epilobium ciliatum	fringed willowherb	yes	FACW-	2	y								1		3	28	2	2		2.6
Epilobium densiflora	dense spike-primrose	yes	FACW-	2	y									5						0.4
Fraxinus latifolia	Oregon ash	yes	FACW	2	y								75							5.4
Gratiola ebracteata	bractless hedgehyssop	yes	OBL	1	y														5	0.4
Hordeum brachyantherum	meadow barley	yes	FACW-	2	y										60	22	50	65		14.1
Hypochaeris radicata	hairy cat's ear		FACU	4									1	1						0.1
Juncus articulatus	jointed rush	yes	OBL	1	y			5	2		10	2								1.4
Juncus effusus	soft rush	yes	FACW	2	y						12									0.9
Lactuca serriola	prickly lettuce		FACU	4												1		1		0.1
Ludwigia palustris	marsh seedbox	yes	OBL	1	y			5			3	10								1.3
Lythrum portula	spatulaleaf loosestrife		OBL	1	y			2					45						20	4.8
Mentha pulegium	pennyroyal		OBL	1	y		1	78	14	7	11	45	7						42	14.6
Plagiobothrys scouleri	Scouler's popcornflower	yes	FACW	2	y								3	8					1	0.9
Polygonum hydropiperoides	waterpepper	yes	OBL	1	y	62														4.4
Populus balsamifera ssp. trichocarpa	black cottonwood	yes	FAC	3	y					70	6									5.4
Salix hookeriana	Hooker willow	yes	FACW	2	y						18									1.3
Salix lucida ssp. lasiandra	Pacific [red] willow	yes	FACW+	2	y	2		1		25										2.0
Salix sitchensis	Sitka willow	yes	FACW	2	y		95		50			35					1	5		13.3
Schoenoplectus acutus	hardstem bulrush	yes	OBL	1	y						1									0.1
Spiraea douglasii	Douglas' spiraea	yes	FACW	2	y		7													0.5
bare (soil, mud, rock)	DOES NOT INCLUDE CANOPY, IF ANY								2		3		17	1	5	3	5	15	20	5.1
algae, moss, duff, dead vegetation, etc. (incl. sprayed veg.)	"					30		20	5	10	22	20	1	1	15	25	35	20	5	14.9
standing water (inches)						18		6			1	8								
			Total cover:			92	170	103	133	192	125	149	178	112	83	76	63	76	91	117
			FAC and better cover:			92	170	103	133	192	125	149	152	109	83	75	63	75	90	115
			Native cover:			92	169	23	114	180	64	104	85	13	83	75	63	74	28	83
			Percent FAC and better of total:			100	100	100	100	100	100	100	85	97	100	99	100	99	99	98
			Percent native of total:			100	99	22	86	94	51	70	48	12	100	99	100	97	31	71
																	Soil Moisture Index:			1.61

Marion Mitigation Bank Plant Monitoring, 2013 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						70	30							7.7
Agrostis stolonifera	creeping bentgrass		FACW	2	y				80	82			12		10			10	14.9
Alopecurus geniculatus	water foxtail		OBL	1	y					15							17		2.5
Anthemis cotula	mayweed chamomile/ stinking mayweed		FACU	4					1										0.1
Beckmannia syzigachne	American slough grass	yes	OBL	1	y								38				1	2	3.2
Bromus hordeaceus ssp. hordeaceus	soft brome		FACU	4								25							1.9
Callitriche sp.	water starwort	NA	OBL	1	y								32						2.5
Carex feta	green-sheathed sedge	yes	FACW	2	y					6									0.5
Carex obnupta	slough sedge	yes	OBL	1	y	40	85	60						8					14.8
Cerastium glomeratum	sticky chickweed		UPL	5								1							0.1
Daucus carota	wild carrot/ Queen Anne's lace		NOL	5	u							2							0.2
Deschampsia cespitosa	tufted hairgrass	yes	FACW	2	y	3						7			1		48		4.5
Eleocharis acicularis	needle spike-rush	yes	OBL	1	y	30							2		16	90	10		11.4
Eleocharis palustris	common [creeping] spike-rush	yes	OBL	1	y	3		15	8	2						4		5	2.8
Epilobium brachycarpum	tall annual willow-herb	yes	UPL	5								2							0.2
Fraxinus latifolia	Oregon ash	yes	FACW	2	y				47										3.6
Galium aparine	catchweed bedstraw/ cleavers	yes	FACU	4							3								0.2
Geranium sp.	geranium	NA	---	5	u							4							0.3
Gratiola ebracteata	bractless hedgehyssop	yes	OBL	1	y										18				1.4
Holcus lanatus	common velvetgrass		FAC	3	y						5	1							0.5
Hordeum brachyantherum	meadow barley	yes	FACW-	2	y							26							2.0
Hypochaeris radicata	hairy cat's ear		FACU	4		3				4		1							0.6
Juncus articulatus	jointed rush	yes	OBL	1	y	3	2												0.4
Lactuca serriola	prickly lettuce		FACU	4								2							0.2
Lathyrus sphaericus	grass peavine		NOL	5	u					1									0.1
Lolium arundinacea	tall fescue		FAC-	3							1								0.1
Lotus corniculatus	birdsfoot trefoil		FAC	3	y	2													0.2
Ludwigia palustris	marsh seedbox	yes	OBL	1	y		4	1											0.4
Lythrum portula	spatulaleaf loosestrife		OBL	1	y	1									15		10		2.0
Mentha pulegium	pennyroyal		OBL	1	y	45	18	10	4	4			1		37	4	5	5	10.2
Phalaris arundinacea	reed-canary grass	invasive	FACW	2	y									1		1			0.2
Plagiobothrys scouleri	Scouler's popcornflower	yes	FACW	2	y												1		0.1
Plantago major	broadleaf plantain		FAC	3	y				4										0.3
Populus balsamifera ssp. trichocarpa	black cottonwood	yes	FAC	3	y		22									28			3.8
Salix sitchensis	Sitka willow	yes	FACW	2	y		20	82			98			60		45			23.5
Spiraea douglasii	Douglas' spiraea	yes	FACW	2	y			1					47	55	27				10.0

Marion Mitigation Bank Plant Monitoring, 2013 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**
Trifolium repens	white clover		FAC-	3		4													0.3
Vicia hirsuta	tiny vetch		NOL	5	u							15							1.2
Vicia pannonica	Hungarian vetch		NOL	5	u							7							0.5
Vicia sativa	common vetch		UPL	5							1								0.1
bare (soil, mud, rock)	DOES NOT INCLUDE CANOPY, IF ANY					8	2					6		2	5	3	5	5	2.8
algae, moss, duff, dead vegetation, etc. (incl. sprayed veg.)	"					6	6	2	15	5	20	2	5	80	20	3	12	80	19.7
standing water (inches)							1	2								2			
			Total cover:			134	151	169	144	114	178	123	132	124	124	172	92	22	129
			FAC and better cover:			127	151	169	143	109	173	64	132	124	124	172	92	22	123
			Native cover:			79	133	159	55	8	101	35	87	123	62	167	60	7	83
			Percent FAC and better of total:			95	100	100	99	96	97	52	100	100	100	100	100	100	95
			Percent native of total:			59	88	94	38	7	57	28	66	99	50	97	65	32	64
																Soil Moisture Index:			1.81

Marion Mitigation Bank Plant Monitoring, 2013 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**
Agrostis castellana/capillaris	dryland/colonial bentgrass		FAC	3	y				30			37	45				55	13.9
Aira caryophyllea	silver hairgrass		FACU	4								5						0.4
Alopecurus geniculatus	water foxtail		OBL	1	y												2	0.2
Bidens frondosa	leafy beggar's-tick	yes	FACW+	2	y												8	0.7
Bromus hordeaceus ssp. hordeaceus	soft brome		FACU	4								25	20	3				4.0
Bromus sterilis	barren brome		NOL	5	u							2						0.2
Carex leptopoda	Dewey's sedge	yes	FAC	3	y			4										0.3
Carex obnupta	slough sedge	yes	OBL	1	y						45							3.8
Centaurium erythraea	European centaury		FAC	3	y					1					1			0.2
Cirsium vulgare	bull [common] thistle		FACU	4					1									0.1
Convolvulus arvensis	field bindweed		NOL	5	u								4					0.3
Cornus sericea	redosier dogwood	yes	FACW	2	y			4										0.3
Daucus carota	wild carrot/ Queen Anne's lace		NOL	5	u				15	1			5		2			1.9
Deschampsia cespitosa	tufted hairgrass	yes	FACW	2	y		12	17		37	25					50		11.8
Epilobium brachycarpum	tall annual willow-herb	yes	UPL	5					1									0.1
Epilobium ciliatum	fringed willowherb	yes	FACW-	2	y	3				1	1							0.4
Equisetum arvense	common [field] horsetail	yes	FAC	3	y				6					87				7.8
Festuca rubra	red fescue		FAC+	3	y				35									2.9
Fraxinus latifolia	Oregon ash	yes	FACW	2	y										15		33	4.0
Galium aparine	catchweed bedstraw/ cleavers	yes	FACU	4										8				0.7
Galium parisiense	creeping [wall] bedstraw		UPL	5									6					0.5
grass	NA	NA	---	5	u	10												0.8
Holcus lanatus	common velvetgrass		FAC	3	y				15					25	2			3.5
Hypochaeris radicata	hairy cat's ear		FACU	4						27					17	1	65	9.2
Juncus articulatus	jointed rush	yes	OBL	1	y			4		1	9							1.2
Juncus effusus	soft rush	yes	FACW	2	y		12	16			1				1			2.5
Juncus patens	spreading rush	yes	FACW	2	y			25							8			2.8
Juncus tenuis	slender rush	yes	FACW-	2	y			2							5			0.6
Lactuca serriola	prickly lettuce		FACU	4		1												0.1
Lolium arundinacea	tall fescue		FAC-	3					12						4			1.3
Lotus corniculatus	birdsfoot trefoil		FAC	3	y						26							2.2
Lotus unifoliolatus var. unifoliolatus	Spanish clover	yes	UPL	5												7		0.6
Mentha pulegium	pennyroyal		OBL	1	y	2										28	4	2.8
Parentucellia viscosa	parentucellia		FAC-	3							1		2				1	0.3
Phalaris arundinacea	reed-canary grass	invasive	FACW	2	y					1								0.1
Plagiobothrys scouleri	Scouler's popcornflower	yes	FACW	2	y												4	0.3
Poa compressa	Canada bluegrass		FACU+	4								3						0.3
Rumex acetosella	sheep [red] sorrel		FACU+	4								1						0.1
Salix lucida ssp. lasiandra	Pacific [red] willow	yes	FACW+	2	y			20										1.7

Marion Mitigation Bank Plant Monitoring, 2013 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**
Salix sitchensis	Sitka willow	yes	FACW	2	y		98	35										11.1
Sonchus asper	prickly sow-thistle		FAC-	3		1												0.1
Spiraea douglasii	Douglas' spiraea	yes	FACW	2	y	1	5											0.5
Trifolium repens	white clover		FAC-	3						2								0.2
Typha latifolia	cattail	yes	OBL	1	y			1										0.1
Vicia hirsuta	tiny vetch		NOL	5	u								3					0.3
Vicia pannonica	Hungarian vetch		NOL	5	u				15			45		5	10			6.3
Vicia sativa	common vetch		UPL	5					10									0.8
Vicia tetrasperma	four-seeded vetch		NOL	5	u	12				1					7		10	2.5
Vulpia bromoides	barren fescue		UPL	5								10	30					3.3
bare (soil, mud, rock)	DOES NOT INCLUDE CANOPY, IF ANY					5				5	1	2	1		1	8		1.9
algae, moss, duff, dead vegetation, etc. (incl. sprayed veg.)	"					65	75	37	3	25	25	15	5	0	7	10	1	22.3
standing water (inches)																		
			Total cover:			30	127	128	140	72	108	128	115	128	72	86	182	110
			FAC and better cover:			6	127	128	86	41	107	37	45	112	32	78	106	75
			Native cover:			4	127	128	7	39	81	0	0	95	29	57	45	51
			Percent FAC and better of total:			20	100	100	61	57	99	29	39	88	44	91	58	69
			Percent native of total:			13	100	100	5	54	75	0	0	74	40	66	25	47
															Soil Moisture Index:			2.97

Marion Mitigation Bank Plant Monitoring, 2013 Phase 1

		Percent FAC and better										Percent native									
Habitat	Station	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
E	E-003	86	100	100	100	100	100	100	100	100		85	89	56	80	95	55	71	100	100	
E	E-053	80	60	100	100	100	100	100	100	100		64	84	98	99	98	99	99	99	99	
E	E-066	99	100	100	100	100	100	100	100	100		43	48	50	56	29	52	35	50	22	
E	E-079	100	100	99	99	100	100	100	100	100		32	47	86	97	94	97	94	97	86	
E	E-080	100	100	96	99	100	99	100	100	100		39	60	78	82	72	69	55	92	94	
E	EN-008	N	100	58	100	100	100	100	100	100		N	82	31	76	61	41	40	64	51	
E	EN-052	N	100	68	100	100	100	100	100	100		N	98	64	83	69	58	54	66	70	
E	EN-070	N	82	99	90	36	99	90	97	85		N	48	90	68	27	14	27	66	48	
E	EN-076	N	87	100	100	R	100	100	100	97		N	48	95	23	R	8	2	1	12	
E	ENS-01	N	N	N	N	N	N	N	N	100		N	N	N	N	N	N	N	N	100	
E	ENS-02	N	N	N	N	N	N	N	N	99		N	N	N	N	N	N	N	N	99	
E	ENS-03	N	N	N	N	N	N	N	N	100		N	N	N	N	N	N	N	N	100	
E	ENS-04	N	N	N	N	N	N	N	N	99		N	N	N	N	N	N	N	N	97	
E	S-116	100	87	56	100	100	100	100	100	99		94	12	36	77	40	76	30	29	31	
F	E-082	N	90	86	91	98	93	99	100	20		M	63	57	72	68	73	82	74	13	
F	F-033	87	95	81	97	99	100	100	100	100		12	75	72	95	97	98	99	100	100	
F	F-034	81	87	93	100	98	98	100	99	100		42	91	90	98	98	98	100	100	100	
F	F-071	33	44	18	54	S	35	59	73	61		1	1	0	1	S	0	3	2	5	
F	F-096	53	50	67	55	63	59	91	97	57		14	26	28	29	43	55	86	94	54	
F	F-097	76	73	72	84	74	84	98	100	99		44	57	50	61	68	73	78	91	75	
F	F-103	38	59	62	95	R	22	38	16	29		1	1	0	0	R	2	1	0	0	
F	F-144	9	16	40	21	R	31	40	42	39		3	1	1	3	R	2	0	0	0	
F	F-149	77	65	63	61	R	45	81	87	88		42	62	11	54	R	50	74	82	74	
F	F-205	47	58	56	74	57	76	69	61	44		6	7	7	10	11	17	27	34	40	
F	S-056	13	69	68	88	72	84	95	97	91		0	18	29	27	31	62	61	66	66	
F	S-119	77	42	46	65	50	78	85	89	58		11	15	5	8	7	8	16	46	25	
S	E-035	26*	82	94	97	75	79	89	97	95		4	17	70	12	29	11	30	57	59	
S	E-052	100	98	100	100	89	100	100	100	100		61	22	83	73	81	79	85	94	88	
S	E-086	100	100	99	100	100	100	100	100	100		56	66	72	48	53	71	75	85	94	
S	E-109	100	86	99	99	90	93	99	100	99		33	16	39	43	52	37	31	44	38	
S	E-123	71	96	70	97	93	81	98	100	96		60	57	36	20	21	17	3	11	7	
S	F-009	***21***	***39***	95	95	97	99	98	67	97		3	14	39	47	53	48	49	52	57	
S	S-011	45	27	12	17	7	41	76	42	52		10	2	4	0	3	2	9	34	28	
S	S-020	80	90	99	100	100	100	100	100	100		88	47	81	65	83	31	48	65	66	
S	S-021	100	99	92	97	99	100	100	100	100		28	43	59	46	31	48	45	60	99	
S	S-040	100	98	99	100	100	100	100	100	100		42	42	81	59	50	53	48	63	50	
S	S-046	84	94	100	100	100	100	100	100	100		65	41	80	83	94	92	87	98	97	
S	S-058	68	97	89	100	100	100	100	100	100		59	20	78	34	76	51	24	63	65	
S	S-155	M	99	87	96	98	90	98	100	100		M	66	57	41	67	15	6	16	32	

*location error? N = no data R = remediated S = sprayed

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

Marion Mitigation Bank Phase II Vegetation Monitoring - 2013

Introduction, Summary, and Methods

This report summarizes vegetation assessment and monitoring conducted at Phase II of the Marion Mitigation Bank (MMB) site on June 2nd and 7th, 2013. The following table presents a summary of the 2013 vegetation sampling results:

MMB Phase 2 Habitats	Emergent	Scrub/Shrub	Forested
Percent FAC and better cover	100	95	87
Percent native cover	94	85	67
Percent non-vegetated (under canopy)	25	54	11

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 2012. 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 *Polygonum hydropiperoides* (waterpepper), *Juncus effusus* (soft rush), *Salix lucida* ssp. *lasiandra* (Pacific willow), *Lemna minor* (duckweed), *Salix sitchensis* (Sitka willow), *Ludwigia palustris* (marsh seedbox), and *Spirodela polyrrhiza* (common duckmeat). FAC and better species made up 100% of the total cover. Native species accounted for about 94% of the total cover in this area. The moisture index for this habitat type was 1.53, and 25% of the area was not vegetated.

Scrub/Shrub Habitat Type

This habitat type was dominated by *Salix sitchensis* (Sitka willow), *Salix hookeriana* (Hooker willow), *Salix lucida* ssp. *lasiandra* (Pacific willow), *Equisetum arvense* (common horsetail), *Juncus effusus* (soft rush), *Alnus rhombifolia* (white alder), and *Holcus lanatus* (common velvetgrass). The *Alnus* was only in one quadrat. FAC and better species made up 95% of the total cover. Native species accounted for about 85% of the total cover in this area. The moisture index for this habitat type was 2.21, and 54% of the area was not vegetated.

Forested Habitat Type

This habitat type was dominated by *Salix sitchensis* (Sitka willow), *Lemna minor* (duckweed), *Phalaris arundinacea* (reed-canary grass), *Alnus rhombifolia* (white alder), *Holcus lanatus* (common velvetgrass), *Salix lucida* ssp. *lasiandra* (Pacific willow), *Holcus mollis* (creeping velvetgrass), *Elodea canadensis* (Canadian waterweed), *Poa trivialis* (roughstalk bluegrass), *Eleocharis palustris* (creeping spikerush), and *Spiraea douglasii* (Douglas' spiraea). The *Alnus*, *Holcus mollis*, *Elodea*, and *Poa* were in only one quadrat each. FAC and better species made up 87% of the total cover. Native species accounted for about 67% of the total cover in this area. The moisture index for this habitat type was 2.04, and 11% of the area was not vegetated.

Appendix 1

Vegetation Monitoring Report

2013

Marion Mitigation Bank Plant Monitoring, 2013 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**
Azolla mexicana	mexican mosquito-fern [water-fern]	yes	OBL	1	y	1	1					5				0.7
Carex feta	green-sheathed sedge	yes	FACW	2	y					4						0.4
Deschampsia cespitosa	tufted hairgrass	yes	FACW	2	y					3						0.3
Eleocharis acicularis	needle spikerush	yes	OBL	1	y					2						0.2
Eleocharis ovata	ovate spikerush	yes	OBL	1	y										2	0.2
Eleocharis palustris	common [creeping] spikerush	yes	OBL	1	y	15		10						2		2.7
Elodea canadensis	Canadian waterweed	yes	OBL	1	y			5					18			2.3
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	4				8	20				5	3.7
Holcus lanatus	common velvetgrass		FAC	3	y					28						2.8
Juncus effusus	soft rush	yes	FACW	2	y		32	7	75	12	68	5	5		15	21.9
Juncus ensifolius	dagger-leaf rush	yes	FACW	2	y					7						0.7
Juncus tenuis	slender rush	yes	FACW-	2	y										1	0.1
Lemna minor	duckweed	yes	OBL	1	y	5	23	12	50			40	10	8	7	15.5
Ludwigia palustris	marsh seedbox	yes	OBL	1	y	82		1	22						10	11.5
Mentha pulegium	pennyroyal		OBL	1	y	1										0.1
Phalaris arundinacea	reed-canary grass	invasive	FACW	2	y										30	3.0
Polygonum hydropiperoides	waterpepper	yes	OBL	1	y	25	8	3	22			60	27	57	20	22.2
Potamogeton sp.	pondweed	NA	OBL	1	y	17										1.7
Salix hookeriana	Hooker willow	yes	FACW	2	y								18			1.8
Salix lucida ssp. lasiandra	Pacific [red] willow	yes	FACW+	2	y						47	55	75			17.7
Salix sitchensis	Sitka willow	yes	FACW	2	y	2				27	8			80	10	12.7
Sparganium emersum	European bur-reed	yes	OBL	1	y			2	2					5		0.9
Spirodela polyrrhiza	common duckmeat	yes	OBL	1	y							30	15	10		5.5
Trifolium repens	white clover		FAC-	3						6						0.6
Wolffia borealis	northern watermeal	yes	OBL	1	y		5	8	10				1			2.4
bare (soil, mud, rock)										15	2					1.7
algae, moss, duff, dead vegetation, etc. (incl. sprayed veg.)						5	58	55	2	30	30	2	15	25	10	23.2
standing water (inches)						10	24	16	10		2	16	24	12	1	
			Total cover:			152	69	48	181	97	145	195	169	162	100	132
			FAC and better cover:			152	69	48	181	91	145	195	169	162	100	131
			Native cover:			134	69	48	181	63	145	195	169	162	70	124
			Percent FAC and better of total:			100	100	100	100	94	100	100	100	100	100	100
			Percent native of total:			88	100	100	100	65	100	100	100	100	70	94
															Moisture Index:	1.53

Marion Mitigation Bank Plant Monitoring, 2013 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**
Agrostis castellana/capillaris	dryland/colonial bentgrass		FAC	3	y	2							12			1.4
Alnus rhombifolia	white alder	yes	FACW	2	y										99	9.9
Azolla mexicana	mexican mosquito-fern [water-fern]	yes	OBL	1	y			10								1.0
Bidens frondosa	leafy beggar's-tick	yes	FACW+	2	y										1	0.1
Callitriche sp.	water starwort	NA	OBL	1	y						27					2.7
Deschampsia cespitosa	tufted hairgrass	yes	FACW	2	y		1									0.1
Eleocharis palustris	common [creeping] spikerush	yes	OBL	1	y									17		1.7
Elodea canadensis	Canadian waterweed	yes	OBL	1	y									22		2.2
Epilobium ciliatum	fringed willowherb	yes	FACW-	2	y			1								0.1
Equisetum arvense	common [field] horsetail	yes	FAC	3	y	70				20					40	13.0
Fraxinus latifolia	Oregon ash	yes	FACW	2	y			3								0.3
Galium aparine	catchweed bedstraw/ cleavers	yes	FACU	4											2	0.2
grass seedlings	NA	NA	---	5	u						1					0.1
Holcus lanatus	common velvetgrass		FAC	3	y	25	10					25	28			8.8
Holcus mollis	creeping velvetgrass		FACU	4											38	3.8
Hypochaeris radicata	hairy cat's ear		FACU	4									2			0.2
Juncus effusus	soft rush	yes	FACW	2	y		30	65				5				10.0
Lemna minor	duckweed	yes	OBL	1	y			5								0.5
Lotus corniculatus	birdsfoot trefoil		FAC	3	y							6				0.6
Ludwigia palustris	marsh seedbox	yes	OBL	1	y			2								0.2
Mentha pulegium	pennyroyal		OBL	1	y			1								0.1
Polygonum hydropiperoides	waterpepper	yes	OBL	1	y									1		0.1
Populus balsamifera ssp. trichocarpa	black cottonwood	yes	FAC	3	y		17									1.7
Rubus discolor	Himalayan blackberry	invasive	FACU	4					1				1			0.2
Salix hookeriana	Hooker willow	yes	FACW	2	y	70				10	60		95			23.5
Salix lucida ssp. lasiandra	Pacific [red] willow	yes	FACW+	2	y		25	8	99							13.2
Salix sitchensis	Sitka willow	yes	FACW	2	y		22	2		98	20	99				24.1
Senecio jacobaea	tansy ragwort	invasive	FACU	4									2			0.2
Spiraea douglasii	Douglas' spiraea	yes	FACW	2	y			1								0.1
Trifolium pratense	red clover		FACU	4									8			0.8
Veronica americana	American speedwell	yes	OBL	1	y	20		8			2					3.0
Vicia sativa	common vetch		UPL	5		2										0.2
bare (soil, mud, rock)							2		30				1	5		3.8

Marion Mitigation Bank Plant Monitoring, 2013 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**
algae, moss, duff, dead vegetation, etc. (incl. sprayed veg.)							58	30	69	80	70	65	50	55	22	49.9
standing water (inches)								5		trace	1			24	trace	
			Total cover:			189	105	106	100	128	110	135	148	40	180	124
			FAC and better cover:			187	105	106	99	128	109	135	135	40	140	118
			Native cover:			160	95	105	99	128	82	104	95	40	142	105
			Percent FAC and better of total:			99	100	100	99	100	99	100	91	100	78	95
			Percent native of total:			85	90	99	99	100	75	77	64	100	79	85
															Moisture Index:	2.21

Marion Mitigation Bank Plant Monitoring, 2013 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**
Alisma gramineum	narrowleaf water plantain	yes	OBL	1	y	1	1									0.2
Alnus rhombifolia	white alder	yes	FACW	2	y			90							45	13.5
Azolla mexicana	mexican mosquito-fern [water-fern]	yes	OBL	1	y						1					0.1
Bromus hordeaceus ssp. hordeaceus	soft brome		FACU	4								5				0.5
Cerastium glomeratum	sticky chickweed		UPL	5									5			0.5
Daucus carota	wild carrot/ Queen Anne's lace		NOL	5	u							8	1			0.9
Deschampsia cespitosa	tufted hairgrass	yes	FACW	2	y							3				0.3
Eleocharis palustris	common [creeping] spikerush	yes	OBL	1	y	65	12									7.7
Elodea canadensis	Canadian waterweed	yes	OBL	1	y						95					9.5
Epilobium ciliatum	fringed willowherb	yes	FACW-	2	y							7			2	0.9
Equisetum arvense	common [field] horsetail	yes	FAC	3	y								3			0.3
Galium aparine	catchweed bedstraw/ cleavers	yes	FACU	4										2		0.2
Holcus lanatus	common velvetgrass		FAC	3	y							42	35		40	11.7
Holcus mollis	creeping velvetgrass		FACU	4										97		9.7
Hordeum brachyantherum	meadow barley	yes	FACW-	2	y										12	1.2
Hypochaeris radicata	hairy cat's ear		FACU	4								13	6			1.9
Juncus effusus	soft rush	yes	FACW	2	y	7										0.7
Lemna minor	duckweed	yes	OBL	1	y	20	87	1	25	55	12					20.0
Leucanthemum vulgare	oxeye daisy		UPL	5								5	1			0.6
Ludwigia palustris	marsh seedbox	yes	OBL	1	y	2	35			20						5.7
Parentucellia viscosa	parentucellia		FAC-	3								1	12			1.3
Phalaris arundinacea	reed-canary grass	invasive	FACW	2	y		20	80	42							14.2
Poa sp.	bluegrass	NA	---	5	u			20								2.0
Poa trivialis	rough [roughstalk] bluegrass		FACW	2	y										80	8.0
Polygonum hydropiperoides	waterpepper	yes	OBL	1	y				1	5						0.6
Populus balsamifera ssp. trichocarpa	black cottonwood	yes	FAC	3	y								10			1.0
Rubus ursinus	trailing blackberry	yes	FACU	4											8	0.8
Rumex acetosella	sheep [red] sorrel		FACU+	4								5	1			0.6
Salix lucida ssp. lasiandra	Pacific [red] willow	yes	FACW+	2	y	30	5		68							10.3
Salix sitchensis	Sitka willow	yes	FACW	2	y				47	95				68		21.0
Senecio jacobaea	tansy ragwort	invasive	FACU	4									4			0.4
Spiraea douglasii	Douglas' spiraea	yes	FACW	2	y				50					25		7.5
Spirodela polyrrhiza	common duckmeat	yes	OBL	1	y	5	10									1.5
Trifolium repens	white clover		FAC-	3								7	8			1.5
Typha latifolia	cattail	yes	OBL	1	y		20									2.0

Marion Mitigation Bank Plant Monitoring, 2013 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**
Veronica americana	American speedwell	yes	OBL	1	y		10	3								1.3
Vicia hirsuta	tiny vetch		NOL	5	u								5			0.5
Vicia pannonica	Hungarian vetch		NOL	5	u							3				0.3
Vicia sativa	common vetch		UPL	5										7		0.7
Wolffia borealis	northern watermeal	yes	OBL	1	y				25	28	2					5.5
bare (soil, mud, rock)								5			40	2	8		1	5.6
algae, moss, duff, dead vegetation, etc. (incl. sprayed veg.)						8	2	10	5	5	10	5	10	1	2	5.8
standing water (inches)						5	5	2	16	8	6					
			Total cover:			130	200	194	258	203	110	99	91	199	187	167
			FAC and better cover:			130	200	174	258	203	110	52	48	93	179	145
			Native cover:			130	180	94	216	203	110	10	13	95	67	112
			Percent FAC and better of total:			100	100	90	100	100	100	53	53	47	96	87
			Percent native of total:			100	90	48	84	100	100	10	14	48	36	67
														Moisture Index:		2.04

Marion Mitigation Bank Plant Monitoring, 2012 Phase 2

		Percent FAC and better										Percent native									
Habitat	**Station**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
E	E-020	100	100	100	100	100	100	100	100	100		40	90	56	39	29	44	57	98	88	
E	E-143	100	100	100	100	100	100	100	100	100		19	100	95	95	94	92	60	100	100	
E	E-160	100	100	100	100	100	100	100	100	100		52	89	98	95	95	81	64	100	100	
E	E-162	100	99	100	100	100	100	100	100	100		88	98	88	92	66	72	88	100	100	
E	F-083	15	38	34	64	72	85	90	86	94		3	8	5	6	4	21	50	47	65	
E	F-090	32	84	82	100	100	100	100	100	100		16	78	78	100	100	99	99	100	100	
E	F-103	98	100	95	100	100	100	100	97	100		50	85	79	99	99	94	99	99	100	
E	S-073	37	100	91	100	100	100	100	100	100		27	98	94	100	97	94	95	100	100	
E	S-140	100	100	100	100	100	100	100	100	100		85	97	98	53	49	26	28	100	100	
E	S-195	98	100	100	100	100	100	100	100	100		94	97	97	95	92	81	66	95	70	
F	E-014	100	100	100	100	100	100	100	100	100		84	100	98	100	100	100	100	100	100	
F	E-055	16	65	80	100	R	100	100	100	100		1	6	35	58	R	71	96	88	90	
F	E-081	76	98	100	100	100	100	87	92	90		57	96	58	65	56	98	83	82	48	
F	E-091	87	91	99	97	100	100	97	100	100		75	94	71	67	77	83	87	80	84	
F	E-112	84	93	100	100	100	100	100	100	100		53	63	79	47	48	26	95	99	100	
F	E-189	100	100	100	94	100	100	100	100	100		100	100	100	100	88	46	97	100	100	
F	F-006	13	79	58	67	R	4	32	76	53		0	0	0	3	R	2	0	15	10	
F	F-028	15	44	38	23	R	27	45	64	53		18	9	19	4	R	0	3	12	14	
F	F-049	20	74	49	22	R	1	4	34	47		0	0	0	0	R	2	6	34	48	
F	S-245	75	99	98	99	97	100	100	99	96		63	99	98	100	86	85	49	45	36	
S	F-070	68	52	81	57	81	95	100	99	99		15	28	9	24	19	75	84	73	85	
S	F-076	37	55	33	63	55	86	89	96	100		16	40	16	49	30	76	89	95	90	
S	F-106	66	89	93	100	100	100	100	98	100		32	82	72	100	100	100	100	100	99	
S	F-112	67	63	63	63	77	77	60	100	99		34	38	38	38	46	46	60	99	99	
S	S-022	89	82	100	100	100	100	100	100	100		52	81	80	83	75	53	87	80	100	
S	S-036	89	***44***	***17***	98	100	100	100	100	99		50	***25***	***19***	97	99	98	90	89	75	
S	S-056	38	57	66	87	92	96	99	98	100		1	15	30	48	71	80	73	75	77	
S	S-106	89	58	16	48	71	89	90	91	91		10	5	4	19	23	55	65	64	64	
S	S-153	100	99	100	100	100	100	100	100	100		93	99	100	97	89	52	100	100	100	
S	S-227	84	64	95	97	99	100	100	80	78		58	26	59	66	78	88	83	79	79	

location error? R = remediated

Marion Mitigation Bank Phase III Vegetation Monitoring - 2013

Introduction, Summary, and Methods

This report summarizes the vegetation assessment conducted at the Marion Mitigation Bank (MMB) Phase 3 site on June 1st and 7th, 2013. Vegetation monitoring at MMB Phase 3 followed the sampling design implemented in 2010. However, a change was made in how data were summarized. The ten Scrub/Shrub habitat sampling stations were re-identified as either Emergent habitat (3 stations) or Upland habitat (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 2013 wetland vegetation sampling results:

MMB Phase 3 Habitats	Emergent
Percent FAC and better cover	99
Percent native cover	89
Percent non-vegetated	27

Vegetative cover for one of the Emergent sampling stations was not assessed because it was 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), *Lemna minor* (duckweed), *Eleocharis palustris* (common spikerush), *Salix lucida* ssp. *lasiandra* (Pacific willow), *Wolffia borealis* (northern watermeal), and *Potamogeton* sp. (pondweed). Twenty of the 23 sampling stations had standing water on the soil surface at the time of sampling. FAC and better species made up 99% of the total cover. Native species accounted for about 89% of the total cover. The SMI for this habitat type was 1.26, and 27% of the area was not vegetated.

Oak Savannah Habitat Type

This habitat type currently includes 5 random sampling locations on the hill, 4 locations with one each centered on each of the perimeter berms (N, S, E, W), and 7 random sampling locations (previously Scrub/Shrub) on the interior and perimeter berms. This habitat type was dominated by *Agrostis castellana/capillaris* (dryland/colonial bentgrass), *Festuca idahoensis* ssp. *roemeri/ F. occidentalis* (Roemer's fescue/ western fescue), *Poa trivialis* (roughstalk bluegrass), *Vicia pannonica* (Hungarian vetch), *Lolium perenne* ssp. *multiflorum* (Italian ryegrass), *Bromus hordeaceus* ssp. *hordeaceus* (soft brome), *Poa compressa* (Canada bluegrass), *Geranium* sp., and *Trifolium repens* (white clover). Native species accounted for 25% of the total cover in this area, and about 28% of the area was not vegetated.

Marion Mitigation Bank Plant Monitoring, 2013 Phase 3

Emergent Habitat Type — w = deep water; no vegetation

Cover (%)

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
						Sample Station																							
Alisma gramineum	narrowleaf water plantain	yes	OBL	1	y	1				12											2			w	4				0.9
Alopecurus geniculatus	water foxtail		OBL	1	y													1						w			3	1	0.2
Azolla mexicana	mexican mosquito-fern [water-fern]	yes	OBL	1	y	15	1	45	81	55	20	20	40	20	1		1	2			8	3	35	w	60	20	15		20.1
Bidens frondosa	leafy beggar's-tick	yes	FACW+	2	y															1				w					0.0
Cerastium glomeratum	sticky chickweed		UPL	5																				w				2	0.1
Deschampsia cespitosa	tufted hairgrass	yes	FACW	2	y																			w				2	0.1
Eleocharis palustris	common [creeping] spikerush	yes	OBL	1	y	17			5		25			20		28	35	82	1			48	42	w	90		1		17.9
Elodea canadensis	Canadian waterweed	yes	OBL	1	y						12			2										w					0.6
Epilobium brachycarpum	tall annual willowherb	yes	UPL	5																				w				1	0.0
Epilobium ciliatum	fringed willowherb	yes	FACW-	2	y																			w				55	2.5
Geranium sp.	NA	NA	---	5	u																			w				17	0.8
Holcus lanatus	common velvetgrass		FAC	3	y																			w				20	0.9
Hordeum brachyantherum	meadow barley	yes	FACW-	2	y																			w				1	0.0
Juncus effusus	soft rush	yes	FACW	2	y									15						60	3			w					3.5
Leersia oryzoides	rice cut-grass	yes	OBL	1	y												1							w					0.0
Lemna minor	duckweed	yes	OBL	1	y	45	7	50	18	40	17	25	35	20	1	1	1	1	5		5	1	1	w		60	75		18.5
Lolium perenne	perennial ryegrass		FAC	3	y																			w				1	0.0
Ludwigia palustris	marsh seedbox	yes	OBL	1	y							4	2	2	1		3		3		3			w	8				1.2
Myriophyllum hippuroides	western watermilfoil	yes	OBL	1	y									10										w					0.5
Paspalum distichum	knotgrass	yes	FACW	2	y																			w	3				0.1
Phalaris arundinacea	reed-canary grass	Invasive	FACW	2	y			2		1									1		1			w			1		0.3
Poa trivialis	rough [roughstalk] bluegrass		FACW	2	y															1				w				42	2.0
Polygonum hydropiperoides	waterpepper	yes	OBL	1	y				1				7	2			1	1	3	2	3		1	w					1.0
Populus balsamifera ssp. trichocarpa	black cottonwood	yes	FAC	3	y					7														w					0.3
Potamogeton sp.	pondweed	NA	OBL	1	y						40								10					w		45	60		7.0
Salix hookeriana	Hooker willow	yes	FACW	2	y																5			w					0.2
Salix lucida ssp. lasiandra	Pacific [red] willow	yes	FACW+	2	y			15	5	50		70			35			2			27			w					9.3
Salix sitchensis	Sitka willow	yes	FACW	2	y																5			w			15		0.9
Sparganium emersum	European bur-reed	yes	OBL	1	y	40	18							1			16		5		2			w	2				3.8
Typha latifolia	cattail	yes	OBL	1	y			12																w					0.5
Vicia hirsuta	tiny vetch		NOL	5	u																			w				4	0.2
Wolffia borealis	northern watermeal	yes	OBL	1	y	1	1	1	1	15	15	10	15	10	25	35	2	1	10		20	2	8	w					7.8
bare (soil, mud, rock)	DOES NOT INCLUDE CANOPY, IF ANY																20			2								1	1.0
algae, moss, duff, dead vegetation, etc. (incl. sprayed veg.)	"					12	75	5			8	45	10	35	72	30	20	15	65	35	60	50	35		1			8	26.4
standing water (inches)						16	18	8	8	12	16	1	16	18	20	20	12	12	10		2	24	16	?		20	18		
			Total cover:			119	27	125	111	180	129	129	99	102	63	64	60	90	38	64	84	54	87	NA	167	125	170	146	102
			FAC and better cover:			119	27	125	111	180	129	129	99	102	63	64	60	90	38	64	84	54	87	0	167	125	170	122	100
			Native cover:			119	27	123	111	179	89	129	99	102	63	64	60	89	27	63	83	54	87	0	167	80	106	59	90
			Percent FAC and better of total:			100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	NA	100	100	100	84	99
			Percent native of total:			100	100	98	100	99	69	100	100	100	100	100	100	99	71	98	99	100	100	NA	100	64	62	40	89
																												Moisture Index:	1.26

Marion Mitigation Bank Plant Monitoring, 2013 Phase 3

Oak Savannah Habitat Type

Cover (%)

ND = No data collected in 2013

			Sample Station																
Species	**Common Name**	**Native**	**O-7**	**O-27**	**O-28**	**O-59**	**O-60**	**O-EB**	**O-NB**	**O-SB**	**O-WB**	**S-002**	**S-037**	**S-055**	**S-075**	**S-076**	**S-100**	**S-103**	**Mean**
Agrostis castellana/capillaris	dryland/colonial bentgrass		60					45		85	10	33		12	ND	ND			17.5
Bromus hordeaceus ssp. hordeaceus	soft brome		4					7		10	40	20			ND	ND			5.8
Bromus sitchensis	Alaska brome	yes		10	12	25		1			2				ND	ND			3.6
Bromus sterilis	barren brome											10	8		ND	ND			1.3
Cerastium glomeratum	sticky chickweed								1						ND	ND		1	0.1
Daucus carota	wild carrot/ Queen Anne's lace		5			1			1						ND	ND			0.5
Elymus glaucus	blue wildrye	yes		5	5	15									ND	ND			1.8
Epilobium brachycarpum	tall annual willowherb	yes		1	1										ND	ND		3	0.4
Epilobium ciliatum	fringed willowherb	yes													ND	ND	5	12	1.2
Equisetum arvense	common [field] horsetail	yes													ND	ND	2		0.1
Festuca idahoensis ssp. roemeri/ F. occidentalis	Roemer's fescue/ western fescue	yes	55	40	35	48	25								ND	ND			14.5
Galium aparine	catchweed bedstraw/ cleavers	yes		2	15	7							8		ND	ND		1	2.4
Geranium sp.	NA	NA		8				22	17	1	15	5	2		ND	ND	1	3	5.3
Holcus lanatus	common velvetgrass		1					1	2		2	12	2	10	ND	ND	1	2	2.4
Hordeum brachyantherum	meadow barley	yes										2		5	ND	ND			0.5
Lolium arundinacea	tall fescue							1							ND	ND			0.1
Lolium perenne	perennial ryegrass												5		ND	ND		1	0.4
Lolium perenne ssp. multiflorum	Italian ryegrass			10					75						ND	ND			6.1
Lotus corniculatus	birdsfoot trefoil													6	ND	ND			0.4
Mentha pulegium	pennyroyal								2						ND	ND			0.1
Myosotis discolor	yellow and blue forget-me-not												3	1	ND	ND		3	0.5
Parentucellia viscosa	parentucellia				1				8				1		ND	ND			0.7
Phalaris arundinacea	reed-canary grass	invasive	1				1			2					ND	ND			0.3
Plantago lanceolata	buckhorn plantain										7				ND	ND			0.5
Poa compressa	Canada bluegrass					5		20		5	50				ND	ND			5.7
Poa trivialis	rough [roughstalk] bluegrass							5	4		10		80	10	ND	ND	1	2	8.0
Rubus discolor	Himalayan blackberry	invasive			1										ND	ND			0.1
Rumex acetosella	sheep [red] sorrel			7		2	1								ND	ND			0.7
Rumex crispus	curly dock													1	ND	ND			0.1
Senecio jacobaea	tansy ragwort	invasive											5		ND	ND			0.4
Sonchus asper	prickly sow-thistle												5		ND	ND			0.4
Trifolium repens	white clover							3	27			18	12		ND	ND			4.3
Vicia hirsuta	tiny vetch			1						12	3		10		ND	ND		3	2.1
Vicia pannonica	Hungarian vetch			1		1		1	9	3	30	30	5	4	ND	ND	1	1	6.1
Vicia sativa	common vetch							1	2	2	10	22	23		ND	ND			4.3
Vicia tetrasperma	four-seeded vetch									5					ND	ND			0.4
Vulpia bromoides	barren fescue		10						10	5					ND	ND			1.8
bare (soil, mud, rock)	DOES NOT INCLUDE CANOPY, IF ANY		1	2		1	2				1			2			3	2	1.0
algae, moss, duff, dead vegetation, etc. (incl. sprayed veg.)	"		3	15	30	10	72	5	5	3	1			70			90	70	26.7
	Total cover:		136	85	70	104	27	107	158	130	179	152	169	49	NA	NA	11	32	99
	Native cover:		55	58	68	95	25	1	0	0	2	2	8	5	NA	NA	7	16	24
	Percent native of total:		40	68	97	91	93	1	0	0	1	1	5	10	NA	NA	64	50	25

Marion Mitigation Bank Plant Monitoring, 2013 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	100	98	100		
E	E-047	100	100	100	100			7	73	100	100		
E	E-051	100	100	100	100			40	92	88	98		
E	E-052	100	100	100	100			90	89	81	100		
E	E-070	100	100	100	100			32	93	69	99		
E	E-078	100	100	100	100			19	62	100	69		
E	E-138	100	100	100	100			80	94	71	100		
E	E-219	100	100	NA	100			100	100	NA	100		
E	E-315	100	100	100	100			76	100	100	100		
E	E-316	99	100	100	100			88	88	87	100		
E	E-327	100	100	100	100			98	95	100	100		
E	E-224	100	100	100	100			80	96	100	100		
E	E-269	NA	100	100	100			NA	100	100	99		
E	E-282	NA	NA	100	100			NA	NA	100	71		
E	E-299	NA	100	100	100			NA	100	93	98		
E	E-304	NA	100	100	100			NA	100	92	99		
E	E-348	NA	100	100	100			NA	100	100	100		
E	E-349	NA	100	100	100			NA	100	100	100		
E	E-375	NA	NA	NA	NA			NA	NA	NA	NA		
E	E-389	NA	100	100	100			NA	100	100	100		
E	S-027	100	100	100	100			13	48	100	64		
E	S-028	100	100	100	100			12	40	96	62		
E	S-105	74	95	98	84			0	3	60	40		
U	S-002	8	68	[38]	NA			0	65	[15]	NA		
U	S-037	70	38	[51]	NA			2	11	[0]	NA		
U	S-055	73	88	[92]	NA			13	10	[6]	NA		
U	S-075	100	98	[100]	NA			23	44	[2]	NA		
U	S-076	46	72	[79]	NA			10	13	[0]	NA		
U	S-100	93	98	[99]	NA			0	25	[5]	NA		
U	S-103	87	85	[4]	NA			2	18	[4]	NA		

U = these stations were omitted from wetland evaluation starting in 2012 as they appear to be located in upland areas

Appendix 2

Wildlife Monitoring Report

2013

WILDLIFE SURVEY
MARION WETLAND MITIGATION BANK
2013

Marion Courtenay Brasiers

Wildlife monitoring had been conducted from 2001 through 2008 before it was suspended. Recognizing the value of those data for assessing the success of the wetland restoration the monitoring program was reinstated in 2013. Five permanent wildlife observation stations at both the bank site and the USFWS N. Santiam reference site were sampled in Winter (January) and Summer (June) 2013 (Tables 2A, 2B, 2C, and 2D - Appendix 5).

During the Spring survey 31 species were observed at the bank site and 27 at the reference stie. The abundance of birds at the bank site (250) exceeded those at the reference site (157). Not only was the number of species greater at the bank site, but some unique species (two Barn Owls, an American Kestrrel, two Northern Harriers, three Barn and two Cliff Swallows, and three Bushtits were observed at the bank site.. In addition, six Gadwalls and two Pied-Billed Grebes were sited on the ponds. None of these species were observed at the reference site.

During the Winter survey 22 species were observed at the bank site and 23 at the reference site. The abundance of birds at the bank site (266) exceeded that at the reference site (138). Also, several unique species, including Bald Eagle, American Kestrel, Great Blue Heron, Soras, and approximately 50 Surf Scoters, were observed at the bank site but not at the reference sie.

In every survey conducted since 2001 the number of species and abundance of birds at the bank site are comparable to or exceed those at the reference site.

During the Winter survey, one beaver and one norther leopard frog were observed at the bank site. During the Spring survey, one chipmonk, one garter snake, and 200 northern leopard frogs.

Marion Obser. #5
Marion Obser. #2
Marion Site
Marion Obser. #3
Marion Obser. #4
© 2013 Google
Imagery Date: 7/9/2012 44°45'39.93" N 122°54'30.7

Marion Ref. #3
Marion Ref. #2
Maroin Ref. #1
Marion Ref #4
Marion Ref. #5
© 2013 Google
Imagery Date: 7/9/2012 44°41'31.05" N 122°59'37.64

Table 2A. Birds observed in winter 2013.

SPECIES	MARION SITE	USFWS N. Santiam REF
ACORN WOOD PECKER		1
AMERICAN CROW		1,2=3
AMERICAN KESTREL	1	
AMERICAN ROBIN	4	
BALD EAGLE	1	
BELTED KINGFISHER		1
BLACK-CAPPED CHICKADEE	2,2=4	1,2,1,1,1,1,1=8
BLACK PHOEBE	1	
BUSHTIT	1	1,1=2
CANADA GOOSE	60	2,1=3
COMMON RAVEN		1
DARK-EYED JUNCO	20	3
DOWNEY WOODPECKER		1
EUROPEAN STARLING	6,20=26	
FOX SPARROW		1
GOLDEN-CROWNED KINGLET		1
GREAT BLUE HERON	1	
GREEN HERON		1
GREEN-WINGED TEAL	6	1,6,6,6,5,6,10=34
KILLDEER	2,1,2=5	1,1,1=3
LINCOLN SPARROW		10
MALLARD DUCK	3,3=6	
MARSH WREN	25,4=29	
NORTHERN FLICKER	1,1=2	1
NORTHERN HARRIER		1
PACIFIC WREN		1,8,1=10
RED-TAILED HAWK		1
RED-WINGED BLACK BIRD	1,1,4,4,1,21=32	
RUBY-CROWNED KINGLET		1,5=6

SONG SPARROW	1,1,2,1,1,1=7	1,2,2,4,10,20=39
SORA	3	
STELLER JAY		1
SURF SCOTER	50	
WESTERN SCRUB-JAY	1	1
WILSONS SNIPE	4	5
WRENTIT	2	
TOTAL	**266**	**138**

Table 2B. Non-avian species observed in winter 2013.

SPECIES	**MARION SITE**	**USFWS N. SANTIAM REF**
BEAVER	1	
DOUGLAS SQUIRREL		1,1=2
LEAST CHIPMONK		1
NORTHERN LEOPARD FROG	1	

Table 2C. Birds observed in spring 2013.

SPECIES	MARION SITE	USFWS N. SANTIAM REF
AMERICAN GOLD FINCH	2	2
AMERICAN KESTREL	1	
AMERICAN ROBIN	2,5,1,3,4,1,2,1,1,1,3,6=28	1,1,2,1,7,4,1,7,1=25
ANNA'S HUMMINGBIRD	1,1=2	
BALD EAGLE		1
BARN OWL	2	
BARN SWALLOW	3	
BELTED KINGFISHER	1	1,1,1,1=4
BLACK-CAPPED CHICKADEE	3,2,1,2,1,1=10	1,1,4=6
BLACK PHOEBE		1
BROWN HEADED COWBIRD	4	2,1=3
BUSHTIT	1,1,2=4	
CEDAR WAXWING		2,2=4
CLIFF SWALLOW	2	
COMMON YELLOW-THROAT	1	1
EUROPEAN STARLING	2,20,8,1=31	2
GADWALL	6	
GREAT BLUE HERON	1,1,1,3=6	
HOODED MERGANSER	6	17
KILLDEER	1,2,1,1,1,3=9	
LESSER GOLDFINCH	3,1=4	
LINCOLN SPARROW		1,1,2=4
MALLARD DUCK	1,4,7,3=15	2
MOURNING DOVE	30,1=31	1
NORTHERN FLICKER	1,1,1,2,1=6	2,1,1,1,2=7
NORTHERN HARRIER	2	
PIED-BILLED GREBE	1,1=2	

PURPLE FINCH	1	
RED-TAILED HAWK	1	2
RED-WINGED BLACK BIRD	1,3,1,9=14	
SONG SPARROW	2,5,1,1,5,5,1,2,1=23	1,20,9,1,1,4=36
SPOTTED SANDPIPER		1
SPOTTED TOWHEE	1,10,1=12	6,1,4=11
STELLER JAY		1,1=2
SWAINSONS THRUSH	1	1,1,2,3=7
TREE SWALLOW	1,4=5	6
TURKEY VULTURE	2,3,7=12	2,1=3
VIOLET-GREEN SWALLOW		1
WESTERN SCRUB-JAY	1	1,1=2
WESTERN TANGER		4
WESTERN WOOD-PEWEE		2
TOTAL	**250** 31	**157** 27

Table 2D. Non-avian species observed in srping 2013.

SPECIES	**MARION SITE**	**USFWS N. SANTIAM REF**
CHIPMONK	1	
GARTER SNAKE	1 (YELLOW STRIPED, RED SPOTTED)	
NORTHERN LEOPARD FROG	200	

Appendix 3

Journal of Credit Sales

OAK CREEK MITIGATION BANK

DATE	NAME	LOCATION	PERMIT	ADD	SOLD	BALANCE
8/4/1999	DSL/COE UNCERTIFIED 30%			9.350		9.350
10/13/1999	RANCO	MILLERSBURG, OREGON	FP14608		0.420	8.930
10/15/1999	CENTRAL TRAINING TRUST	TANGENT, OREGON	FP17275/1999-00935		0.420	8.510
1/13/2000	GORDON VOGT	CENTER ST.,ALBANY, OR	FP18135/		0.360	8.150
3/15/2000	GARY HARTALOO	COVEY RUN, NORTH ALBANY, OR	RF17655		0.360	7.790
5/19/2000	CLEAR CHANNEL BROADCASTING	2840 MARION RD.ALBANY, OR	RF18955		0.260	7.530
8/16/2000	WESTERN WEBB PRESS	263 29TH AVE., ALBANY, OR	FP22718/2000-00581		0.110	7.420
8/16/2000	PAHLISCH NEILSON HOMES	GRAND OAKS SUBDIVISION, CORVALLIS, OR	RF22756		0.130	7.290
9/8/2000	CLOUDBURST DEVELOPMENT	5TH AND MAIN STS., LEBANON, OR	RF22824/2008-00659		0.470	6.820
9/20/2000	L&H BUILDERS	FIR CT SWEET HOME, OR	RF22478/2000-00365		0.130	6.690
10/5/2000	CAMAS COMMONS	53RD AND COUNTRYCLUB, CORVALLIS, OR	2255-1RF/2000-00467		0.450	6.240
10/20/2000	CONIFER PL APARTMENTS,LLC	3403 NW 60TH ST.,CORVALLIS, OR	22351/20000492		1.520	4.720
10/20/2000	TIMBERHILL HOMES, LLC	29TH ST., CORVALLIS, OR	DSL22349		0.351	4.369
11/1/2000	DSL/COE CREDITS CERTIFIED			6.24		10.609
12/11/2000	ALL STATE PROPERTIES	SKYVIEW ESTATES, LEBANON, OR	FP18844		0.740	9.869
1/8/2001	WEYERHAEUSER COMPANY	AMERICAN CEMWOOD SITE, ALBANY, OR			0.270	9.599
1/27/2001	CITY OF MILLERSBURG	KUMPULA PROPERTY MT VIEW PL	RF22934		0.105	9.494
2/18/2001	MONACO COACH	COBURG, OREGON	FP17425/99-00778		3.680	5.814
3/15/2001	CITY OF LEBANON	VIOLATION	VIOLATION		0.339	5.475
6/8/2001	PAHLISCH NEILSON HOMES	THE PARK AT TIMBERHILL	2001-00207		0.017	5.458
7/27/2001	HARRISON INDUSTRIES	KNOX BUTTE RD AND TIMBER ST., ALBANY, OR	24201RF/2001-00724		0.120	5.338
9/22/2001	LINN COUNTY AFFORDABLE HOUSING	LINN COUNTY AFFORDABLE HOUSING	24434FP/2001-00724		0.020	5.318
5/25/2002	THE SANDERS DO/TC2 INVESTMENT	45TH STREET NEAR COUNTRY CLUB DR	25203FP/2002-00179		0.190	5.128
2/7/2003	CITY OF ALBANY	OAK CREEK DRAINAGE AT 53RD AVENUE	26256/2002-00901		0.480	4.648
2/17/2003	BENTON COUNTY PUBLIC HEALTH	CHAPEL DRIVE NEWTON CR. BRIDGE	26401GA/2002-00993		0.060	4.588
3/8/2003	CITIES OF ALBANY AND MILLERSBURG	WATER INTAKE, SCAVEL HILL ROAD	25849RF/2000-00720		0.105	4.483
11/3/2003	OREGON DEPT OF TRANSPORTATION	I-5 N. JEFFERSON TO N. ALBANY, OR	31156RF/2003-00622		0.300	4.183
1/14/2004	BBF DEVELOPMENT, LLC	NE 1/4 SEC. 20,T11S,R3W W. ALBANY, OR	3106FP/2003-00570		0.080	4.103
3/11/2004	STILLWATER ASSOC, A WASH LP,WA	T12S,R2W TAX LOT 1400 LEBANON, OR	30822FP/2003-00473		0.466	3.637
3/27/2004	LINN COUNTY ROAD DEPARTMENT	CALAPOOIA RIVER (DRIVER ROAD) BRIDGE TANGENT, OR	31618GA/NA		0.047	3.590
5/26/2004	OREGON DEPT OF STATE LANDS	WETLAND MITIGATION BANK REVOLVING FUND			0.167	3.423
6/7/2004	TIMBERHILL CORPORATION	KINGS BLVD. EXT. N OF WALNUT BLVD.,CORVALLIS, OR	30514FP/2000-00320		2.464	0.959
7/20/2004	ROTH BUILT AND BASIC HOMES INC	NW/NE 1/4 SEC.3&4 T11S R3W IN ALBANY, OR	32195FP/2004-00280		0.980	-0.021
5/2/2007	OREGON DEPT OF TRANSPORTATION	I-5 CROSSING OF SODOM DITCH MP221.13 NEAR HALSEY,OR	38105GA/2004-0035		0.052	-0.073
4/4/2008	DSL/COE CREDITS RELEASED			3.000		2.927
9/17/2008	CONSUMERS POWER	AIRPORT SUBSTATION SITE NEAR 36394 AIRPORT DR.,LEBANON,OR	40366RF/2008-00241		0.191	2.736
9/15/2008	DSL/COE CREDITS RELEASED			4.000		6.736
12/3/2008	JUSTIFICATION HOLDINGS, LLC	T13S,R1E,SEC29,TAX LOT 6500,SWEETHOME,OR	40059RF/2008-00153		0.059	6.677
10/8/2009	CITY OF JEFFERSON	700 N 2ND ST,JEFFERSON. OR	39627/RP/1994-989-1		0.250	6.427
10/14/2010	CITY OF PHILOMATH	SEC 18,19,20TS23SR5/6W TAX LOT 801	43699RF/2009-00626		6.230	0.197
6/26/2012	CITY OF CORVALLIS	T11S R5W SSO T23SEC.26TAX LOT 500	50275GP/2012-00173		0.170	0.03
11/13/2013	LES SCHWAB TIRE CENTERS	2925 SANTIAM HWY SE, ALBANY, OR	NWP2013-00357		0.020	0.010