

Mitigation Monitoring Report Cover Sheet
Oregon Department of State Lands

Block 1: Report Information

DSL Permit Number: 36700-RF COE Permit Number: *Nationwide Permit 27* -#200500622
 Permittee: Alton Sullivan
 County: Linn Report Date: 12/2/10 Monitoring Year 4
 Date Removal-Fill Activity Completed: July 07
 Date mitigation was completed Grading: 7/06 Planting: 9/06, 10/06, 2/07-4/07, 10/07, and 2/08.
 Report submitted by: Oregon Wetlands LLC – One Horse Wetland Mitigation Bank

Block 2: Monitoring Report Purpose

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

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

Block 3: Results

	Success Criteria	Met (Y/N)	Comments/Reasons for Failure*
1.	Emergent Vegetation	3 of 3 requirements	
2.	Wetland Prairie	5 of 6 requirements	The moisture index is 1.93, slightly wetter than the 2-3 goal
3.	Created Tree/Shrub	6 of 6 requirements	
4.	Hydrology – Water Monitoring Tubes	1 of 1 requirement	Met 2009
5.	Hydrology - Delineation	1 of 1 requirement	Met 2009

Remedial work recommended Yes No X
 Deed Restriction or other protection instrument attached (noted: if a filed deed restriction was a required as a permit condition, please attach a copy: *previously submitted*) Yes No
 Final Monitoring Report? Yes No X
 Requesting release or partial release of bond/credits Yes X No
 *see report for detailed information

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1.0 REGULATORY BACKGROUND

The purpose of this report is to summarize the progress of the One Horse Wetland Mitigation Bank (Bank). The Bank is located on the south side of Payne Rd. in T12S, R2W, Sec. 1 & 36 Lots 201, 2201 and 3900. The letter of approval for the Bank was signed on December 5, 2006 and is permitted as DSL permit # 36700 and COE permit #200500622. The Bank consists of 130.48 acres.

Development of the Bank was through a combination of enhancement of cropped wetland (118.47 acres), and creation of wetlands (11.81 acres). A portion (0.20 acres) of the 130.48 total acres is being used as parking and is not included in credit generation of bank credits:

<u>Type of Credit</u>	<u>Acres</u>	<u>Ratio</u>	<u>Credits</u>
Cropped Wetland Enhancement	118.47	2:1	59.235
Creation	11.81	1.5:1	7.87
New Parking	0.20		
Total	130.48 acres		66.91 credits

2.0 WORK SUMMARY

February through July, restoration activities focused on non native species control. Beginning in early February, efforts concentrated on covering all prairie areas to spot treat unwanted species before native grasses got tall and inhibited detection. All prairie areas were walked at least two times targeting velvet grass, creeping bentgrass, annual ryegrass, rough-stalk bluegrass, annual blue grass, penny royal, and any other non-natives encountered. As spring moved to summer, focus shifted towards spot treating between tree/shrub plantings and patrolling the emergent draw down zones for opportunistic species such as spatula-leaf loosestrife, and penny royal. Broadleaf herbicide treated was limited to a 40ft swath around borders to prevent encroachment of non-natives from neighboring parcels.

Approximately 3 acres of additional prairie was no-till planted with a variety of wetland forbs species, blended with small amounts of California oatgrass, Slender hairgrass, and Annual hairgrass where native grasses began to naturally thin out in spring 2010. We continue to experiment with a variety of techniques to incorporate forbs species into grass dominated prairie areas and are gaining a lot of knowledge. One challenge is maintaining 25% cover of Tufted hairgrass (per performance standards) while maintaining a diversity of other grasses and establishing a diversity of forbs. As is evident from the monitoring at both One-Horse and Evergreen in the restored PSS/PFO areas where this is not a requirement, diversity of grasses and forbs are much higher. Site monitoring has occurred on an almost daily basis with follow-up spot treatment and removal of invasive and non-native species.

In August 2010 all levees and maintenance trails through the prairie areas were mowed. To prevent possible non-native species encroachment and aid in surveillance, a ~ 40ft swath was mowed around the borders of the site. In addition, sections along the zones where emergent marsh transitions to wet prairie were also mowed to improve habitat for migrating shore birds, which translated into high shore bird counts this fall. Mowing was drastically reduced this year to gain additional knowledge of native grass succession, and its impact on forbs establishment.

This also provides an abundance of wintering habitat for a diversity of wildlife species. Emergent draw down zones were spot sprayed through late summer and early fall, targeting Penny royal and any other non-natives encountered. Borders were spot treated for non natives prior to fall rains.

Table 1 shows a break down of the restoration actions the sponsors have taken to date from the last monitoring period, which establishes the hydrologic and vegetation conditions required to meet performance standards.

Table 1. Summary of Restoration Activities at One Horse Slough Mitigation Bank November 2009 – November 2010

Activity	Location
Site preparation	Ongoing on borders
Existing forested vegetation treatment	All Non-native vegetation treated (on-going)
Forbs seeding	~ 3 acres of wet prairie (spring 2009)
Spot weed control	100% of mitigation bank area (on-going)
Broadleaf weed control	40ft swath around borders
Mowing	All levees, 40ft swath around borders, water lines of emergent areas, maintenance trails, and Wet Prairie from middle emergent area to eastern PSS border (fall 2010).

3.0 AS-BUILT PLANS

The as-built plans were submitted within 60 days of grading as specified in the final instrument.

4.0 HYDROLOGY PERFORMANCE STANDARDS, METHODOLOGY, AND RESULTS

4.1 Performance Standards

Wetland hydrology sufficient to meet the criteria defined in the 1987 Corps of Engineers Wetland Delineation Manual (1987 Wetland Delineation Manual), will be present in at least three out of five years if the weather records are close to normal and no irrigation is supplied. Water depth and depth of saturation will be evaluated throughout the site using a combination of monitoring wells and a one time hydrology and vegetation delineation designed to meet the requirements of the 1987 Wetland Delineation Manual. The soil parameter is expected to be disturbed by the proposed grading, therefore lack of hydric soils indicators will not be interpreted as disqualifying a plot as wetland.

4.2 Methodology

Water Monitoring Tubes: At least six (number of tubes will be driven by the site conditions, following bank grading) groundwater monitoring tubes will be constructed and monitored to show the duration of saturation. Tube monitoring data shall be collected three times between approximately March 1 and May 30 to demonstrate sufficient duration of wetness to meet the 1987 Wetland Delineation Manual. The monitoring report will also include precipitation date for the monitoring period from the nearest recording station. The locations of the monitoring tubes will be representative of the hydrological variation on site to prove duration of saturation needed to meet the 87 Manual criteria. These will be included on the as-built drawings.

Delineation: Paired plots concentrating along the wetland boundary, for any plots dominated by upland

vegetation, and in any high areas will be utilized to indicate the exact location of the wetland boundary. The paired plots will be evaluated using soil probes or pits. This will be done to document that wetland hydrology has been achieved throughout the site. In addition to plot data, these areas will be visually documented with photographs to show a dominance of wetland species. The wetland boundary will then be displayed on a site map to confirm acreage achieving the performance measure.

4.3 Results

This provision has been met for at least three years and is no longer being monitored.

5.0 VEGETATION PERFORMANCE STANDARDS AND METHODOLOGY

5.1. Performance Measures

Emergent Herbaceous

1. A minimum of 55% of the relative plant cover (including bare soil) is comprised of native species.
2. No more than 15% of the relative plant cover is comprised of non-native invasive species as defined below.
3. The wetland's moisture index is less than 3.0.

*Non-native invasive species to be included: reed canary grass (*Phalaris arundinacea*), purple loosestrife (*Lythrum salicaria*), Himalayan blackberry (*Rubus discolor*), and Japanese knotweed (*Polygonum cuspidatum*), Eurasian water milfoil (*Myriophyllum spicatum*), climbing nightshade (*Solanum dulcamara*) and yellow-flag iris (*Iris pseudacorus*), Anne's lace (*Daucus carota*), Canadian thistle (*Cirsium arvense*), bull thistle (*Cirsium vulgare*), orchard grass (*Dactylis glomerata*) and annual ryegrass (*Lolium multiflorum*) or others as determined by the MBRT.

Wetland Prairie

The above performance standards along with the following:

1. At least 10 wetgrass prairie species are present as listed in "Species Composition for Willamette Valley Vegetation Types" by Kathy Pendergrass, August 2003, supplied by John Marshall (USFWS) author of "Draft Guidance on Vegetation Performance Standard and Monitoring Protocols for Reference Sites and Mitigation Sites" to enhance Appendix II of this document.
2. Tufted hairgrass (*Deschampsia cespitosa*) is represented by 25% or greater relative plant cover.
3. At least 50% of the relative plant cover (including bare soil) is comprised of native species.
4. No more than 15% of the relative plant cover is comprised of non-native invasive species as defined above.
5. The prairie's moisture index is between 2.0 and 3.0.
6. No more than 5% relative plant cover by shrubs or trees.

Shrub and Forest - Restoration

By the end of the second growing season, the newly planted shrub and forest component of the wetland will meet or exceed 75% of the species richness of the reference site (excluding non-native invasive species). The plant density in forested and shrub/scrub wetlands will be at least 80% of the reference site, of species that are rated FAC or better, excluding FAC- species. This must be achieved by the end of the second growing season following planting and maintained through the end of the monitoring period until trees and shrubs are established and free to grow. There will be no more than 15% aerial coverage of non-native invasive species*. These densities will be a combination of planted individuals and natural recruitment.

In addition, the herbaceous layer in the forest and shrub areas will meet or exceed the performance measures for emergent herbaceous wetlands as stated above.

5.2 Methodology

A stratified, systematic plot method was used to conduct vegetation sampling in all

areas. Vegetation data was collected at each of 71 original sample points that had been pre-determined and plotted along 6 transects. One additional plot (#72) was added to the upper PSS area in 2007 for a better representation of this area. Four additional emergent plots (#73 - #76) were added in between existing plots to get a better sample of this habitat type, and flatten out the species area curve. These points were randomly selected from the monitoring map in ArcGIS, then uploaded to a handheld GPS, and marked in the field. The monitoring point location map is included as Attachment 1. Each original transect crosses the entire wetland (north to south) and they are located approximately 400 feet apart (north-south). Sampling plots were then located at 200 foot intervals along each transect. Herbaceous data was collected using 1-meter quadrants, and tree and shrub data was collected in 30' diameter plots.

5.3 Vegetation Monitoring Results

Vegetation monitoring was conducted on June 7, 2010 by Ray Fiori and Marvin Gilmour for the wet prairie and PFO/PSS plots. Due to the hydrology and late draw down of emergent areas, the emergent sampling was completed on August 11, 2010 by Ray Fiori and Marvin Gilmour. Attachment 2 includes spread sheets with the results of the monitoring. The spread sheets include a complete listing of all plant species identified in the monitoring plots. Several species that are still present on site but didn't make the monitoring plots this year were left on the list. Seventy-six monitoring plots were examined. The data spread sheets include the botanical names, common names, indicator status, origin (native or non-native) and moisture index.

During the 2010 monitoring, 49 plant species were identified in the monitoring plots. Of the species present, 45 were native and 20 are on the prairie cohort list. The low occurrence and cover of invasive and non-native species on site is a reflection of the effectiveness of site preparation, monitoring, establishment care and spot treatment that has occurred over the past 5 years. The Bank sponsors continue to treat problem areas and prepare the site for re- introduction of a diversity of native forbs.

5.3.1 Emergent Vegetation

Herbaceous native canopy cover averaged 86.85% throughout the emergent marsh area. Open water and bare ground comprised 11.48% and 1.11% respectively. As in 2009 emergent monitoring occurred 2 months later than 2008, allowing significant draw down to occur and the vegetation to respond. The recorded vegetation cover was 99.44% native species. The only non-native species present was Spatulaleaf loosestrife (*Lythrum portula*), which occurred with an average cover of only 0.56% over the entire emergent area.

All three of the performance criteria for **emergent herbaceous** vegetation were met.

Required: At least 55% of the mean plant cover (including bare soil) will be comprised of native species – **Met**; *the emergent vegetation plots have a relative percent native cover of 98.33%.*

Required: No more that 15% of the mean plant cover will be comprised of non-native invasive species. –**Met**; with 0.56 % of non-native species, with no non-native invasives.

Required: The wetlands moisture index is less than 3 –**Met**; with an average weighted moisture index of 1.03.

5.3.2 Wetland Prairie

Herbaceous native canopy cover averaged 96.05% throughout the wetland prairie areas. Non-native canopy cover (including bareground) averaged 3.82% As in past years, there was only one non-native invasive species present; annual rye grass, which accounted for 0.13% canopy cover. Bareground accounted for 3.29% cover this year. Of the vegetation itself in the wet prairie, 99.47% was native, while 0.53% is non-native species.

As succession moves forward, diversity will decrease as early seral species are out competed. To counteract this process certain prairie areas will be selected each year to set back the existing vegetation and introduce additional diversity. This will take approximately 4 years to complete, but it will load up the seed bank with a diversity of native seeds as they reproduce, so over the long run, the site can naturally adapt to natural disturbance. This will not affect the long-term management costs, as this will be completed as part of the active management by the sponsors.

The performance criteria for **wetland prairie** were met for 5 of the 6 requirements.

Required: At least 10 wetgrass prairie species are present as listed in "Species Composition for Willamette Valley Vegetation Types" by Kathy Pendergrass. – In conversations in spring 2008 with John Marshall (USFWS), it was agreed upon to include the vernal pool species from this same source in the 10 required species, as this was the original intent. **Met**; thirteen wet grass prairie and vernal pool species were identified within the prairie plots.

Required: Tufted hairgrass (*Deschampsia cespitosa*) is represented by 25% or greater mean cover. - **met**; Tufted hairgrass represented 47.50%.

Required: At least 55% of the relative plant cover (including bare soil) will be comprised of native species- **Met**; the overall relative native plant cover was 96.05%.

Required: No more that 15% of the mean plant cover will be comprised of non-native invasive species –**Met**; with only 0.13% cover of non-native invasive species. The only non native invasive species present was annual rye grass.

Required: The wetland prairie moisture index is between 2.0 and 3.0 – **Not Met**; *the average weighted moisture index is slightly low at 1.95. This can partially be explained by the way habitat types are displayed, the numerous microhabitats within the prairie, the lack of facultative upland species (only 1 non-native), and the presence of obligate prairie cohort species.*

Required: The prairie has no more than 5% relative plant cover comprised of shrubs or trees. **Met**; *this has not been an issue. Very few trees have been observed in the prairie and the few that were along the borders were taken out in 2009 with broadleaf herbicide treatment.*

5.3.3 Forest and Scrub/Shrub Creation

Four plots were picked at random in the reference site which is directly adjacent to the bank, and represent both the open and closed canopy sections of this relatively undisturbed forested wetland. Many areas had extensive Himalayan blackberry thickets and were avoided as reference plots. These plots are representative of other forested wetlands in the area, although the shrub density seems to be higher than other sites. Every tree stem over 18” and every shrub stem over 1” diameter was counted to compute the stem density. Although this would be too time consuming on a large scale, with a relatively small site this seemed the best way to quantify stem density and compare it to the restored areas. An analysis of the original reference site data was conducted with the results included in Table 2.

Monitoring plots were surveyed in a similar way as the reference site. Based on comments from the 2009 monitoring report, plant counts were used to quantify shrub species, rather than stem counts. Tree species over 18” tall (2 to 3 yrs old) were counted as in the reference site. A 30ft diameter sampling plot was used from the original monitoring date, as all but one plot contained both tree and shrub species. This same sampling protocol has been followed in subsequent years to be consistent, and the 30ft diameter plot has been utilized in all the emergent and wet prairie sample plots to quantify encroachment of woody vegetation into these habitats. Many new trees and shrubs are taking hold through natural recruitment from adjacent areas as well as from planted individuals in these areas and will take several years to fully establish. This year’s data is included in table 3.

Required: Year 2 performance measure. Meet or exceed 75% of the species richness of the reference site excluding non native invasive species. **Met**; *13 woody species were identified with only seven species in the reference site.*

Required: Year 2 performance measure. Plant density will be at least 80% of the reference site with FAC or wetter species. **Met**; *with an average 583 stems/plants per acre of FAC or wetter species. An analysis of the original reference site data was conducted with the results included in Table 2.*

Table 2 - Reference Site Analysis Summary

Reference Site Species	Native/Non	Indicator Status	Reference Site Stem/Acre
Oregon Ash	Native	FAC	200
Pacific crabapple	Native	FACW	30
Nootka rose	Native	FAC	222
Sweetbriar rose	Non	FACW	87
Service berry	Native	FACU	65
Snowberry	Native	FACU	65
English hawthorne	Non	FAC	65
Total stems per acre of FAC or wetter and native			452

* **Items in bold** do not meet bank performance standards

The analysis showed that of the seven species in the reference site only three species (Oregon ash, pacific crabapple and nootka rose) were both FAC or wetter and native species. The other four species were either non-native or FACU species. The original stem density calculations for the reference site included all of the species, even those that do not count toward the Bank's performance standard (FAC or wetter and native). It was determined that of the suitable species on the reference site, the stem density is 452 stems per acre. Using this analysis information, the reference site usable stem densities would be 80% of 452 stems/per acre which is 362 stems per acre.

A similar analysis was done of the 13 species that were found in the created shrub/forest wetlands within the Bank. All of the Bank species are native and 8 of the 13 species are FAC or wetter. The results are included on Table 3.

Table 3 – One Horse Shrub/Forest Analysis Summary

Bank Species	Native/Non	Indicator Status	Stem/Acre
Douglas hawthorne	native	FAC	90
Oregon ash	native	FACW	252
Ponderosa pine	native	FACU	11
Black cotton wood	native	FAC	84
Service berry	native	FACU	6
Red osier dogwood	native	FACW	11
Indian plum	native	FACU	17
Red flowering current	native	FACU	22
Nootka rose	native	FAC	67
Clustered rose	native	FAC	50
Pacific willow	native	FACW	11
Douglas spirea	native	FAC	17
Snowberry	native	FACU	56
Total stems per acre of FAC or wetter and native			583

***Items in bold** do not meet bank performance standards

Required: Year 2 performance measure. There will be no more than 15% aerial coverage of non-native invasive species*. **Met;** with 0% non-native invasive species found within in the plots.

The herbaceous layer in the shrub and forest area will meet or exceed the following year 2 emergent habitat performance measures.

Required: At least 55% of the mean plant cover (including bare soil) will be comprised of native species – **Met;** Native plant cover was 99.55%, while non-native cover (including bareground) was 0.45%

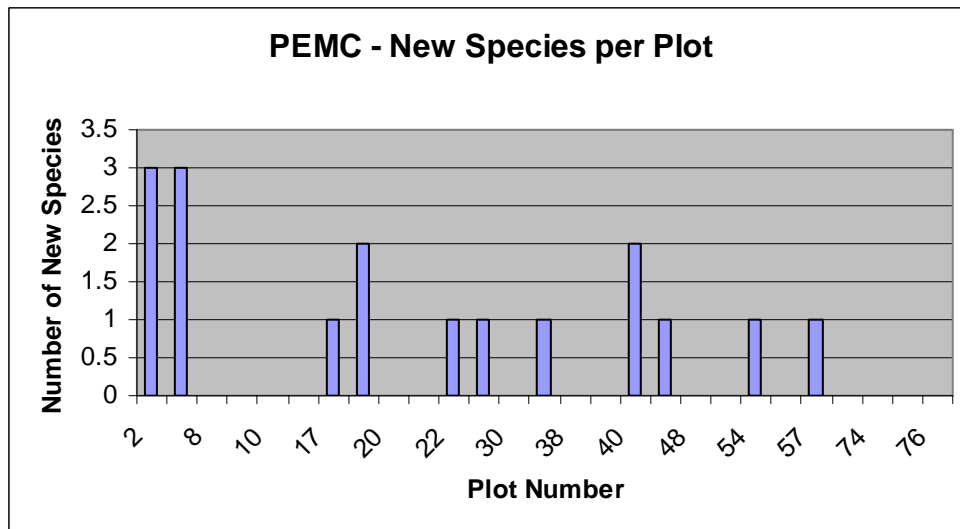
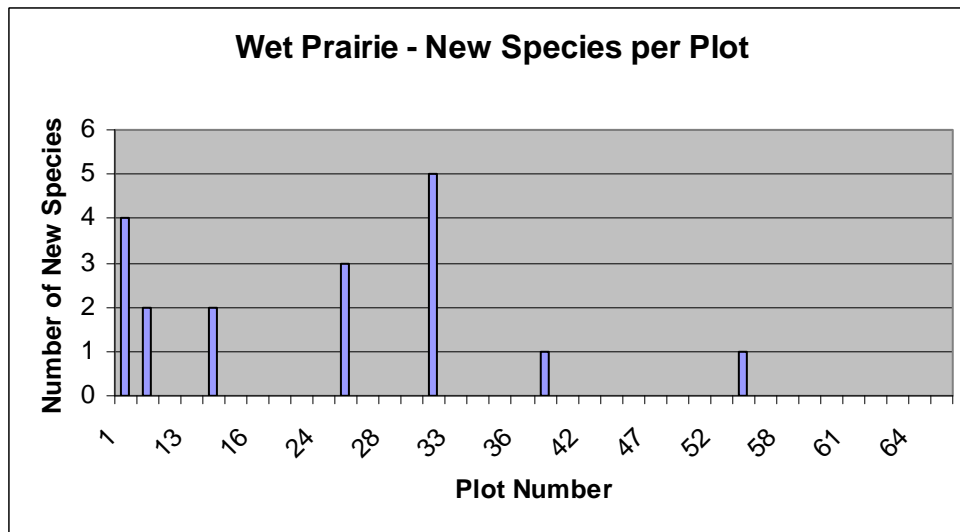
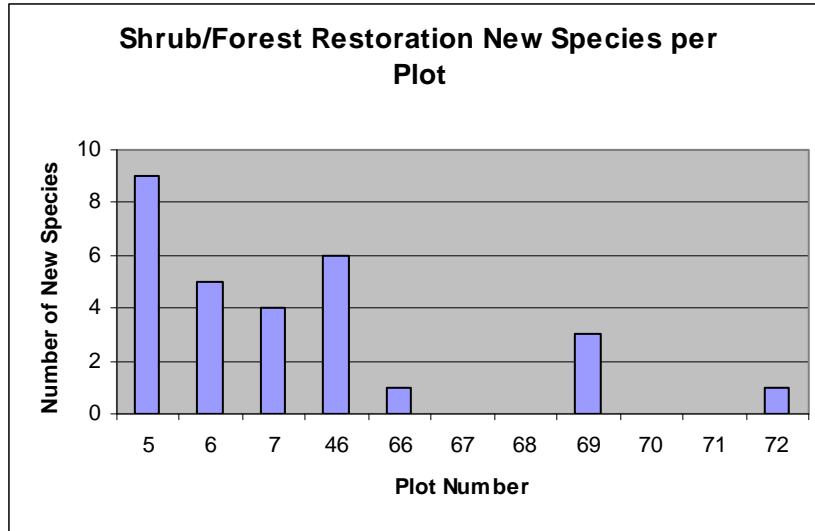
Required: No more that 15% of the mean plant cover will be comprised of non-native invasive species – **Met;** with 0 % of non-native invasive species found in the plots.

Required: The wetlands moisture index is less than 3 –**Met;** with an average weighted moisture index of the herbaceous layer of 2.10.

6.0 SPECIES AREA CURVE

The species area curves for each of the major wetland types is included. It was the original plan to develop the species area curve for each of the habitat types and then analyze the data. The evaluating criteria was that after the curve flattens out it would be deemed a sufficient number of plots when there are three plots in a row with one or fewer new species. The data on the 76 monitoring plots indicates that there is extensive plant diversity on the site, and the

curves are flattening out.



7.0 PHOTO POINT MONITORING

Photos from the photo points are included as Attachment 3.

8.0 CREDIT SALES SUMMARY

An initial 17.8 credits (30% of enhancement credits) were released in December 2006. Following the 2007 MBRT site visit Release #2 was approved pending submission of the monitoring report. The 2008 Monitoring Report was submitted and release #2 and a partial release #3 were issued by DSL on 09/09/08 and by the Corps on 08/14/08 for 19.11 credits. The remainder of release #3 and a partial release of #4 was issued by DSL on 1/26/2010 for 15.99 credits and by the Corps on 1/25/2010 for 7.72 credits. A combination of releases by both agencies yielded a total credit release of 52.9 credits on 1/26/10.

With the submission of this monitoring report, we have shown that all the performance measures have been met for the remainder Release #4 for 7.32 credits. This would be a 90% release of the total credits, $66.91 * 90\% = 60.22$ – the previously released 52.9 credits (17.8 credits + 19.11 credits + 15.99 credits = 52.9) = 7.32 (release 4).

Release 1 (Fall/Winter 2006): Up to 30 percent (of the enhancement areas until a hydrology delineation occurs on the creation areas), upon submission of the grading as-built, Restrictive Covenant, submission of financial assurance and the MBRT conducts a field inspection.

Release 2 (Spring/Summer 2007): Up to 20 percent (of the enhancement areas until a hydrology delineation occurs on the creation areas) upon demonstration of all performance measures being achieved and delineation of acreage meeting the 1987 Wetland Delineation Manual hydrology (if weather conditions are close to normal).

Release 3 (Spring/Summer 2008): *Up to 20 percent upon demonstration of all performance measures being.*

Release 4 (Spring/Summer 2009): *Up to 20 percent upon demonstration of all performance measures being.*

Total Credit Release Requested:

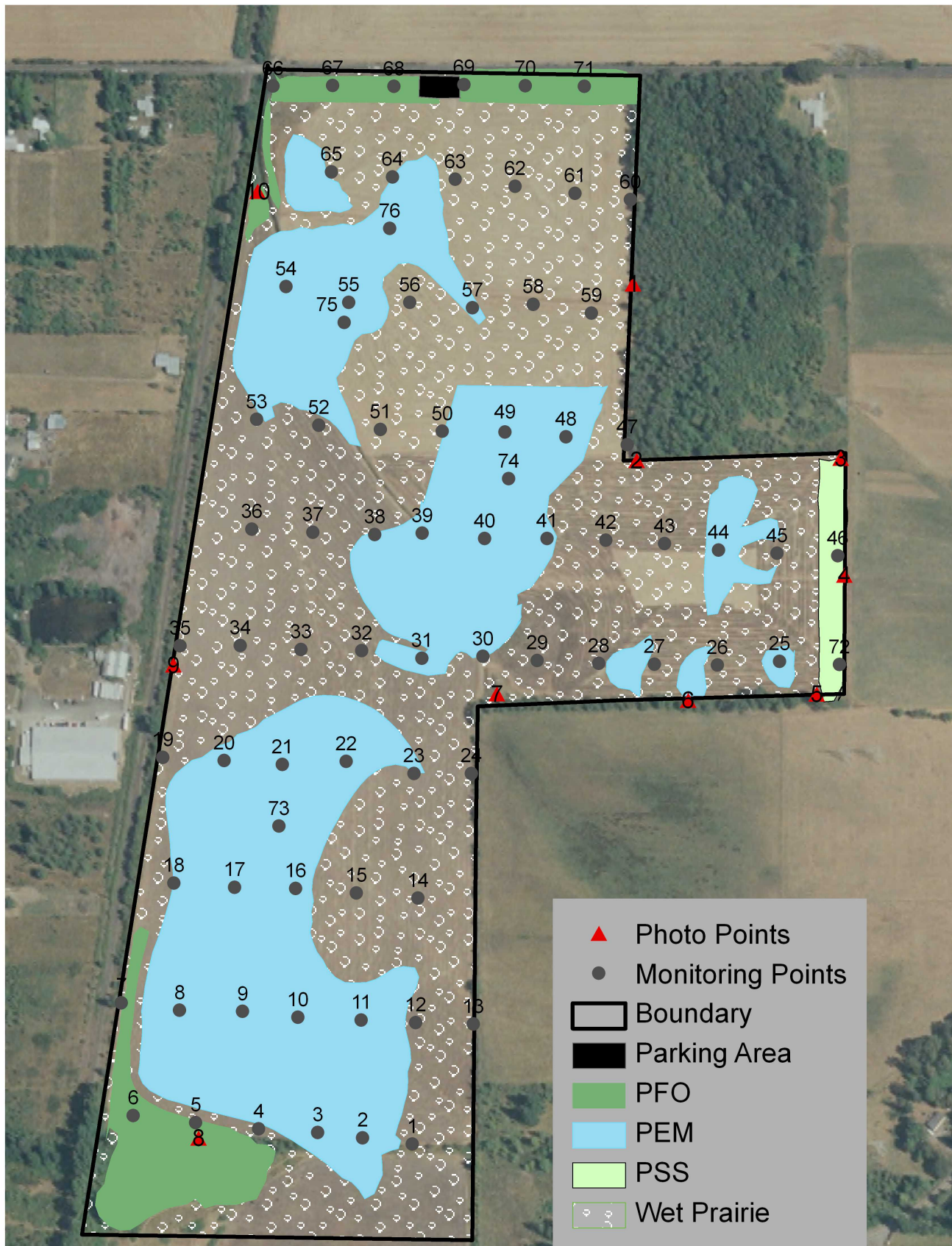
7.32 credits

Table 4 is a summary of the credit sales to date.

Table 4: One Horse Credit Sales Summary

<i>DATE</i>	<i>NAME</i>	<i>LOCATION</i>	<i>DSL</i>	<i>CORP</i>	<i>ADDED</i>	<i>SOLD</i>	<i>BALANCE</i>
12/5/06	INITIAL 30% RELEASE		Permit Number		17.8		17.8
12/28/06	City of Lebanon	T12S; R2W; Sec 16; DA; Lot 300	37235-RF	2006-00825		0.71	17.09
12/28/06	Pace American	T12S; R2W; Sec 16; DA; Lot 301	37233-RF	2006-00737		5.02	12.07
12/28/06	David Hunter	T12S; R2W; Sec 16; DA; Lot 302	36777-RF	2006-00462		1.38	10.69
12/28/06	RC Ventures	T12S; R2W; Sec 16; DA; Lot 303	36799-RF	2006-00462		2.08	8.61
12/28/06	Lane Manufacturing	T12S; R2W; Sec 16; DA; Lot 304	37302-RF	2006-00786		1.1	7.51
3/19/07	RC Ventures	T12S; R2W; Sec 16; DA; Lot 305	36799-RF	2006-00462		0.046	7.464
3/20/07	Lepman Properties	Sweet Home	37745-RF	NA		0.2	7.264
4/3/07	Linn County Parks Dept	Calkins Park Boating Facility	37424-RF	2006-00851		0.154	7.11
7/11/07	Western Warehousing, LLC	Lebanon	38585-RF	NA		0.56	6.55
5/12/08	Ralph Nauman	Thornton Lake Drive, Albany	37957-RF	2007-148		0.15	6.4
7/21/08	LCD Partners LLC	Lebanon; 2900 S. Main Road	39960-RF	2008-125		0.31	6.09
7/25/08	Pacific Cast Technologies	2008 expansion –Pacific Cast T	40084	2008-154		0.28	5.81
8/5/08	Benton Co. Public Works	53 rd Street	34015-NP	NA		.06	5.75
8/12/08	Gilbert LLC	T12S, R2W, Sec 16; TL 808 &900	40946-RF	2008-388		1.92	3.83
8/25/08	City of Lebanon	Lebanon Railroad Reload Facility	41028	2008-439		0.86	2.97
9/9/08	RELEASE #2 & part of #3		Permit Number		19.11		22.08
10/29/08	City of Lebanon	NW Industrial Improvements	6392-ENF	NA		0.27	21.81
10/20/09	First Creek, Lebanon	T12S, R1W, Sect. 4&5	43062-RF	2009-457		1.22	20.59
1/26/10	RELEASE #3 & part of #4		Permit Number		15.99		36.58
Total Sold						<i>16.32</i>	

One Horse Slough Mitigation Bank Photo and Vegetation Monitoring Points



0 400 800 1,600 Feet

1 inch equals 466 feet

One Horse Slough Wetland Mitigation Bank					
Plant Species List					
June-10					
Includes only species identified in monitored plots. Some species were found last year, but not this year, but remain on the list because they are still present just didn't make the monitoring plot.					
Common Name	Botanical Name	Status	Origin	Wet Prairie Species	Moisture Index
Overstory Species					
<i>Crataegus douglasii</i>	Douglas hawthorne	FAC	native		3
<i>Fraxinus latifolia</i>	Oregon ash	FACW	native		2
<i>Malus fusca</i>	Flowering crabapple	FACW	native		2
<i>Pinus ponderosa</i>	Ponderosa pine	FAC	native		3
<i>Populus angustifolia</i>	Black cottonwood	FACW	native		2
Scrub/shrub Species					
<i>Amelanchier alnifolia</i>	Service berry	FACU	native		4
<i>Cornus sericea</i>	Red osier dogwood	FACW	native		2
<i>Douglas spirea</i>	Spiraea douglasii	FAC	native		3
<i>Oemlaria cerasiformis</i>	Indian plum	FACU	native		4
<i>Rosa nutkana</i>	Nootka rose	FAC	native	Yes	3
<i>Ribes sanguineum</i>	Red flowering current	FACU	native		4
<i>Rosa pisocarpa</i>	Clustered rose	FAC	native		3
<i>Salix lasiandra</i>	Pacific willow	FACW	native		2
<i>Symphoricarpos albus</i>	Snowberry	FACU	native		4
Herbaceous Species					
<i>Achillea millefolium</i>	Yarrow	FACU	native		4
<i>Alisma gramineum</i>	Narrow leaf water plantain	OBL	native		1
<i>Alisma triviale</i>	Northern water plantain	OBL	native		1
<i>Camassia quamash</i>	Camas	FACW	native	Yes	2
<i>Carex densa</i>	Dense sedge	OBL	native	Yes	1
<i>Carex feta</i>	Green-sheath sedge	FACW	native	Yes	2
<i>Carex unilateralis</i>	One-sided sedge	FACW	native	Yes	2
<i>Downingia elegans</i>	Showy downingia	OBL	native	Yes	1
<i>Eleocharis acicularis</i>	Needle spike-rush	OBL	native	yes	1
<i>Eleocharis ovata</i>	Ovoid spike rush	OBL	native	Yes	1
<i>Eleocharis palustris</i>	Creeping spike rush	OBL	native		1
<i>Epilobium watsonii</i>	Watson's willow herb	FACW	native		2
<i>Epilobium densiflorum</i>	Dense spike-primrose	FACW	native	Yes	2
<i>Eriophyllum lanatum</i>	Oregon sunshine	NOL	native	Yes	
<i>Gilia capitata</i>	Bluefield gilia	NOL	native		
<i>Gnaphalium palustre</i>	Cudweed	FAC	native	Yes	3
<i>Juncus bufonius</i>	Toad rush	FACW	native	Yes	2
<i>Juncus tenuis</i>	Slender rush	FACW	native	Yes	2
<i>Lupinus rivularis</i>	Stream-side lupine	FAC	native		3
<i>Lythrum portula</i>	Spatulaleaf loosestrife	NOL	non		
<i>Plagiobothrys figuratus</i>	Fragrant popcorn flower	FACW	native	Yes	2
<i>Plagiobothrys scouleri</i>	Scouler's popcorn flower	FACW	native	Yes	2

<i>Polygonum hydropiperoides</i>	Waterpepper	OBL	native		1
<i>Rorippa curvisiliqua</i>	Western yellowcress	OBL	native	Yes	1
<i>Potamogeton natans</i>	Floating-leaved pondweed	OBL	native		1
<i>Sagittaria latifolia</i>	Wapato	OBL	native		1
<i>Sidalcea cusickii</i>	Cusick's checkermallow	NOL	native	Yes	
<i>Sisyrinchium angustifolium</i>	Blue-eyed grass	FACW	native	Yes	2
<i>Sparganium emersum</i>	Simple-stem bur-reed	OBL	native		1
<i>Typha latifolia</i>	Common cattail	OBL	native		1
<i>Veronica americana</i>	American speedwell	OBL	native		1
<i>Veronica peregrina var. xalapensis</i>	Hairy purlane speedwell	OBL	native	Yes	1
Grass Species					
<i>Agrostis exarata</i>	Spike bentgrass	FACW	native	Yes	2
<i>Alopecurus aequalis</i>	Short-awned foxtail	OBL	native		1
<i>Alopecurus geniculatus</i>	Water foxtail	OBL	native		1
<i>Beckmania syzigachne</i>	American Sloughgrass	OBL	native	Yes	1
<i>Deschampsia cespitosa</i>	Tufted hairgrass	FACW	native	Yes	2
<i>Deschampsia danthonioides</i>	Annual hairgrass	FACW-	native	Yes	2
<i>Deschampsia elongata</i>	Slender hairgrass	FACW	native	Yes	2
<i>Elymus glaucus</i>	Blue wildrye	FACU	native		4
<i>Glyceria borealis</i>	Floating mannagrass	OBL	native		1
<i>Glyceria occidentalis</i>	Western mannagrass	OBL	native		1
<i>Hordeum brachyantherum</i>	Meadow barley	FACW	native	Yes	2
<i>Leersia oryzoides</i>	Rice cut-grass	OBL	native		1
<i>Lolium multiflorum</i>	Annual rye grass	FACU	non		4
<i>Panicum capillare</i>	Common witchgrass	FACU	native	yes	4
<i>Poa annua</i>	Annual bluegrass	FAC	non		3
<i>Poa trivialis</i>	Rough-stalk bluegrass	FAC	non		3
<i>Vulpia myuros</i>	Rattail fescue	FAC	non		3

One Horse Slough Wetland Mitigation Bank

Planted Shrub/Forest (PFO) Sample Plot Monitoring Results - June 7, 2010

Species Observed																				
				Moisture		Cover		5	6	7	46	66	67	68	69	70	71	72		
Botanical Name	Common Name	Status	Origin	Index	ea. Species															
Overstory Species. - stem count within 30' diameter																				
<i>Crataegus douglasii</i>	Douglas hawthorne	FAC	native	3	90					9		7								
<i>Fraxinus latifolia</i>	Oregon ash	FACW	native	2	252	6	2				2	4	6	4	5	8	8			
<i>Malus fusca</i>	Flowering crabapple	FACW	native	2	0															
<i>Pinus ponderosa</i>	Ponderosa pine	FACU	native	4	11					2										
<i>Populus balsamifera</i>	Black cotton wood	FAC	native	3	84	3	5	3				2	2							
Total # of Plots: 11																				
Total Stems per plot																				
Average Stems per Plot =		7.1	Avg Stems per Plot (fac or wetter) =		6.9															
Mean Trees/Acre =		437																		
Mean Trees/Acre(fac or wetter) =		426																		
Shrub Species. - Plant count within 30' diameter																				
<i>Amelanchier alnifolia</i>	Service berry	FACU	native	4						1										
<i>Cornus sericea</i>	Red osier dogwood	FACW	native	2										1	1					
<i>Oemleria cerasiformis</i>	Indian plum	FACU	native	4		2				1										
<i>Ribes sanguineum</i>	Red flowering current	FACU	native	4							3								1	
<i>Rosa nutkana</i>	Nootka rose	FAC	native	3					1	3	1	1					1	5		
<i>Rosa pisocarpa</i>	Clustered rose	FAC	native	3				1		2	2	2							2	
<i>Salix lasiandra</i>	Pacific willow	FACW	native	2											2					
<i>Spiraea douglasii</i>	Douglas spirea	FAC	native	3							2								1	
<i>Symphoricarpos albus</i>	Snowberry	FACU	native	4		2	1	1		2		1	2						1	
Total # of Plots: (11)																				
Total Stems per plot																				
Average Plants per Plot =		4.3	Avg Plants per Plot (fac or wetter) =		2.5															
Mean Shrubs/Acre =		263																		
Mean Shrubs/Acre(fac or wetter) =		157																		
Herbaceous Species - percent cover																				
<i>Achillea millefolium</i>	Yarrow	FACU	native	4	0.91														10	
<i>Carex densa</i>	Dense sedge	OBL	native	1	0.45	5														
<i>Carex unilateralis</i>	One-sided sedge	FACW	native	2	2.73						30									
<i>Epilobium watsonii</i>	Watson's willow herb	FACW	native	2	0.45						5									
<i>Eriophyllum lanatum</i>	Oregon sunshine	NOL	native		0.00															
<i>Gilia capitata</i>	Bluefield gilia	NOL	native		0.00															
<i>Gnaphalium palustre</i>	Cudweed	FAC	native	3	0.00															
<i>Juncus bufonius</i>	Toad rush	FACW	native	2	6.36	55			15											
<i>Juncus tenuis</i>	Slender rush	FACW	native	2	2.27	25														
<i>Lupinus rivularis</i>	Stream-side lupine	FAC	native	3	11.36					50									75	
<i>Lythrum portula</i>	Spatulateleaf loosestrife	NOL	non		0.45	5														
<i>Sisyrinchium angustifolium</i>	Blue-eyed grass	FACW	native	2	0.91	10														
Grass Species																				
<i>Agrostis exarata</i>	Spike bentgrass	FACW	native	2	20.91			20	65			15	15	30	25	40	20			
<i>Alopecurus geniculatus</i>	Water foxtail	OBL	native	1	1.36										15					
<i>Beckmania syzigachne</i>	American Sloughgrass	OBL	native	1	2.27							10			10		5			
<i>Deschampsia cespitosa</i>	Tufted hairgrass	FACW	native	2	16.82			55				20	20	15	20	30	25			
<i>Deschampsia elongata</i>	Slender hairgrass	FACW	native	2	17.73			5	20			25	35	40	20	10	40			
<i>Elymus glaucus</i>	Blue wildrye	FACU	native	4	0.91					5									5	
<i>Hordeum brachyantherm</i>	Meadow barley	FACW	native	2	14.09			20			10	30	30	15	10	20	10	10		
<i>Panicum capillare</i>	Common witchgrass	FACU	native	4	0.00															
<i>Poa annua</i>	Annual bluegrass	FAC	non	3	0.00															
<i>Poa trivialis</i>	Rough-stalk bluegrass	FAC	non	3	0.00															
					100.00															
Bareground Mean =		0.00																		
Relative % native cover (herbaceous only)				Mean =	99.55	95	100	100	100	100	100	100	100	100	100	100	100	100	100	
Relative % non-native invasive (herbaceous layer only):				Mean =	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Relative % non-native (includes bareground,herbaceous layer only):				Mean =	0.45	5	0	0	0	0	0	0	0	0	0	0	0	0	0	
Percent of Total Vegetation Cover That is Native =				Mean =	99.55	Percent of Total Vegetation Cover That is Non-Native = 0.45														
Weighted moisture index (herbaceous layer only)				Mean =	2.10	1.95	2.00	2.00	2.55	1.90	2.00	2.00	2.00	1.75	2.00	1.95	3.05			
Total # of Native Species = 28		Total Sample points = 11																		

One Horse Slough Wetland Mitigation Bank																														
Emergent Marsh (PEMC) Plot Data - August 11, 2010																														
Species Observed	Botanical Name	Common Name	Status	Origin	Index	Ave. % Moisture Cover	Sample Plot Number																							
							ea. Species	2	3	8	9	10	11	17	18	20	21	22	25	30	31	38	39	40	44	48	49	54	55	57
Herbaceous Species - percent cover																														
<i>Alisma gramineum</i>	Narrow leaf water plantain	OBL	native	1	4.81		30	5	20		10		5	20						20	20									
<i>Alisma triviale</i>	Northern water plantain	OBL	native	1	4.63	20	10		30	20		5		20		10													10	
<i>Downingia elegans</i>	Showy downingia	OBL	native	1	2.22										60															
<i>Eleocharis acicularis</i>	Needle spike-rush	OBL	native	1	4.81							35	15			30				30							20			
<i>Eleocharis ovata</i>	Ovoid spike rush	OBL	native	1	9.63												40				20	40			65	30	40	25		
<i>Eleocharis palustris</i>	Creeping spike rush	OBL	native	1	10.56	50						35				20		25								100	15	40		
<i>Gnaphalium palustre</i>	Cudweed	FAC	native	3	0.00																									
<i>Juncus bufonius</i>	Toad rush	FACW	native	2	0.00																									
<i>Lythrum portula</i>	Spatulaleaf loosestrife	NOL	non		0.56															5		10								
<i>Plagiobothrys figuratus</i>	Fragrant popcorn flower	FACW	native	2	2.22																60									
<i>Plagiobothrys scouleri</i>	Scouler's popcorn flower	FACW	native	2	0.00																									
<i>Polygonum hydropiperoides</i>	Waterpepper	OBL	native	1	0.00																									
<i>Potamogeton natans</i>	Floating-leaved pondweed	OBL	native	1	0.37																				10					
<i>Sagittaria latifolia</i>	Wapato	OBL	native	1	2.78		15				50			10																
<i>Sparganium emersum</i>	Simple-stem bur-reed	OBL	native	1	15.74		25	30		70	40			60						50		50	80	20						
<i>Typha latifolia</i>	Common cattail	OBL	native	1	14.44	30		65				25	65	80					55	20			20		20	10				
<i>Veronica americana</i>	American speedwell	OBL	native	1	1.11															5									25	
Grass Species																														
<i>Agrostis exarata</i>	Spike bentgrass	FACW	native	2	0.93																					25				
<i>Alopecurus geniculatus</i>	Water foxtail	OBL	native	1	0.00																									
<i>Beckmania syzigachne</i>	American Sloughgrass	OBL	native	1	5.37								5			40			60						15	5	20			
<i>Deschampsia cespitosa</i>	Tufted hairgrass	FACW	native	1	0.37											10														
<i>Glyceria borealis</i>	Floating mannagrass	OBL	native	1	0.00																									
<i>Hordeum brachyantherm</i>	Meadow barley	FACW-	native	2	0.00																									
<i>Leersia oryzoides</i>	Rice cut-grass	OBL	native	1	6.85								10			20			20						70	20		45		
<i>Panicum capillare</i>	Common witchgrass	FACU	native	4	0.00																									
Herbaceous Cover Mean =					86.85																									
Bareground (due to recent inundation) Mean =					1.11						10				10				10											
Open Water Mean =					11.48			20		50										100		70				70				
Relative Percent Native Cover					Mean = 98.33		100	100	100	100	90	100	100	100	90	100	100	100	100	100	95	100	90	100	100	100	100	100	100	100
Relative Percent Non-Native Cover (includes bareland)					Mean = 1.67		0	0	0	0	10	0	0	0	10	0	0	10	0	0	0	5	0	10	0	0	0	0	0	0
Relative % non-native invasive canopy cover :					Mean = 0.00																									
Percent of Total Vegetation Cover That is Native =					Mean = 99.44	Percent of Total Vegetation Cover That is Non-Native =					0.56																			
Weighted moisture index					Mean = 1.03		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.60	1.00	1.00	1.00	1.00	1.25	1.00	1.00	
Total # of Species: 15						Total Sample points = 27																								

One Horse Slough Wetland Mitigation Bank

Wetland Prairie Plot Data

June 7, 2010

Species Observed				Wet/Prairie	Ave. %		Plot #s																												
				Vernal	Moisture	Cover																													
Botanical Name	Common Name	Status	Origin	Pool	Index	ea. Species	1	4	12	13	14	15	16	19	23	24	26	27	28	29	32	33	34	35	36										
				Species																															
No Scrub/Shrub Species found in vegetation plots																																			
Herbaceous Species - percent cover																																			
<i>Alisma gramineum</i>	Narrow leaf water plantain	OBL	native		1	0.13																							5						
<i>Camassia quamash</i>	Camas	FACW	native	Yes	2	0.00																													
<i>Eleocharis ovata</i>	Ovoid spike rush	OBL	native	Yes	1	0.79																							30						
<i>Epilobium watsonii</i>	Watson's willow herb	FACW	native		2	0.00																													
<i>Epilobium densiflorum</i>	Dense spike-primrose	FACW	native	Yes	2	1.84											10										15	10	20						
<i>Gnaphalium palustre</i>	Cudweed	FAC	native	Yes	3	0.00																													
<i>Juncus bufonius</i>	Toad rush	FACW	native	Yes	2	1.45	15										20										5	5							
<i>Lythrum portula</i>	Spatulaleaf loosestrife	NOL	non			0.13																							5						
<i>Plagiobothrys figuratus</i>	Fragrant popcorn flower	FACW	native	Yes	2	0.66																							25						
<i>Plagiobothrys scouleri</i>	Scouler's popcorn flower	FACW	native	Yes	2	0.26											10																		
<i>Rorippa curvisiliqua</i>	Western yellowcress	OBL	native	Yes	1	0.13						5																							
<i>Sidalcea cusickii</i>	Cusick's checkermallow	NOL	native	Yes		0.53											5										5		5						
<i>Veronica peregrina var. xalapensis</i>	Hairy purlane speedewell	OBL	native	Yes	1	0.00																													
Grass Species																																			
<i>Agrostis exarata</i>	Spike bentgrass	FACW	native	Yes	2	15.39	25	10	15			50	50	25	20	15											10	20		30	15	10	10		
<i>Alopecurus aequalis</i>	Short-awned foxtail	OBL	native		1	0.00																													
<i>Alopecurus geniculatus</i>	Water foxtail	OBL	native		1	3.16						10					20	25	10								5								
<i>Beckmania syzigachne</i>	American Sloughgrass	OBL	native	Yes	1	1.18																													
<i>Deschampsia cespitosa</i>	Tufted hairgrass	FACW	native	Yes	2	47.50	20	65	85	70	35	45	75	60	60	60	60	40	40	35	35														
<i>Deschampsia danthonioides</i>	Annual hairgrass	FACW-	native	Yes	2	0.26																													
<i>Deschampsia elongata</i>	Slender hairgrass	FACW	native	Yes	2	1.32		5					5																						
<i>Glyceria occidentalis</i>	Western mannagrass	OBL	native		1	0.00																													
<i>Hordeum brachyantherm</i>	Meadow barley	FACW	native	Yes	2	21.45	30				10																								
<i>Lolium multiflorum</i>	Annual rye grass	FACU	non		4	0.13																													
<i>Poa annua</i>	Annual bluegrass	FAC	non		3	0.13					5																								
<i>Poa trivialis</i>	Rough-stalk bluegrass	FAC	non		3	0.26																													
<i>Vulpia myuros</i>	Rattail fescue	FAC	non		3	0.00																													
Bareground Mean =		3.29					10	15		20								15																10	
Relative % Native canopy cover					Mean =	96.05	90	80	100	80	100	100	100	100	100	100	100	85	100	100	85	95	100	100	100	90									
Relative % non-native invasive canopy cover :					Mean =	0.13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0		
Relative % non-native canopy cover, includes bareland:					Mean =	3.82	10	20	0	20	0	0	0	0	0	0	0	15	0	0	10	5	0	0	0	0	0	0	0	0	0	0	10		
% of Total Vegetation that is Native =		99.47		Percent of Total Vegetation that is Non-native =		0.53																													
Weighted moisture index		1.95						2.00	2.06	2.00	2.00	1.85	2.00	2.00	1.80	1.75	1.90	2.00	2.00	1.95	2.11	1.26	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00			
Total # of native Species: 15				# of Wet Praire or Vernal Pool Species = 13																															
Total number of Species Sampled: 19 Total Number of Sample Plots: 38																																			
Bareground due to recent inundation or age =#1, #4, #13, # 29, #41, #42																																			
Bareground (organic litter) #26, #36, #45																																			

One-Horse Slough Mitigation Bank 2010 Photo Monitoring

Photo Point 1 North



Photo Point 1 South



Photo Point 1 West



Photo Point 2 North



Photo Point 2 East



Photo Point 2 South



Photo Point 2 West



Photo Point 3 Southwest



Photo Point 3 South



Photo Point 3 West



Attachment 3

Photo Point 4 North



Photo Point 4 South



Photo Point 4 West



Photo Point 5 North



Photo Point 5 East



Photo Point 5 Southwest



Photo Point 5 West



Photo Point 6 North



Photo Point 6 East



Photo Point 6 Southwest



Photo Point 6 west



Attachment 3

Photo Point 7 North



Photo Point 7 East



Photo Point 7 Southwest



Photo Point 7 West



Photo Point 8 North



Photo Point 8 East



Photo Point 8 South



Photo Point 8 West



Photo Point 9 North



Photo Point 9 East



Photo Point 9 South



Photo Point10 North

Photo Point 10 East

Photo Point 10 South

