

2009 Monitoring Report: Muddy Creek Wetland Mitigation Bank, Monroe, Oregon.

***Project Overview:***

- (1) ACOE permit # 2005-714
- (2) Katie Arhangel'sky, Turnstone Environmental Consultants, 6/11/2009 and 6/18/2009
- (3) Muddy Creek Wetland Mitigation Bank is 108 acres that will generate 60.33 mitigation credits when fully restored. 101 acres are projected to become wet prairie and palustrine emergent habitats. 7 acres are riparian forest-shrub habitat.
- (4) The bank is located west of hwy 99 between McFarland and Dawson Roads, 3 miles north of Monroe, in Benton County. Legal description for Bank location is T14 R5W Section 9, tax lot 300.
- (5) Bank was authorized by DSL to sell credits August 17, 2007.
- (6) This is year 2 monitoring report.
- (7) Vegetation monitoring summaries (section 3) for emergent wetland, planted forest and enhanced forest habitats show the Bank meeting all of the MBI performance standards.
- (8) This is the second monitoring report submission. There are no additional, or corrective activities to report.
- (9) There have been no corrective or remedial actions associated with the Bank.

II. Monitoring requirements and performance standards:

Bank Hydrologic Monitoring:

Hydrology monitoring data is collected to validate compliance with 1987 manual soil saturation standard. 26 monitoring wells were established throughout the Bank. 20 of the 26 wells are located in areas originally delineated as uplands in the 2006 wetland delineation. Saturation/soil water depth was measured twice weekly from March 9 to April 9, 2009

Hydrology Performance:

Well log data summary (in section III) shows all phase I wells meeting hydrologic saturation standards. Two wells (#s 16 and 23) in phase II met saturation standards for the entire monitoring season. Both of these wells are located in emergent wetland habitat that we are asking for credit release. The balance of monitoring wells in phase II are not meeting saturation standards, however; these wells are located on ground where we have not started any restoration.

Vegetation Monitoring:

For **wetgrass prairie** and **emergent wetlands**, transects established approximately 250' apart along the baseline. A total of 12 transect lines were established in these two habitats. The location of the first sample plot along the transect line will be randomly placed, and then the remaining sample positions follow at roughly 115 foot intervals.

For **planted forested wetlands**, nine randomly located 50-foot diameter circular plots describe tree and shrub information. Within each plot herbaceous vegetation was recorded from a randomly located 1m<sup>2</sup> quadrat.

For **enhanced forested wetlands** sampling protocol is similar to planted forest habitat. Data for four randomly located plots of similar size were recorded.

Vegetation Performance Standards and Summary: Detailed summaries of plot data in section 3.

Emergent Wetlands - - Phase I

1. Min. 55% cover native species
2. Grass or grass-like species at least 25% cover
3. Min 3 herbaceous species yrs 1& 2
4. 15% cover non-native invasives
5. Moisture index less than 3.0

Met?

- yes- 37 plots avg = 83%  
 Yes- 37 plot avg = 55%  
 Yes- 7 native herb. species  
 Yes- 37 plot avg = 5.37%  
 Yes- all plots less than 3.0

Emergent Wetlands - - Phase II

1. Min. 55% cover native species
2. Grass or grass-like species at least 25% cover
3. Min 3 herbaceous species yrs 1 & 2
4. 15% cover or less non-native invasives
5. Moisture index less than 3.0

- Yes- 23 plot avg = 92%  
 Yes- 23 plot avg = 59%  
 Yes- 10 native herb species  
 Yes- 23 plot avg = 3.60 %  
 Yes- all plots less than 3.0

Forested Wetland- Planted

1. Min 2 tree species planted density of 200 stems/acre
2. Min 55% cover native species
3. Min 3 native shrubs planted @ 240 stems/acre
4. 15% cover or less non-native invasives
5. Moisture index less than 3.0

- Yes- 9 plot avg 352 stems/acre  
 Yes- 9 plot avg = 73%  
 Yes- 9 plot avg = 501 stems/acre  
 Yes- 9 plot avg = 5.33%  
 Yes- all plots less than 3.0

Forested Wetland- Enhanced

1. Min 2 native shrubs planted @ 240 stems/acre
2. Min 20% cover of Carex obnupta
3. Less than 30% cover of non-native invasives
4. Min 55% cover native species

- Yes- 4 plot avg = 511 stems/acre  
 Yes- 4 plot avg = 41%  
 Yes- 4 plot avg = 1.25%  
 Yes- 4 plot avg = 98%

Wetgrass Prairie-

14 wetgrass prairie plots were established in phase I creation acres following planting in the fall of 2008 and data summary is provided in section 3; however since we are not asking for credit release for any of this habitat we did not evaluate monitoring data as to performance standards.

**III. Summary data: included with document**

- a. Well log data table
- b. Monitoring data table for emergent wetland- phase I
- c. Monitoring data table for wetgrass prairie- phase I
- d. Monitoring data table for planted forest-phase I
- e. Monitoring data table for enhanced forest-phase I
- f. Monitoring data table for emergent wetland-phase II

**IV. Maps and plans: included with document**

- a. Monitoring plots and anticipated habitats

**V. Conclusions:**

Credit Sales:

A total of 227,819 sq. ft. of Bank land was sold in 2009.

Date	DSL Permit #	ACOE Permit #	Enforcement File #	Total of Land Sold
6/24/2009	41620	NWP 2008-694		227,819 sq ft (5.23 credits)

Management activities: Phase I

In the enhanced forested wetland habitat, shrub rootstock (*Rosa pisioarpa*, *Cornus sericea*, and *Salix scouleri*) and *Carex obnupta* plugs were planted in Jan and Feb, 2009. Selective spraying for non-native vegetation, focusing on nightshade and reed canary grass, occurred over the course of the spring, and all English hawthorn was cut and piled for burning.

In the planted forested wetland habitat, tree rootstock (*Quercus garryana* and *Fraxinus latifolia*) and shrub rootstock (*Cornus sericea*, *Oemlaria cerasiformis*, *Physocarpus capitatus*, *Rosa pisioarpa*, *Salix lucida*, *Salix scouleri*, and *Symphoricarpus albus*) were planted in Jan and Feb, 2009. Selective spraying for non-natives grasses and pennyroyal throughout the spring was conducted. Ground that was not planted in rootstock was mowed in April to reduce future moisture competition. Weekly watering of rootstock began in July.

In the emergent wetland habitat selective spraying for non-native grasses and forbs throughout winter and spring of 2009. Selective spraying on phase 1 continues into the summer. We target pennyroyal especially in this selective spraying. We are satisfied with the progress of seed/forb planting mix and do not anticipate additional planting this year. We will continue selective spraying and probably mow this fall.

In the wetgrass prairie habitat, initial planting was in the fall of 2008. Seed mixture was a combination of *Deschampsia caespitosa*, *D. elongata*, *Hordeum brachyantherum*, and *Alopecurus geniculatus*. Weedy broadleaves do not appear to be much of a problem, although there are *Lythrum* and *Lolium* invasives, so continued selective spraying will be required. During the IRT review *Vupia myuros* was noticed so that species will become a focus of future selective spraying. It is likely that we will do supplemental planting this fall with the original seed mixture. Some areas are thinly vegetated and we would like to get a good grass-dominant mixture, then supplemental planting of additional native broadleaves.

Management activities: Phase II

In the fall of 2008, 22.2 acres of phase 2 wetland-delineated ground, (our emergent wetland habitat), were seeded to a mix of *Deschampsia caespitosa*, *D. elongata*, *Hordeum brachyantherum*, *Alopecurus geniculatus*, and *Beckmania sygnache*. Calico flower, (*Downingia elegans*) was also planted in this mix. To discourage waterfowl predation 6,000 bamboo stakes with plastic flagging were placed on newly planted ground. Monitoring results show a good response to this planting. All 23 monitoring plots exceed every performance standard except for #10 which has 20% *Lolium* cover. The only concern that we have is the amount of *Lolium* in

that area of the property. After the IRT inspection tour we mowed this area with the expectation that we will herbicide sponge the Lolium when it resprouts in the fall.

In March of 2009 the anticipated wetgrass prairie habitat was sprayed with roundup herbicide. While effective at killing sprouting Lolium the application was too early for later sprouting broadleaves, especially the Lactuca and Sonchus species. We are not too concerned that this will affect the establishing emergent wetland habitat, as they do not compete well where there is standing water lasting into the growing season. For example, in the Phase I emergent wetland habitat, this years monitoring did not record any Lactuca and Sonchus was only found on 3 plots with low coverage. However, we did note the concern of the IRT and we will spray that ground with several timed applications next year.

In May and June of 2009 approximately 1,400 cubic yards of fill excavated out of phase II uplands was used to plug the drainage ditch that borders the access road into the property. We do not anticipate additional excavation on phase II ground this year, pending the outcome the Junction City prison to use some of our fill for their construction.





2009 Monitoring data: <b>Emergent wetland habitat--Phase I</b>																											
Summary of emergent wetland vegetation sampled on 6/11 and 6/18, 2009.																											
	Origin	moisture index	Plot#																								
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
<b><i>Herbaceous plants</i></b>																											
<i>Alisma plantago-aquatica</i>	native	1	10	30	10		60	60				2	30	65	45	30		20	15		3	5	1				
<i>Boisduvalia densiflorum</i>	native	2								1								3	1				1	2		5	
<i>Bidens cernua</i>	native	2							5					1													
<i>Cerastium glomeratum</i>	non-native	5														2			5								
<i>Cirsium arvense</i>	invasive	3.5							1																		
<i>Gnaphalium uliginosum</i>	native	2.5														5			5		10	5	25	5	1	15	
<i>Juncus bufonius</i>	native	2							5										15								
<i>Lotus pinnatus</i>	native	2							2																		
<i>Lythrum portula</i>	invasive	1	5	15	5		5	5		5	10	2	30	5	5	8	10	5		5		2	5	5	1	2	10
<i>Mentha arvensis</i>	native	2	10																								
<i>Mentha pulegium</i>	invasive	1																						1			
<i>Medicago lupulina</i>	non-native	4																									
<i>Myosotis laxa</i>	native	1																	1				1	1	1		
<i>Navarretia intertexta</i>	native	2														5		10									
<i>Parentucellia viscosa</i>	non-native	3.5							8							2			1			3					
<i>Plagiobothrys figuratus</i>	native	2								11							15						1			1	
<i>Poamogeton epihydrus</i>	native	1													5												
<i>Polygonum hydropiperoides</i>	native	1																	1	15	5	4	5	5	25	3	
<i>Polygonum persicaria</i>	native	2																	1	5			2	10	3		
<i>Rorippa curvisiliqua</i>	native	1								4						5	4		10	3		10	3	10	1		
<i>Sonchus asper</i>	non-native	3																	2			3					
<i>Trifolium repens</i>	non-native	3.5																									
<i>Typha latifolia</i>	native	1												1													
<i>Veronica peregrina</i>	native	1								1	5	3						1		1			1		3		
<b><i>Grasses-Grass-like</i></b>																											
<i>Agrostis capillaris</i>	non-native	3							15																		
<i>Agrostis exarata</i>	native	2							15																		
<i>Alopecurus aequalis</i>	native	1															1	5		2			4				
<i>Alopecurus geniculatus</i>	native	1	10	5			15	20	90	70	50	5				25	20	5	5	30	20	35	10	45	20	35	
<i>Beckmannia syzigachne</i>	native	1																		3		2	5	1			
<i>Bromus hordeaceus</i>	non-native	4																									
<i>Deschampsia caespitosa</i>	native	2							2																		
<i>Deschampsia elongata</i>	native	2.5							7								30			50				20	1	2	



													row
26	27	28	29	30	31	32	33	34	35	36	37	average	
		1	10	3	25							11.75	
												0.32	
												0.16	
												0.22	
												0.02	
3	5	1	1	1	1			1	1	15	1	2.73	
								15	3		35	1.97	
												0.05	
25	5	1	3					5	3	2		5.10	
												0.27	
	1										1	0.08	
							5					0.13	
												0.11	
							2					0.46	
							1		2			0.78	
							5	5			1	1.05	
												0.13	
40			1	10		5		20	15			4.29	
	3	35	1	20		3	3	10	5			2.73	
							3				1	1.51	
									1			0.22	
							5					0.16	
												0.02	
								1			1	0.46	
												0.40	
							5					0.54	
												0.32	
10	15	35		10	1	1	5	65	40	30	40	20.73	
1	3											0.4	
							3					0.08	
											5	0.19	
	1						60			15		5.02	





2009 monitoring data: <b>planted forest habitat.</b>												
Tree and shrub rootstock planted in Jan and Feb, 2009.												
	origin	moist.	pf-1	pf-2	pf-3	pf-4	pf-5	pf-6	pf-7	pf-8	pf-9	row
<b><i>Tree-Shrub % cover--stem count</i></b>		index										average
Fraxinus latifolia	native	2	5--35	3--7	4--11	2--6	2--6	2--5	4--15	2--4	2--2	10%
Quercus garryana	native	3	2--6	3--7	2--5	3--5	5--7	2--6	1--2	3--7	4--9	5.33
Cornus sericea	native	2	4--7	2--6	2--5	3--5	2--8	2--4		2--6	3--8	5.44
Oemlaria cerasiformus	native	4		5--10	4--5	3--9	4--8	2--4	2--3	3--5	2--2	5.33
Physocarpus capitatus	native	2.5	1--1	3--3	2--5	1--1	2--6		3--7	1--3		2.88
Rosa pisiocarpa	native	3	2--2	2--2	3--5	2--5		4--6	2--3	2--2	3--7	3.55
Rubus discolor	invasive	4					1--1	1--1				0.22
Salix lucida	native	2				2--2		1--2	2--2	1--1	1--2	0.77
Salix scouleri	native	3	5--7		2--2		1--1	1--3				1.44
Symphoricarpos albus	native	4	5--4	2--4	1--4	2--7	1--1	3--5	1--2	2--3		3.33
<b><i>Herbaceous Species-% cover</i></b>												
Cerastium glomeratum	non-native	3						1				0.11
Daucus carota	invasive	5									1	0.11
Downingia elegans	native	1							3			0.33
Geranium molle	non-native	5			1		1		1			0.33
Lupinus bicolor	native	3.5						1		4		0.55
Lythrum portula	invasive	1							2	1		0.33
Lotus corniculatus	non-native	3	5									0.55
Lotus purshianus	native	2								1		0.11
Matricaria discoidea	non-native	4									1	0.11
Medicago lupulina	non-native	4			2		1	2				0.55
Mentha puligeum	invasive	1			2		1					0.33
Myosotis laxa	native	1			1	1	1	1				0.44
Orthocarpus bracteosus	native	2						1	1			0.22
Parentucellia viscosa	non-native	3	1	5	5	1	1	1	2			1.77
Plagiobothrys figuratus	native	1							1		5	0.66
Rorippa curvisiliqua	native	1	5	3				2	5	5		2.22
Rumex crispus	non-native	2.5						1				0.11
Sonchus asper	non-native	3	1		1	1	1	1			5	1.11
Trifolium repens	non-native	3.5	5		2			3	2			1.33
Vicia sativa	non-native	5						1				0.11

<b>Grasses % Cover</b>												
Agrostis gigantea	non-native	3	15	5	15		5	20	15		10	9.44
Alopecurus geniculatus	native	1	10	10	5		3	10	10	20		7.55
Bechmannia sygnache	native	1	4	1								0.44
Briza minor	non-native	3			3	1						0.44
Deschampsia caespitosa	native	2	1	5	35	50	25	5	5	10	2	15.33
Deschampsia elongata	native	2					10	10	5	30	20	9.44
Holcus lanatus	non-native							1				0.11
Hordeum brachyantherum	native	2	20	25	25	25	25	10	30		30	22.22
Hordeum (commercial)											2	0.22
Lolium multiflorum	invasive	3	10	5	1			5	3	10	5	4.33
Poa pratensis	non-native	3			1		5	5		3	3	1.88
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% cover native herbaceous species			63%	64%	67%	94%	83%	58%	75%	86%	72%	73%
meets MBI standard: 55% relative native plant cover			yes	yes	yes	yes	yes	yes	yes	yes	yes	
% cover non-native herbaceous			27%	10%	30%	3%	14%	36%	20%	3%	21%	18%
% cover IRT listed invasive species			10%	5%	3%	0%	2%	6%	5%	11%	6%	5.33%
meets MBI performance standard: < 15% cover invasives			yes	yes	yes	yes	yes	yes	yes	yes	yes	
stems per acre: trees			902	308	352	242	286	242	352	242	242	352
meets MBI standard: 2 species, 200 stems per acre			yes	yes	yes	yes	yes	yes	yes	yes	yes	
stems per acre: shrubs			462	550	572	638	528	528	374	440	418	501
meets MBI standard: min. 3 species, 240 stems per acre			yes	yes	yes	yes	yes	yes	yes	yes	yes	
% cover bare ground			0%	21%	0%	3%	1%	0%	0%	0%	0%	2.77%
moisture index			2.44	2.43	1.72	2.61	2.72	2.18	2.43	2.28	2.58	
meets MBI standard: less than 3.0			yes	yes	yes	yes	yes	yes	yes	yes	yes	
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