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Mud Slough Wetland Mitigation Bank

Phase 1 and Phase 2 2009 Annual Report

Compiled by Mark Knaupp

and

Ridgeline Resource Planning

June 2009

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1.0 REGULATORY APPROVAL AND HISTORY

Mud Slough Wetland Mitigation Bank (Bank) is submitting the 2009 Annual Monitoring Report for Phases 1 and 2. Phase 1 of the Bank was approved via the Memorandum of Agreement (MOA) signed by the Bank sponsor and the members of the Mitigation Bank Review Team (MBRT) dated October 2000. Phase 2 of the Bank was approved in 2004.

Phase 1 - The MBRT released the first 30% (8.44) of the available uncertified credits in the Spring of 2000, an additional release of 13.43 credits was released in March 2003 and the final 6.255 credits were released in March 2004. This is a total Phase 1 release of 28.125 credits, all of which have been sold.

Phase 2 - The MBRT released the first 40% (18.28) of the available uncertified credits in 2005 and then released the remaining 27.42 credits in the summer of 2006, for a total Phase 2 release of 45.7 credits. To date 42.529, Phase 2 credits have been sold, leaving 3.171 credits unsold. *- NW Mitigation*

2.0 GRADING AND HYDROLOGY HISTORY

The grading work, which was originally done in September 2000 for Phase 1 and September 2004 for Phase 2, meets all the specifications defined in the Mud Slough Wetland Mitigation Final Instrument. No additional grading work has been conducted.

The hydrology of the bank continues to function as expected and is providing optimum conditions for the plant communities that have been restored. No further monitoring of the hydrology is being conducted. All structures continue to function as designed.

3.0 VEGETATION

3.1 Phase 1 Vegetation Summary

Initial planting of Phase 1 was completed in October 2001, with additional planting in October 2002. Phase 1 plant communities are well established and continue to perform well.

3.2 Phase 2 Vegetation Summary

Phase 2 was planted in October 2004 with additional planting occurring in February 2005. As was reported in the 2008 Annual Report, Phase 2 experienced some vegetation problems. The tufted hair grass was so heavy in 2007 and produced so much bio mass that it smothered itself out with the help of a January 2008 snow that laid it flat and created a blanket that prevented light penetration. As the spring of 2008 progressed, it began to be clear that survival of the old plants was minimal. There was not a lot to do at that point but to wait and see what would happen. Seedling tufted hair grass and other grass species began to sprout as the old thatch began to break down. In addition, Queen Anne's lace and prickly lettuce made a presence.

The situation was discussed with others including Pat Thompson, Carla Cudmore, Steve Smith and members of the MBRT. Various options were debated, including burning, complete removal of the old thatch by swathing and bailing, mowing the straw down and doing nothing. The action plan decided upon was to swath and bail approximately 30 acres. This was chosen for the majority of the site, assuming removal of all the dead growth would prevent the Queen Anne's lace from going to seed. In addition, a "mow" plot and a "no action" plot were used to evaluate the long range results of three different options. These three areas are shown on the Phase 2 Trial Map - Attachment 1.

3.3 On-Site Vegetation Survey

Phase 1

No on-site survey was conducted on Phase 1, since all performance standards have been met as per our final instrument. Monitoring could be resumed in the event of observed problems noted during the annual site visits by the MBRT. Photos were taken in June 2009 at the assigned photos points (See Attachment 2.)

Phase 2

Phase 2 monitoring began in 2006 and continued in 2007, meeting all performance standards. No monitoring was conducted in 2008 due to the site passing performance standards two years in a row. This year however, we have reinstated monitoring on the herbaceous layer to evaluate how the various human manipulations have affected the tufted hairgrass die off areas. Photos were also taken at each of the photo points and are included in Attachment 3. Results of the monitoring are included in Attachment 4 and the Monitoring Point Location Map is included as Attachment 5.

It is difficult to compare the trial areas as each of them was selected for a specific remediation based upon its then current condition. For example, the area with no treatment at all was wetter to begin with, along with more diversity than the other problem areas. This made the original tufted hairgrass die off less dramatic than in other less diverse areas. The sponsor feels that the swathing and bailing method removing the vast majority of the seed heads appears to be a better option than just mowing the area. The mowing only area, has more non-native annuals due to the seed going back on site.

Emergent Vegetation - The performance criteria for **emergent herbaceous** vegetation were both met.

Required: At least 55% of the mean plant cover (including bare soil) will be comprised of native species. **Met**, with an average 83.14% native species which includes any bare ground as part of the non-native component. The most observed non-native species was water-purslane (*Peplis portula*).

Required: No more that 15% of the mean plant over will be comprised of non-native invasive species. **Met** with 1.0% of non-native invasive species, all due to pennyroyal.

*Non-native 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*), yellow-flag iris (*Iris pseudacorus*), and pennyroyal (*Mentha pulegium*).

Wetgrass Prairie - The performance criteria for **wetgrass prairie** was met for 5 of the 5 monitored requirements (1 requirement was not monitored).

Required: At least 55% of the mean plant cover (including bare soil) will be comprised of native species. **Met** – 58.43% of the species present were native. The most observed non-native species were velvet grass (*Holcus lanatus*) and rough bluegrass (*Poa trivialis*).

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.

Required: At least 10 wetgrass prairie species listed in Appendix II of the "Draft Guidance on Vegetation Performance Standard and Monitoring Protocols for Reference Sites and Mitigation Sites" are present. **Met** with 19 species present.

Required: Tufted hairgrass (*Deschampsia cespitosa*) is represented by 25% or greater

mean cover. **Met** - Tufted hairgrass averaged 37.9% of the total herbaceous cover, in the 23 plots identified as wetland prairie.

Required: The prairies's moisture index is between 2.0 and 3.0. **Met** – The moisture index is 2.16.

Required: The prairie has no more than 5% mean cover by shrubs or trees. **Not monitored** but there s no apparent problem.

4.0 BANK CREDIT SALES SUMMARY

Summary of the 2008 Credit Sales for Phase 2

(Phase 1 Credits were previously sold out)

Date	Name	DSL Permit #	ACOE Permit #	Credits Purchased
2/2/09	JCNW Family LLC	DSL 39192	COE2007-817	0.79
5/4/09	Tualatin Business West LLC	DSL 17701-RF	COE199-0794	0.56
5/11/09	City of Salem	DSL41767-RF	COE2009-48	0.39
Total Phase 2 Credit Sales in 2009				1.74

Total Phase 1 and Phase 2 Credit Sales through June 2009

Report Year	Phase	Credits Sold	Total Sold
2002	Phase 1	0.39	0.39
2003	Phase 1	8.03	8.42
2004	Phase 1	6.216	14.636
2005	Phase 1 and Phase 2	15.945	28.125 Phase1 Sold Out 2.456 Phase 2
2006	Phase 2	8.67	11.126
2007	Phase 2	12.492	23.618
2008	Phase 2	17.171	40.789
June 2009	Phase 2	1.74	42.529

Total Phase 2 credits 45.700
 Sold to Date 42.529
 3.171 **Remaining Phase 2 Credits.**

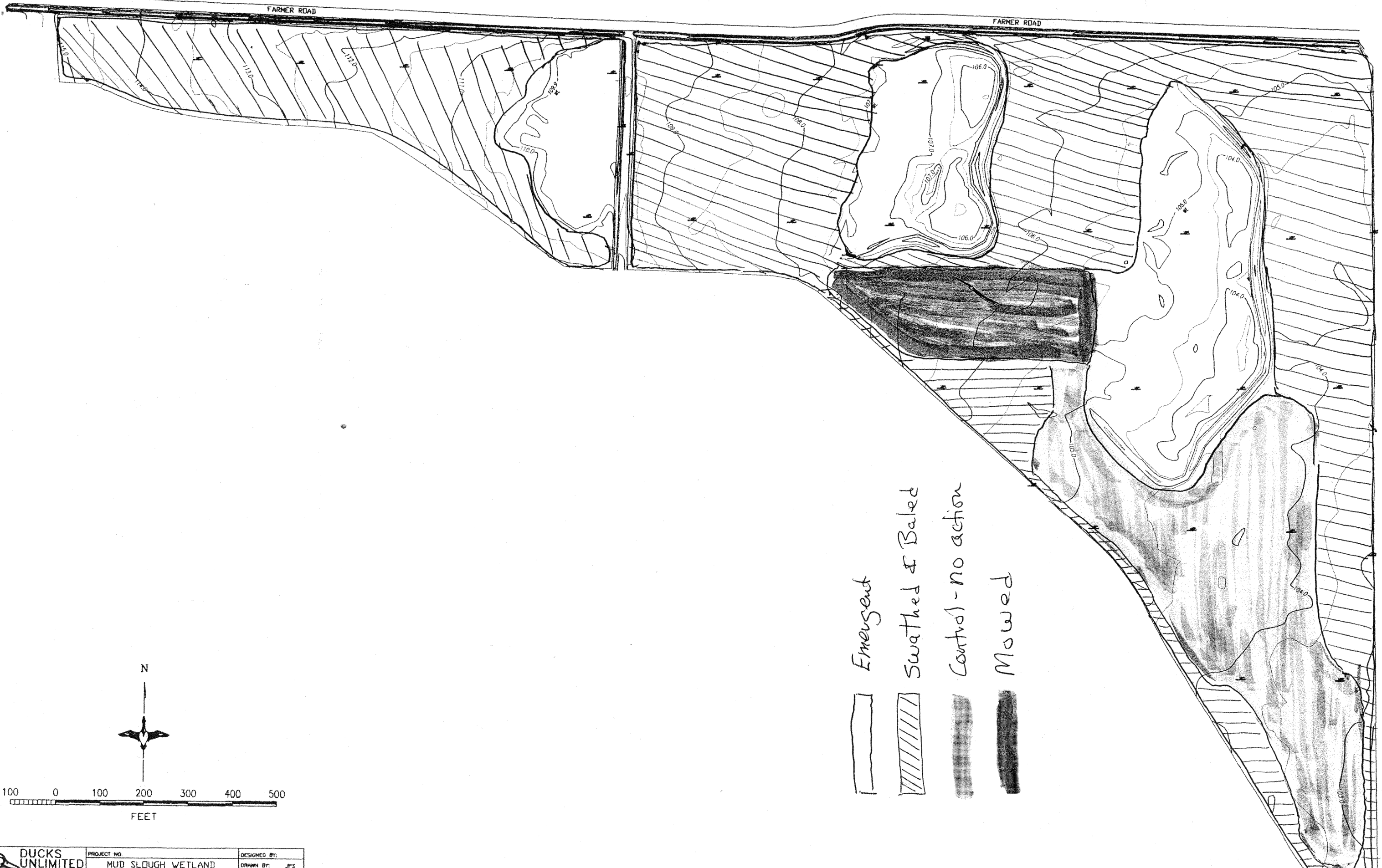
5.0 CONSERVATION EASEMENT- ENDOWMENT

A conservation easement on Phase 1 was granted to The Wetlands Conservancy in September 2005. Funding of an endowment for Phases 1 and 2 was completed with the payment of \$92,778 to The Wetlands Conservancy on January 2, 2007. These funds will be invested and used for maintenance of the site after 2010 when our official commitment for action management of Phase 2 ends. We will be working with The Wetlands Conservancy to draft the actual management plan prior to 2010.

6.0 FINAL DISCUSSION

Phase 1 of the Mud Slough Wetland Mitigation Bank continues to perform as expected. Phase 2 although meeting all of its performance standards, is still suffering from the affects of the tufted hairgrass die off. Reviewing the monitoring results it is difficult to determine if one method of treatment is better than another, if any. The areas look different, but it is hard to say which is better. Following the MBRT annual visit we are hoping have further discussions regarding an active management of this area versus a no, or limited action plan.

If you have any questions or for further information call Mark Knaupp at 503-623-0768 or 503-559-0223.



- Emergent
- Swathed & Baled
- Control - no action
- Mowed



	PROJECT NO.	DESIGNED BY:
	MUD SLOUGH WETLAND MITIGATION BANK AS-BUILT	DRAWN BY: JPS
		SURVEYED BY: JPS
		CHECKED BY:
DATE:	SHEET NO.	APPROVED BY:

HORIZONTAL COORDINATES: OREGON STATE PLANE NORTH ZONE NAD83
 VERTICAL COORDINATES: ASSUMED ELEVATION
 (ASSUMED ELEVATION OF MONUMENT SE CRNR SEC 17=100.0, NAVD88 ELEVATION =174.7)

Attachment 1
 Phase 2 Trial Map

PHOTO POINT #1 Facing East (June 2009)

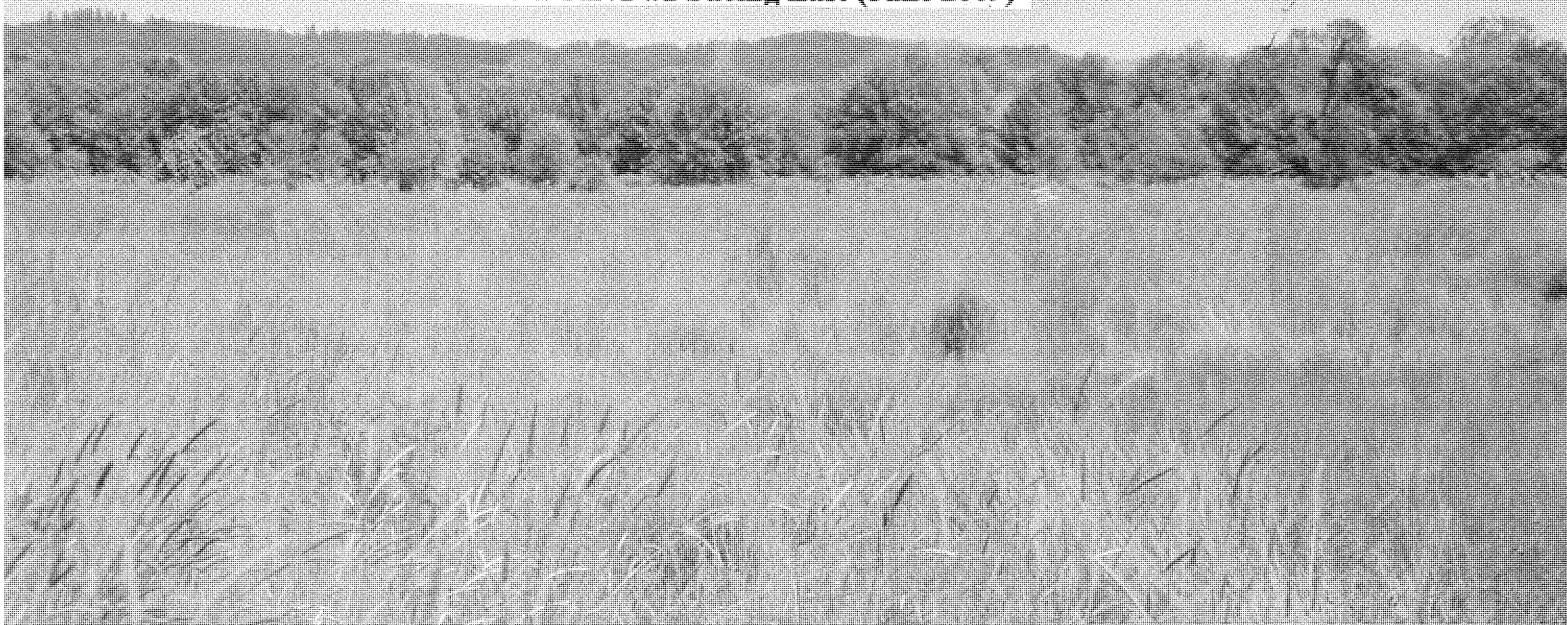


PHOTO POINT #2 Facing West (June 2009)

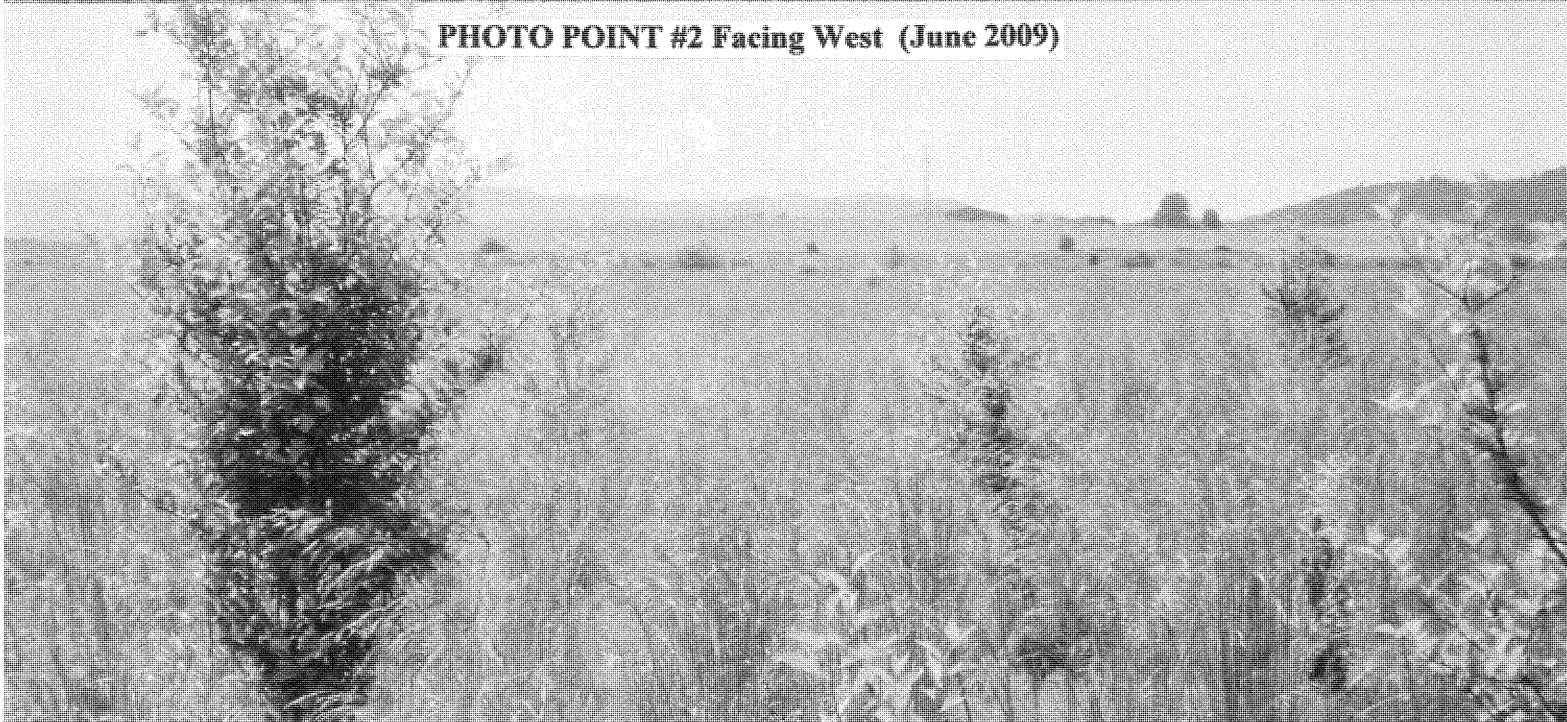


PHOTO POINT #3 Facing West (June 2009)

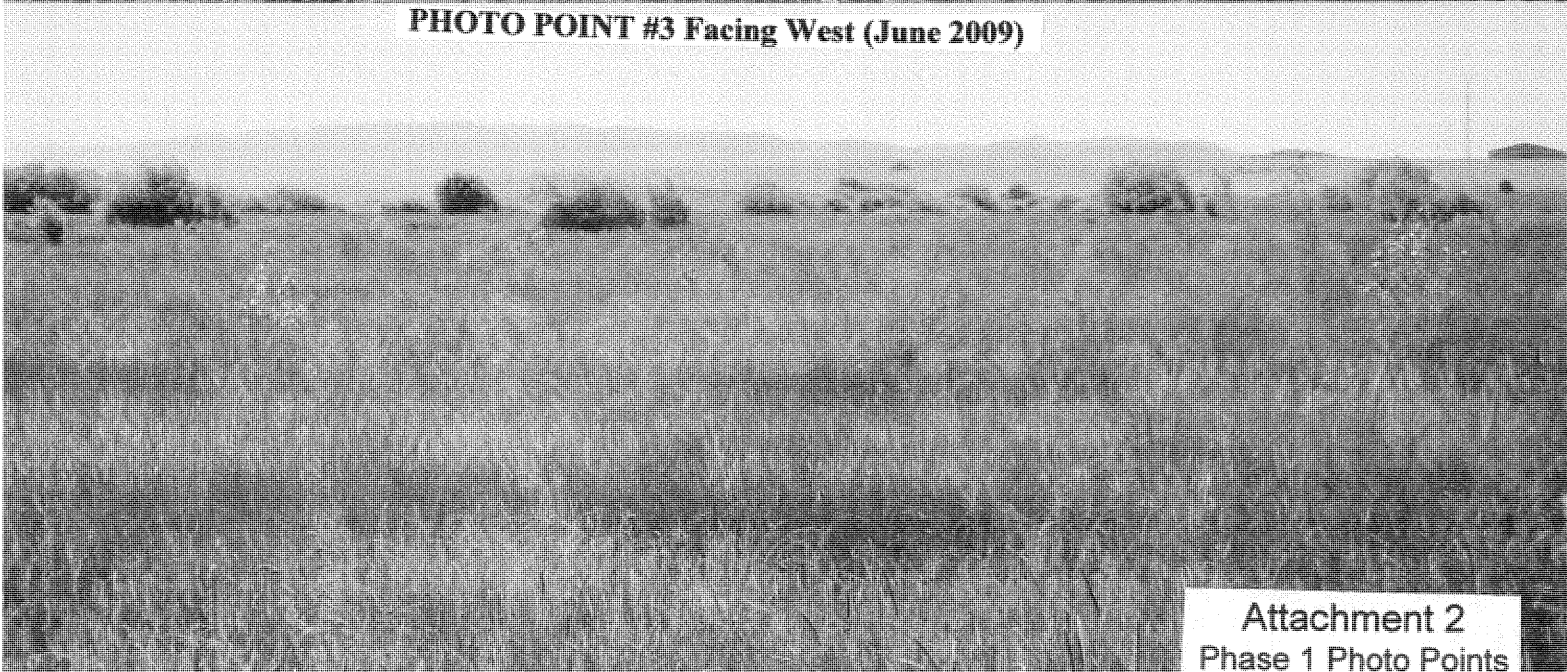


PHOTO POINT #4 Facing West (June 2009)

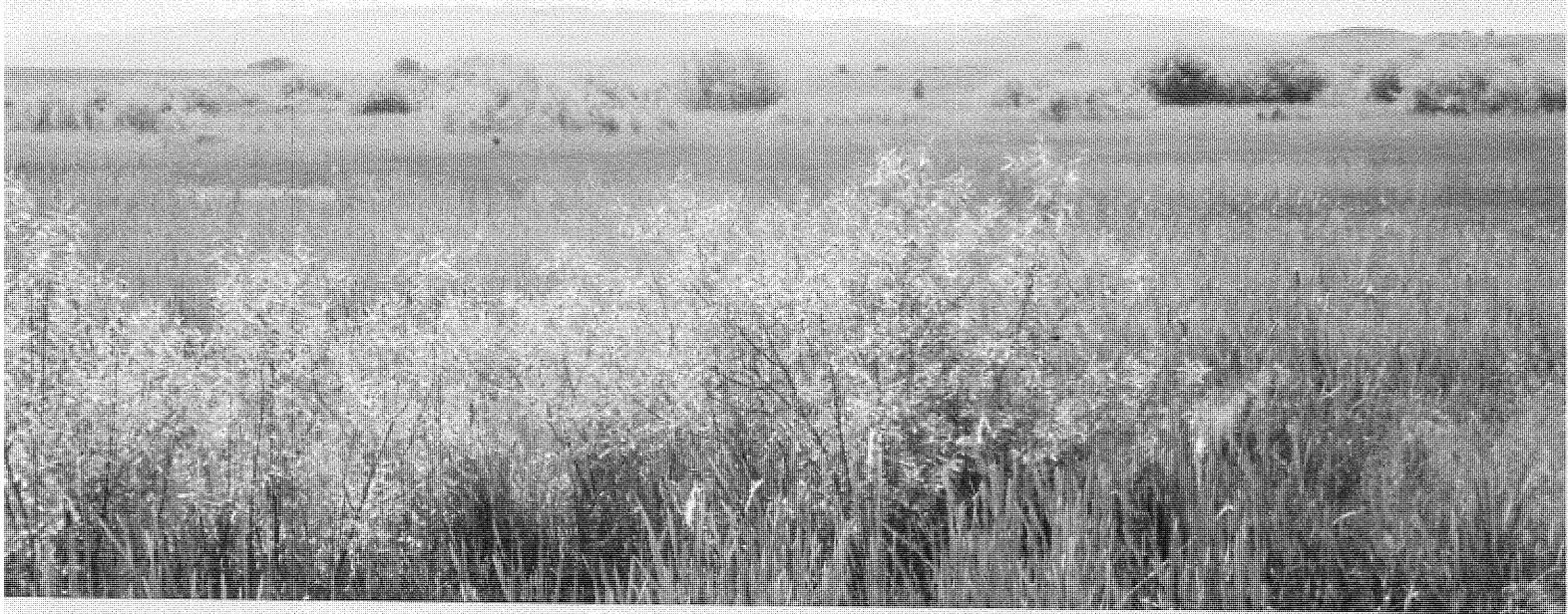


PHOTO POINT #5 Facing North (June 2009)



PHOTO POINT #6 Facing East (June 2009)



PHOTO POINT #1 Facing West (June 2009)

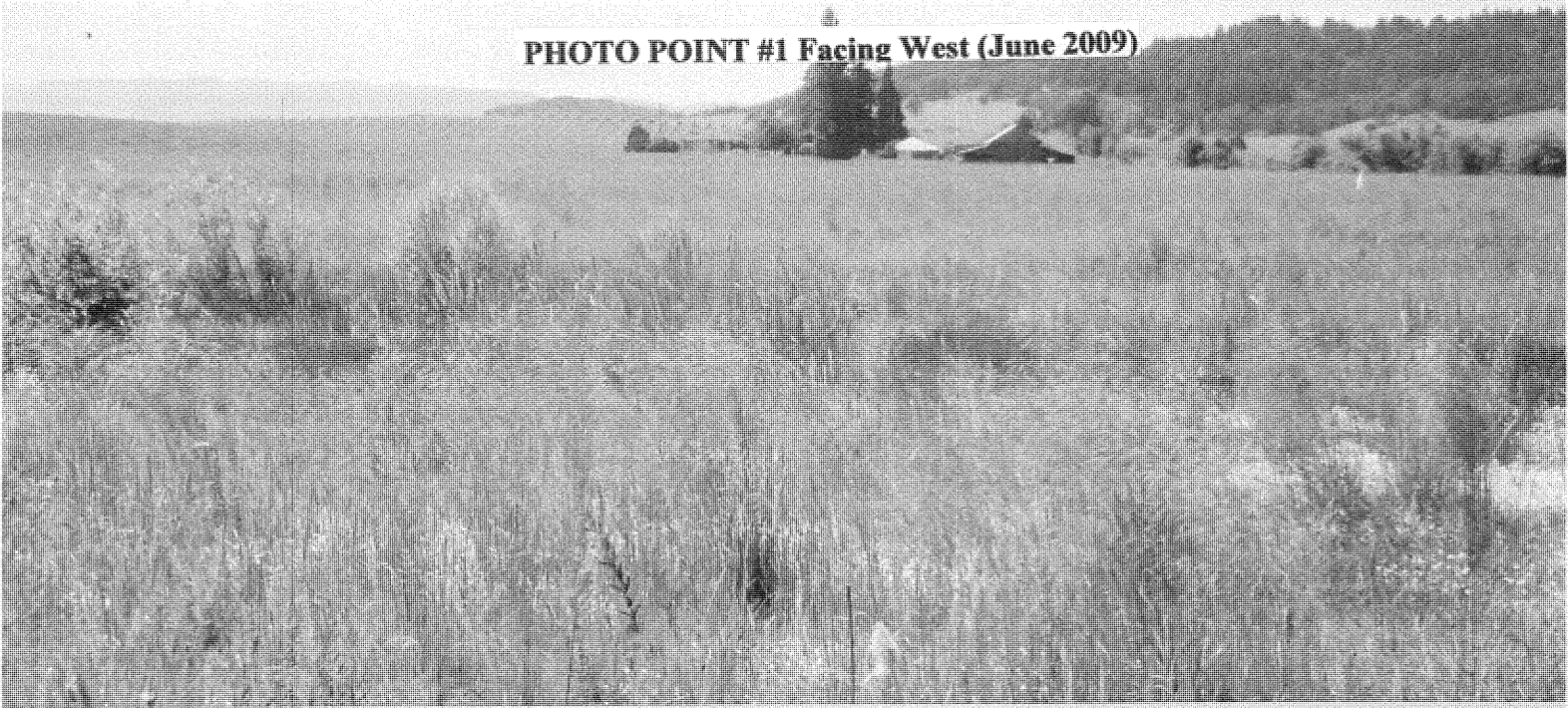


PHOTO POINT #2 Facing East (June 2009)

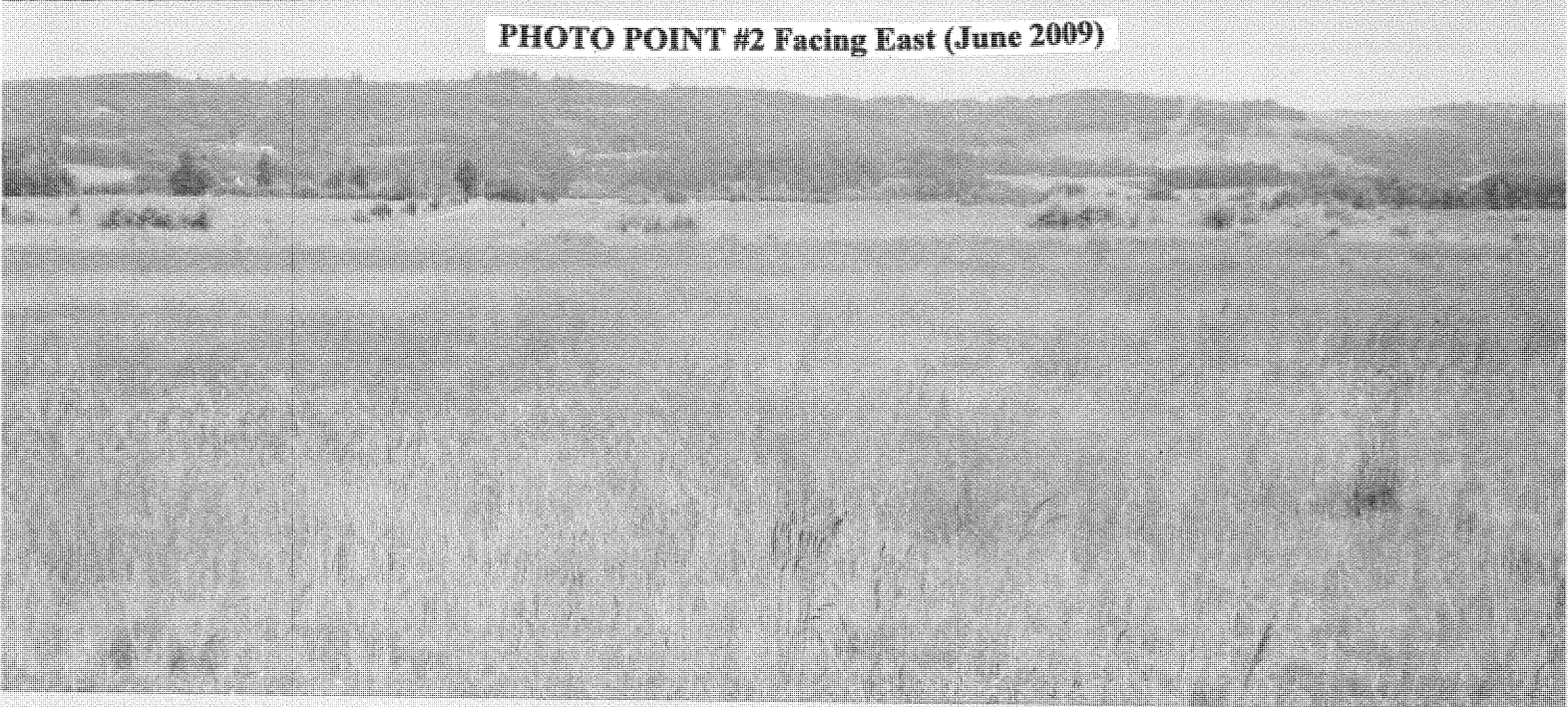


PHOTO POINT #3 Facing South (June 2009)

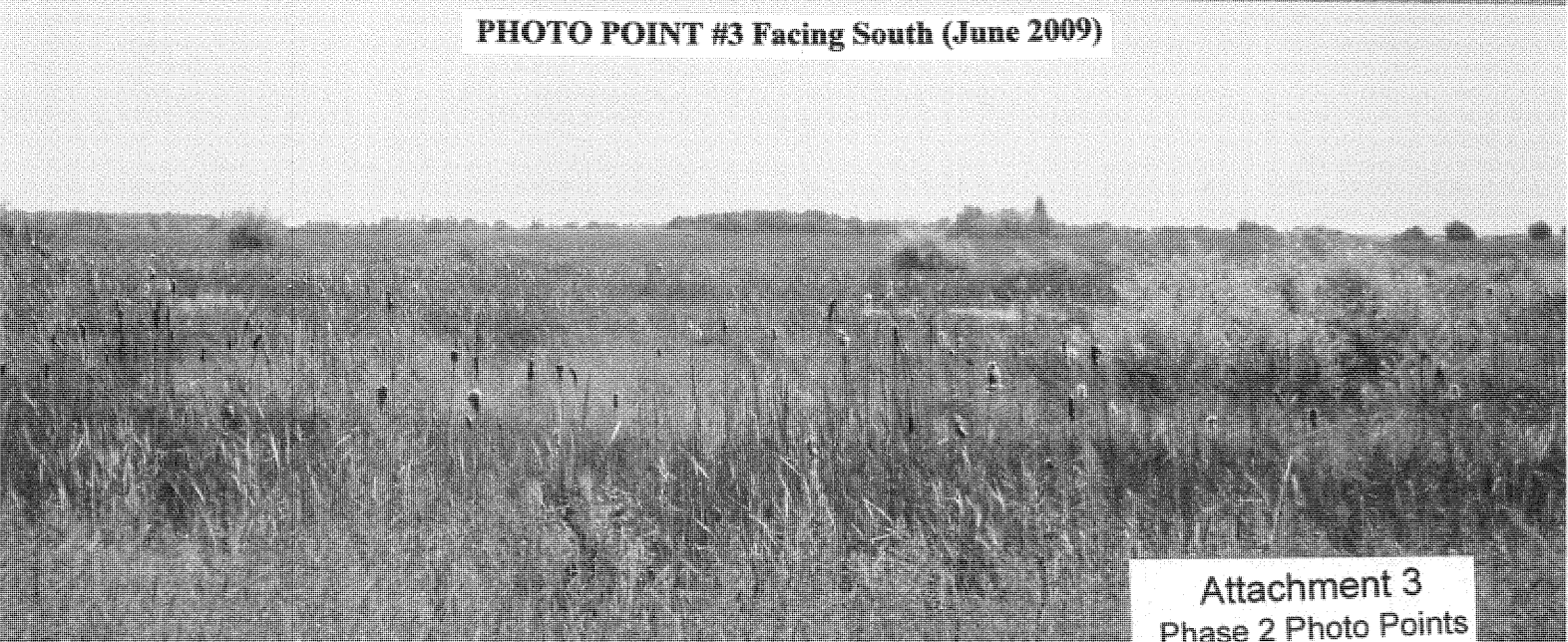


PHOTO POINT #4 Facing West (June 2009)



PHOTO POINT #5 Facing West (June 2009)



PHOTO POINT #6 Facing Northeast (June 2009)



Mud Slough Mitigation Bank - Phase 2																																			
June 1, 2009 Field Sheet																																			
Botanical Name	Common Name	Status	Origin	Wet Prairie		Emergent Species	Prairie Species																												
				Vernal pool	Moisture			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	26	27	28
Herbaceous Species - percent cover																																			
<i>Alisma plantago aquatica</i>	Water plantain	OBL	native		1	1.4	0.0																												
<i>Bidens cernua</i>	Nodding beggarstick	FACW	native		2	1.6	0.0																												
<i>Carex densa</i>	Dense sedge	OBL	native	Yes	1	0.0	0.2																												
<i>Carex feta</i>	Green-sheath sedge	FACW	native	Yes	2	0.0	0.0																												
<i>Carex unilateralis</i>	One-sided sedge	FACW	native	Yes	2	0.0	1.4																												
<i>Centaurium erythraea</i>	Centuary	FAC	introduced		3	0.0	0.0																												
<i>Cerastium vulgatum</i>	Mouse-ear chickweed	FACU	introduced		4	0.0	0.0																												
<i>Cirsium arvense</i>	Canada thistle	FACU	introduced		4	0.0	0.0																												
<i>Cirsium vulgare</i>	Bull thistle	FACU	introduced		4	0.0	0.0																												
<i>Daucus carota</i>	Queen Ann's Lace	NOL	introduced			0.0	0.0																												
<i>Downingia elegans</i>	Showy downingia	OBL	native	Yes	1	1.9	0.0																												
<i>Eleocharis palustris</i>	Creeping spike rush	OBL	native		1	26.4	1.1																												
<i>Epilobium ciliatum</i>	Watson's willow weed	FACW	native	Yes	2	0.0	0.4																												
<i>Epilobium paniculatum</i>	Autumn willow-herb	NOL	native	Yes		0.0	1.9																												
<i>Eryngium petiolatum</i>	Rush leaf Coyote thistle	OBL	native	Yes	1	0.0	0.0																												
<i>Galium parisiense</i>	Wall bedstraw	NOL	introduced			0.0	0.2																												
<i>Gnaphalium palustre</i>	Lowland cudweed	FACW	native	Yes	2	0.3	0.0																												
<i>Hypochaeris radicata</i>	Cat's ear daisy	FACU	introduced		4	0.0	0.2																												
<i>Juncus bufonius</i>	Toad rush	FACW	native	Yes	2	0.0	0.2																												
<i>Juncus tenuis</i>	Slender rush	FACW	native	Yes	2	0.0	0.5																												
<i>Lactuca serriola</i>	Prickly lettuce	FAC	introduced		3	0.0	0.1																												
<i>Lotus purshianus</i>	Spanish-clover	NOL	native	Yes		0.0	0.7																												
<i>Medicago lupina</i>	Black medic	FACU	introduced		4	0.0	0.0																												
<i>Mentha pulegium</i>	Pennyroyal	OBL	introduced		1	1.0	0.0																												
<i>Myosotis discolor</i>	Yellow & blue forget-me-not	FACW	introduced		2	0.0	0.0																												
<i>Peplis portula</i>	Water-purslane	NOL	introduced			14.4	0.0																												
<i>Plagiobothrys figuratus</i>	Fragrant popcorn flower	FACW	native	Yes	2	13.3	0.6																												
<i>Plagiobothrys scouleri</i>	Scouler's popcorn flower	FACW	native	Yes	2	0.0	0.0																												
<i>Plantago major</i>	Common plantain	FACU	introduced		4	1.4	0.0																												
<i>Polygonum hydropiperoides</i>	Smartweed	OBL	native		1	0.0	0.0																												
<i>Rorippa curvisiliqua</i>	Western Yellowcress	OBL	native	Yes	1	0.0	0.2																												
<i>Rumex crispus</i>	Curly dock	FAC	introduced		3	0.0	0.2																												
<i>Scirpus tabernaemontani</i>	tule, softstem bulrush	OBL	native		1	6.4	0.0																												
<i>Sonchus asper</i>	Prickly sow-thistle	NOL	introduced			0.0	0.0																												
<i>Typha latifolia</i>	Common cattail	OBL	native		1	21.0	0.0																												
<i>Ventenata dubia</i>	Ventenata	NOL	introduced			0.0	0.1																												
<i>Veronica peregrina</i>	Purslane speedwell	OBL	native	Yes	1	1.4	0.0																												
<i>Veronica scutella</i>	Skullcap speedwell	OBI	native		1	0.0	0.7																												
<i>Vicia tetrasperma</i>	Slender vetch	NOL	introduced			0.0	5.0																												
Grass Species - percent cover																																			
<i>Agrostis capillaris</i>	Creeping bentgrass	FAC	introduced		3	0.0	1.7																												
<i>Agrostis exarata</i>	Spike bentgrass	FACW	native	Yes	2	0.0	3.0																												
<i>Alopecurus geniculatus</i>	Water foxtail	OBL	native		1	0.0	2.0																												
<i>Alopecurus pratensis</i>	Meadow foxtail	FACW	introduced		2	0.0	0.2																												
<i>Beckmania syzigachne</i>	Slough grass	OBL	native	Yes	1	9.4	2.7																												
<i>Briza minor</i>	Little Quaking grass	FAC	introduced		3	0.0	0.3																												
<i>Bromus mollis</i>	Soft brome	NOL	introduced			0.0	0.0																												
<i>Deschampsia cespitosa</i>	Tufted hairgrass	FACW	native	Yes	2	0.0	37.9																												
<i>Deschampsia elongata</i>	Slender hairgrass	FACW	native	Yes	2	0.0	0.4																												
<i>Festuca arundinacea</i>	Tall fescue	FAC	introduced		3	0.0	0.0																												
<i>Festuca myuros</i>	Rat-tail fescue	NOL	introduced			0.0	0.5																												
<i>Holcus lanatus</i>	Velvet grass	FAC	introduced		3	0.0	20.3																												
<i>Hordeum brachyantherum</i>	Meadow barley	FACW	native		2	0.0	4.4																												
<i>Lolium multiflorum</i>	Annual ryegrass	NOL	introduced			0.0	0.0																												
<i>Panicum capillare</i>	Witch grass	FACU	native		4	0.0	0.0																												
<i>Poa annua</i>	Annual bluegrass	FAC	introduced		3	0.0	0.0																												
<i>Poa trivialis</i>	Rough bluegrass	FACW	introduced		2	0.0	8.7																												
<i>Bareland</i>																																			
Wet Prairie Plots																																			
% introduced - mean cover including bareland:				41.57																															
% non-native invasives as defined in Final Document			Mean=	0.00																															
Wet prairie plot average moisture index			Mean=	2.16																															
Emergent Plots																																			
% introduced - mean cover including bareland:				16.86																															
% non-native invasives as defined in Final Document			Mean=	1.00																															

Phase 2 2009 Species List

Phase 2 Mud Slough Wetland Mitigation Bank						
Plant Species List						
June 1, 2009						
Includes species identified in monitored plots, planted, or found while walking between sample plots						
Common Name	Botanical Name	Status	Origin	Wet Prairie Vernal pool	Moisture Index	Planted
Overstory Species- stem count						
<i>Crataegus douglasii</i>	Douglas hawthorne	FAC	native		3	
<i>Fraxinus latifolia</i>	Oregon Ash	FACW	native		2	Yes
<i>Populus trichocarpa</i>	Black cottonwood	FAC	native		3	
<i>Salix lasiandra</i>	Pacific Willow	FACW	native		2	Yes
<i>Salix sitchensis</i>	Sitka willow	FACW	native		2	
Scrub/Shrub Species - stem count						
<i>Rosa nutkana</i>	Nootka rose	FAC	native	Yes	3	Y
<i>Spiraea douglasii</i>	Douglas' spiraea	FACW	native		2	Y
Herbaceous Species - percent cover						
<i>Alisma plantago aquatica</i>	Water plantain	OBL	native		1	Y
<i>Bidens cernua</i>	Nodding beggarstick	FACW	native		2	
<i>Bidens frondosa</i>	Leafy beggars tick	FACW	native		2	Y
<i>Carex densa</i>	Dense sedge	OBL	native	Yes	1	Y
<i>Carex feta</i>	Green-sheath sedge	FACW	native	Yes	2	Y
<i>Carex unilateralis</i>	One-sided sedge	FACW	native	Yes	2	Y
<i>Centaurium erythraea</i>	Centuary	FAC	introduced		3	
<i>Cerastium vulgatum</i>	Mouse-ear chickweed	FACU	introduced		4	
<i>Cirsium arvense</i>	Canada thistle	FACU	introduced		4	
<i>Cirsium vulgare</i>	Bull thistle	FACU	introduced		4	
<i>Daucus carota</i>	Queen Ann's Lace	NOL	introduced			
<i>Downingia elegans</i>	Showy downinga	OBL	native	Yes	1	Y
<i>Eleocharis ovata</i>	Ovoid spike rush	OBL	native	Yes	1	Y
<i>Eleocharis palustris</i>	Creeping spike rush	OBL	native		1	Y
<i>Epilobium ciliatum</i>	Watson's willow-herb	FACW	native	Yes	2	
<i>Epilobium paniculatum</i>	Autumn willow-herb	NOL	native	Yes		
<i>Eryngium petiolatum</i>	Rush leaf Coyote thistle	OBL	native	Yes	1	
<i>Rat-tail fescue</i>	Festuca myuros	NOL	introduced			
<i>Galium parisiense</i>	Wall bedstraw	NOL	introduced			
<i>Gnaphalium palustre</i>	Lowland cudweed	FACW	native	Yes	2	
<i>Hypochaeris radicata</i>	Cat's ear daisy	FACU	introduced		4	
<i>Juncus acuminatus</i>	Tapered rush	OBL	native		1	
<i>Juncus bufonius</i>	Toad rush	FACW	native	Yes	2	
<i>Juncus oxymeris</i>	Pointed rush	FACW	native		2	
<i>Juncus tenuis</i>	Slender rush	FACW	native	Yes	2	
<i>Lactuca serriola</i>	Prickly lettuce	FAC	introduced		3	
<i>Lotus purshianus</i>	Spanish-clover	NOL	native	Yes		Y
<i>Medicago lupina</i>	Black medic	FACU	introduced		4	
<i>Mentha pulegium</i>	Pennyroyal	OBL	introduced		1	
<i>Myosotis discolor</i>	Yellow & blue forget-me-	FACW	introduced		2	
<i>Myosotis ssp</i>	tri colored					
<i>Navarretia intertexta</i>	Needle-leaved navarretia	FACW	native	Yes	2	
<i>Parentucellia viscosa</i>	Parentucellia	FAC	introduced		3	
<i>Peplis portula</i>	Water-purslane	NOL	introduced			



Phase 2 2009 Species List

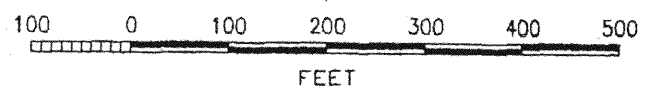
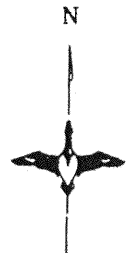
<i>Plantago major</i>	Common plantain	FACU	introduced		4	
<i>Plagiobothrys figuratus</i>	Fragrant popcorn flower	FACW	native	Yes	2	
<i>Plagiobothrys scouleri</i>	Scouler's popcorn flower	FACW	native	Yes	2	
<i>Plantago major</i>	Broadleaf plantain	FACU	introduced		2	
<i>Polygonum hydropiperoid</i>	Smartweed	OBL	native		1	
<i>Potentilla gracilis</i>	Northwest cirquefoil	FAC	native	Yes	3	Y
<i>Rorippa curvisiliqua</i>	Western Yellowcress	OBL	native	Yes	1	
<i>Rubis discolor</i>	Himalayan blackberry	FACU	introduced		4	
<i>Rumex crispus</i>	Curly dock	FAC	introduced		3	
<i>Scirpus tabernaemontani</i>	tule, softstem bulrush	OBL	native		1	Y
<i>Senecio jacobea</i>	Tansy ragwort	FACU	introduced		4	
<i>Senecio vulgaris</i>	Common groundsel	FACU	introduced		4	
<i>Sidalcea nelsoniana</i>	Nelson's checkermallow	OL/FAC	native		3	Y
<i>Sonchus asper</i>	Prickly sow-thistle	NOL	introduced			
<i>Typha latifolia</i>	Common cattail	OBL	native		1	
<i>Ventenata dubia</i>	Ventenata	NOL	introduced			
<i>Veronica americana</i>	American brookline	OBL	native		1	
<i>Veronica peregrina</i>	Purslane speedwell	OBL	native	Yes	1	
<i>Veronica sculellata</i>	Marsh speedwell	OBL	native		1	
<i>Veronica scutella</i>	Skullcap speedwell	OBI	native		1	
<i>Vicia hirsuta</i>	Hairy vetch	NOL	introduced			
<i>Vicia tetrasperma</i>	Slender vetch	NOL	introduced			
Grass Species - percent cover						
<i>Agrostis capillaris</i>	Creeping bentgrass	FAC	introduced		3	
<i>Agrostis exarata</i>	Spike bentgrass	FACW	native	Yes	2	Y
<i>Alopecurus aequalis</i>	Short-awned foxtail	OBL	native		1	
<i>Alopecurus geniculatus</i>	Water foxtail	OBL	native		1	Y
<i>Alopecurus pratensis</i>	Meadow foxtail	FACW	introduced		2	
<i>Beckmania syzigachne</i>	Slough grass	OBL	native	Yes	1	Y
<i>Briza minor</i>	Little Quaking grass	FAC	introduced		3	
<i>Bromus mollis</i>	Soft brome	NOL	introduced			
<i>Bromus sp.</i>	Brome	NOL				
<i>Deschampsia cespitosa</i>	Tufted hairgrass	FACW	native	Yes	2	Y
<i>Deschampsia elongata</i>	Slender hairgrass	FACW	native	Yes	2	
<i>Festuca arundinacea</i>	Tall fescue	FAC	introduced		3	
<i>Festuca myuros</i>	Rat-tail fescue	NOL	introduced			
<i>Glyceria occidententalis</i>	Western mannagrass	OBL	native		1	
<i>Holcus lanatus</i>	Velvet grass	FAC	introduced		3	
<i>Hordeum brachyantherm</i>	Meadow barley	FACW	native		2	Y
<i>Lolium multiflorum</i>	Annual ryegrass	NOL	introduced			
<i>Panicum capillare</i>	Witch grass	FACU	native		4	
<i>Poa annua</i>	Annual bluegrass	FAC	introduced		3	
<i>Poa pratensis</i>	Kentucky bluegrass	FAC	introduced		3	
<i>Poa trivialis</i>	Rough bluegrass	FACW	introduced		2	


FARMER ROAD

FARMER ROAD



 monitoring points
 photo points



 DUCKS UNLIMITED INC.	PROJECT NO.	DESIGNED BY:
	MUD SLOUGH WETLAND MITIGATION BANK AS-BUILT	DRAWN BY: JPS
DATE:	SHEET NO.	SURVEYED BY: JPS
	APPROVED BY:	CHECKED BY:

HORIZONTAL COORDINATES: OREGON STATE PLANE NORTH ZONE NAD83
 VERTICAL COORDINATES: ASSUMED ELEVATION
 (ASSUMED ELEVATION OF MONUMENT SE CRNR SEC 17=100.0, NAVD88 ELEVATION =174.7)

Attachment 5
 Phase 2 Monitoring Point Location Map