

Mud Slough Wetland Mitigation Bank – Phase 3

2010

Monitoring Report

Submitted by:

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1.0 REGULATORY BACKGROUND

The purpose of this report is to summarize the progress of Phase 3 of the Mud Slough Wetland Mitigation Bank (Bank). The Bank is located in Polk County, Township 7S, Range 4W, Section 20, Tax Lot 300. Phase 3 of the Bank is only a portion (81.5 acres) of the 413 acre tax lot. The address is 1875 N. Greenwood Road, Rickreall, Oregon. The MOA for Phase 3 was approved in July 2008. In December 2008, the first 30% (12.45 credits) were released for sale. The next 20% (8.3 credits) were released in 2009. The ACOE released the credits in September and DSL followed in December 2009.

The primary goal(s) of Phase 3 are to enhance 80 acres of cropped wetlands to emergent and wet prairie and restore 1.5 acres of upland to wet prairie habitat. Phase 3 totals 81.5 acres.

Bank credits:	<u>Acres</u>	<u>Mitigation Type</u>	<u>Credit Ratio</u>	<u>Credits Earned</u>
	80.0	Enhancement of cropped wetland	2:1	40.0
	<u>1.5</u>	Restoration	1:1	<u>1.5</u>
	81.5	Total Site		41.5

2.0 WORK SUMMARY

2.1 Site Grading

The initial herbicide application occurred in November 2008, with additional applications in March and July 2008. The grading followed the third herbicide application in July 2008. The grading included removing the surface drain system and the construction of four low berms. The berms have a maximum height of two feet, with 10 foot wide tops with 10:1 side slopes. The average pond created by the berms is 0.7 acres. Overflows are around the upper end of the dikes to avoid erosion potential. All excavation work was done with irregular boundaries and shape mimicking natural features. Two larger areas (approximately 5 and 6 acres) of shallow water/emergent zones were created in the naturally existing lower portions of the site. The only additional grading that has occurred was in August 2009, the northern most berm on the east side of the railroad was extended slightly to help prevent water from going around the edge of the berm. This was done to create more water storage as was designed.

2.2 Seeding and Planting

Grass and forb species were seeded in early October 2008 with the tree and shrubs following in February 2009. Willow (*Salix ssp.*) and Douglas spirea (*Spiraea douglasii*) cuttings were planted with the remainder of the tree and shrub species planted as bare root stock. Seed was applied by both drilling and broadcast in a zone planting for individual species to optimize the different hydrological zones (i.e. emergent, wet prairie). Phase 3 was seeded with a wide variety of species, in particular forbes, to increase the diversity of the plant species on site, and thereby the wildlife that frequents it. The forested and

shrub/shrub areas were planted with a mixture of less aggressive wetland herbaceous species to provide slightly less competition for the trees and shrubs. The shrub areas are scattered throughout Phase 3 in small plantings, mimicking naturally occurring shrub areas. The sample plot monitoring data includes a list of the planted species.

2.3 Weed control and Maintenance

Mowing was conducted in September 2009 to facilitate spot treatment of non-natives. Extensive spot treatment of individual plants and seed heads was conducted from the fall 2009 thru the spring of 2010. Targeted species included annual ryegrass (*Lolium multiflorum*), tall fescue (*Festuca arundinacea*), meadow foxtail (*Alopecurus pratensis*), velvet grass (*Holcus lanatus*) tansy ragwort (*Tanacetum vulgare*), Himalayan blackberry (*Rubus discolor*) and pennyroyal (*Mentha pulegium*).

As previously mentioned, in August 2009, the northern most berm on the east side of the railroad was extended slightly to help prevent water from going around the edge of the berm. A second maintenance activity that was conducted includes removing a section of tile that is seeping water from the western most pond, on the west side of the railroad. Both of these procedures produced the desired results.

2.4 Planned Future Work

The vegetation is doing exceptionally well. With the exception of normal spot treatment on non-native vegetation, no further work is anticipated.

3.0 AS-BUILT PLANS

The as-built plans were submitted to DSL and the ACOE in December 2008.

4.0 HYDROLOGY PERFORMANCE STANDARDS, METHODOLOGY, AND RESULTS

4.1 PERFORMANCE STANDARDS

The hydrology objective is to create areas that will hold precipitation to create seasonal saturation and inundation and meet the criteria defined in the 1987 Corps of Engineers Wetlands Delineations Manual (1987 Wetland Delineation Manual).

4.2 METHODOLOGY:

A one time hydrology delineation designed to meet the requirements of the 1987 Wetland Delineation Manual will be performed. This delineation will include paired plots concentrating along the wetland boundary, any areas dominated by upland vegetation, and any high areas to indicate the exact location of the wetland boundary. The paired plots will be evaluated using soil probes or pits. 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

Delineation: The one time hydrology delineation was conducted in March 2010 and concentrated on the 1.5 acres of upland that existed prior to the construction of Phase 3. Five monitoring tubes were installed and monitored on March 12 and 15, 2010. The location of the monitoring tubes is included on the Monitoring Point Location Map - Attachment 1. The results of this monitoring indicate that each of the monitoring locations was saturated to within at least 8” of the surface during the monitoring. Water in the monitoring tubes ranged from at the surface to 8” below the surface.

Precipitation data for this period was obtained from the preliminary local climatology data from the National Climatic Data Center for Salem Oregon data. The historic averages were obtained from the NRCS WETS table for Dallas Oregon. During the two weeks prior to the beginning of the monitoring (February 26 - March 11), the precipitation was 1.76” with an additional 0.28” on rain on March 12. There was no further rain during the monitoring period. The percent of normal rainfall since the beginning of the rain year, October 1, 2009 to March 15, 2010 was 78.1% of normal (observed 28.13”, average 36.01”).

Table 1 - Rainfall Summary for October 1, 2009 through March 15, 2010

Month	Observed Precipitation (inches)	Average Precipitation (inches)	% of Normal
October	2.61	3.25	80.3%
November	8.02	7.64	105.0%
December	6.14	8.63	71.1%
January	5.85	7.59	77.1%
February	4.07	6.26	65.0%
March 15*	1.44	2.64	54.5%
Total	28.13	36.01	78.1%

*prorated

Table 2 - Monitoring Tube Results

Tube #	March 12	March 13
1	1	6
2	1	8
3	1	4
4	0	2
5	1	4

Data is depth in inches below the surface, “0” = water at the surface

5.0 VEGETATION PERFORMANCE STANDARDS, METHODOLOGY AND RESULTS

5.1. Performance Standards

A. Emergent Herbaceous

1. A minimum of 55% of the relative plant cover is comprised of native species. These densities will be a combination of planted individuals and natural recruitment.
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.
4. By year 5, there will be a minimum of 4 obligate species represented in the monitoring plots.

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

B. Wetgrass Prairie

1. At least 10 wetgrass prairie species are present
2. Tufted hairgrass (*Deschampsia cespitosa*) is represented by 5% or greater relative plant cover in year 1 and 25% by year 5.
3. At least 50% of the relative plant cover is comprised of native species. These densities will be a combination of planted individuals and natural recruitment.
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 should be between 2.0 and 3.0.
6. No more than 5% relative plant cover is composed of shrubs or trees.

C. Overstory and Scrub-Shrub

1. Relative plant cover, of all layers, is comprised of a minimum of 55% native species.
2. The moisture index is equal or less than 3.0.
3. There will be a minimum of 150 trees per acre and 300-400 shrubs per acre in all years 1-5.
4. No more than 5% of the relative live stem count should be comprised of non-native species.
5. These densities will be a combination of planted individuals and natural recruitment.
6. No more than 15% of the relative plant cover, of all layers, is comprised of non-native invasive species.

5.2 Methodology

Transect and sample plot locations are laid out in a stratified arrangement with approximately 300' between each transect and sample plot. Due to the low percentage of overstory and shrub areas, two additional plots (#42, #43) within the overstory/shrub areas were added to provide better coverage. The transects run east to west on the west side of the railroad, and north to south on the east side of the railroad. The sample plots are permanently identified in the field and are plotted on a site map. One plot (#41), outside of the mapped transects was included to monitor the small 1.5 acre upland, which did not fall within plots transects (See Attachment 1 - Monitoring Point Location Map).

Each sample point is the center of a circular plot, ten feet diameter for the herbaceous layer and 30 feet for the scrub/shrub and overstory layers. The center point for the herbaceous, shrub and overstory radius are the same. Each sample plot was evaluated for species, indicator status, native/non-native and invasive status, and the percent cover of each species present.

5.3 VEGETATION MONITORING RESULTS

Vegetation monitoring was conducted June 6, 2010 by Mark Knaupp. Attachment 2 includes spread sheets with the results of the sampling. Forty-four monitoring plots were examined. The spread sheets include the botanical names, common names, indicator status, origin (native or non-native), moisture index, and if it was planted or a volunteer species. The Plant Species list includes all species found within Phase 3 within the plots or found while walking between sample plots.

Table 3 includes a species summary of just the species found within the monitoring plots.

Table 3 - Phase 3 2009 vs 2010 Monitoring Plot Species Summary

	2009		2010	
Number of Species Identified	68		51	
Number and % of Native Species	37	54%	38	75%

As is seen in the above table, Phase 3 has changed significantly from the June 2009 monitoring. In both 2009 and 2010, there were nearly the same number of species identified within the plots, but in 2009 54% were native, whereas in 2010, 75% of the species were native. It should also be noted that of these 75% native species, they accounted for over 98% of the vegetation cover. Some of the more aggressive non-native species continue to be heavily targeted with spot spray but other less aggressive annual non-native forbes were not targeted since spraying for those species would increase the exposure of the native annuals and perennial forbes to the herbicide.

5.3.1 Emergent Vegetation

Plots 1, 2, 3, 4, 24, 25, 32, and 33 were originally classified as emergent plots. This initial classification was based on the mapping and planned vegetation and hydrologic regimes. As the site ages it has become apparent that the hydrology regime planned for plot #25 is not as wet as planned and this monitoring point should be included as a wet prairie sampling plot. This change has been made in the sampling data for 2010.

Nineteen native species were identified in the emergent plots. A huge change occurred from the 2009 monitoring with the presence of standing water in 2010. In 2009, there was no standing water, whereas in 2010 there was an average of 53% water in the seven emergent plots. This change in the hydrology (and weather) also

caused changes in the vegetation. The most abundant species in 2009 was showy downingia (*Downingia elegans*) at 52%, whereas in 2010 it was 0.25%. The sponsor feels that downingia, which is an annual, is tied to the light and water sequence in the growing year. A combination of heavy biomass and water did not allow for the correct sequencing required and the seeds did not germinate. The seeds are still present, and it is assumed they will germinate in subsequent years. The most abundant species in 2010 was American sloughgrass (*Beckmania syzigachne*) at 11.5%. Tufted and slender hairgrass (*Deschampsia cespitosa* and *elongata*) tied with each at 6.35%.

The performance criteria for **emergent wetland** was met for all 4 of the requirements.

Required: A minimum of 55% of the relative plant cover is comprised of native species. These densities will be a combination of planted individuals and natural recruitment. *Met, the emergent plots are comprised of 100% native species. There is however, water covering 53% of the plots.*

Required: No more than 15% of the relative plant cover is comprised of non-native invasive species. *Met with 0% of non-native invasive species. There are no non-native invasive species present.*

Required: The wetland's moisture index is less than 3. *Met with an average moisture index of 1.38*

Required: By year 5, there will be a minimum of 4 obligate species represented in the monitoring plots. *Met, there are seven obligate species in the monitoring plots, with four of those in greater than trace amounts.*

5.3.2 Wetland Prairie

Native herbaceous cover averaged 98.4% throughout the wetland prairie with 26 native species identified in the 32 prairie plots. Eleven native forbes were present at greater than trace amounts. The three most common species are tufted hairgrass (*Deschampsia cespitosa*) at 25.5%, Meadow barley (*Hordeum brachyantherum*) at 25.4% and slender hairgrass (*Deschampsia elongata*) at 19.9%.

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

Required: At least 10 wetgrass prairie species are present *Met. Nineteen wet grass prairie/vernal pool species have been identified within the prairie plots.*

Required: Tufted hairgrass (*Deschampsia cespitosa*) is represented by 5% or greater relative plant cover in year 1 and 25% by year 5. *Met. Tufted hairgrass is*

present in all 31 of the wet prairie plots, with an average cover of 25.5%. This is a huge increase from the 2009 monitoring results.

Required: At least 50% of the relative plant cover is comprised of native species.

Met. Native species accounted for 98.4% of the vegetative cover.

Required: No more than 15% of the relative plant cover is comprised of non-native invasive species. *Met with 0% of non-native invasive species.*

Required: The wetland prairie moisture index is between 2.0 and 3.0. *Met. The average moisture index is 2.07.*

Required: No more than 5% relative plant cover is comprised of shrubs or trees.

Met. No trees or shrubs occurred in the wet prairie.

5.3.3 Shrub and Forest

Both the planted and volunteer Oregon ash (*Fraxinus latifolia*) continues to do well. Douglas spirea (*Spiraea douglasii*) has increased in abundance whereas, sitka willow (*salix sitchensis*) has declined. The overall numbers of both trees and shrubs is well within the performance standard levels.

The performance criteria for **shrub forest wetland** was met for all 5 of 5 of the requirements.

Required: Relative plant cover, of all layers, is comprised of a minimum of 55% native species. *Met, with 90% of the herbaceous and 100% of the tree and shrub cover being native.*

Required: There will be a minimum of 150 trees per acre and 300-400 shrubs per acre in all years 1-5. *Met with mean trees per acres of 4778 (includes the seedlings) or 154 without seedlings. The average shrubs per acre is 971.*

Required: No more than 5% of the relative live stem count should be comprised of non-native species. *Met, with 0% of the live stem count comprised of non-native species.*

Required: No more than 15% of the relative plant cover, of all layers, is comprised of non-native invasive species. *Met, with 0% of non-native invasive species.*

Required: The wetland's moisture index is less than 3. *Met, with an average moisture index of 1.43.*

6.0 SPECIES AREA CURVE

No species area curve analysis was conducted as in 2009, the analysis indicated a sufficient number of plots had been monitored. The same plots were monitored in 2010.

7.0 PHOTO POINT MONITORING

Photos from each of the established six photo points are included as Attachment 3.

8.0 CREDIT SALES SUMMARY

Date	Name	DSL Permit #	ACOE Permit #	Credits Purchased
11/20/09	Advantage Precast, Inc	ENF6899	NA	1.567
12/1/09	State of Oregon	34119-FP	2004-803	0.40
12/14/09	Central School District	42503-RF	2009-00253	1.70
12/14/09	GreenTree, LLC	39251	2007-842	0.44
12/23/09	ODOT	10008-RF	1996-00016	1.46
12/23/09	Pfeiffer Roofing, Inc.	ENF-6902	NA	0.19
2/3/10	Windigo Properties, LLC	42654	2009-302	0.89
4/5/10	State of Oregon	43698-RF	2009-337	0.27
Total Phase 3 Credit Sales in Nov. 2009 thru April 2010				6.917

There are 41.5 credits available for Phase 3. To date 50% (20.75) have been released. Of these 20.75 credits, 6.917 have been sold leaving 13.833 credits released and unsold.

9.0 CREDIT RELEASE REQUEST

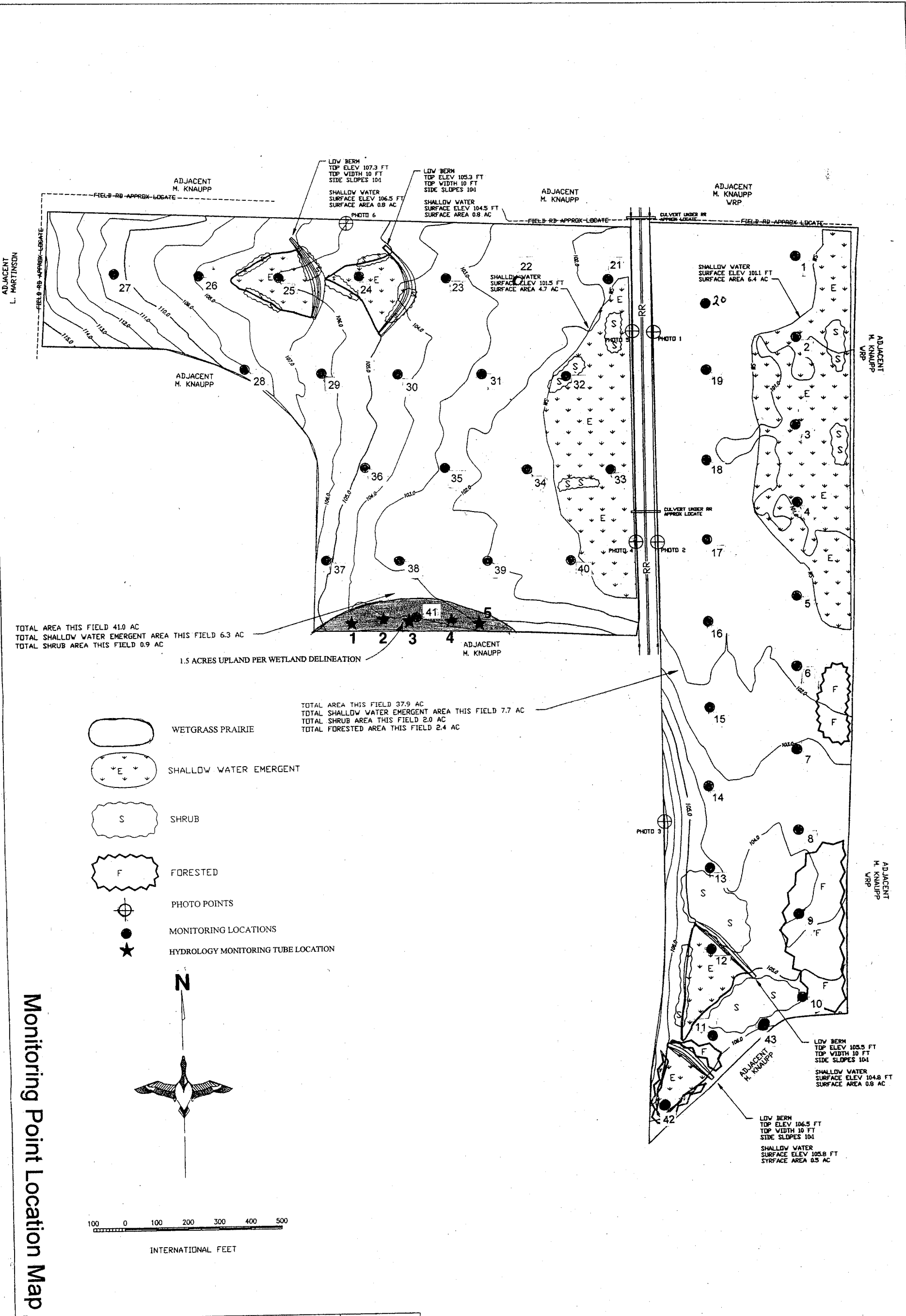
Phase 3 has 41.5 credits, 50% (20.75 credits) have been released for sale. With this submission of the 2010 monitoring report, we are requesting the release of the next 30% credit release for an additional 12.45 credits. This will total an 80% credit release for Phase 3.

10.0 BOND REASSIGNMENT REQUEST

A \$51,853 bond was posted for Phase 3. According to the bond release schedule, 70% (releases 1, 2 and 4) of the bond (\$36,297) is now eligible for release. We are requesting that this bond and any interest that it has accumulated, be reassigned to Phase 4 of the Mud Slough Wetland Mitigation Bank, instead of it being released at this time.

11.0 ENDOWMENT AND LONG TERM STEWARD

The sponsor has signed a conservation easement on Phase 3 with The Wetland Conservancy, which also holds the conservation easement for Phases 1 and 2 of the Bank. An additional \$81,000 was added to the long term endowment for Phase 3.

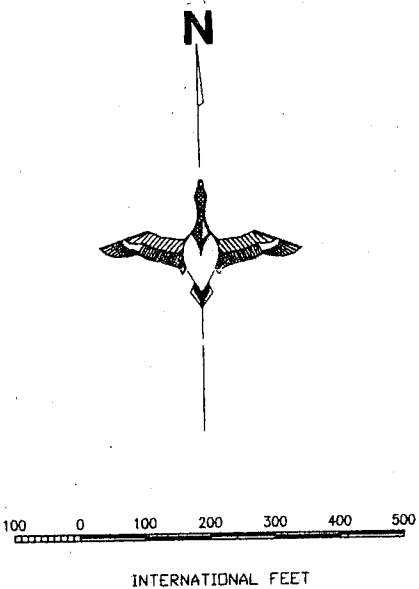


TOTAL AREA THIS FIELD 41.0 AC
 TOTAL SHALLOW WATER EMERGENT AREA THIS FIELD 6.3 AC
 TOTAL SHRUB AREA THIS FIELD 0.9 AC

1.5 ACRES UPLAND PER WETLAND DELINEATION

TOTAL AREA THIS FIELD 37.9 AC
 TOTAL SHALLOW WATER EMERGENT AREA THIS FIELD 7.7 AC
 TOTAL SHRUB AREA THIS FIELD 2.0 AC
 TOTAL FORESTED AREA THIS FIELD 2.4 AC

- WETGRASS PRAIRIE
- SHALLOW WATER EMERGENT
- SHRUB
- FORESTED
- PHOTO POINTS
- MONITORING LOCATIONS
- HYDROLOGY MONITORING TUBE LOCATION



Monitoring Point Location Map

DATE: SURVEY 12/15/07	SHEET NO.	PROJECT NO.	DESIGNED BY: MK
		MUD SLOUGH WETLAND MITIGATION BANK	DRAWN BY: JPS
			SURVEYED BY: MK&JPS
			CHECKED BY:
	APPROVED BY:	APPROVED BY:	

HORIZONTAL COORDINATES: OREGON STATE PLANE NORTH ZONE NAD83 (2007)
 VERTICAL COORDINATES: ASSUMED ELEVATION
 (ASSUMED ELEVATION MONUMENT SE CRNR SEC17=100.0 FT, NAVD88 ELEVATION = 174.7 FT)
 SURVEY CONTROL BY GPS OBSERVATION NGS NESMITH PID QE2664

