MONTANA DEPARTMENT OF TRANSPORTATION
WETLAND MITIGATION MONITORING REPORT: YEAR 2009

Alkali Lake
Pondera County, Montana



Prepared for:

MONTANA DEPARTMENT OF TRANSPORTATION
2701 Prospect Ave
Helena, MT 59620-1001

Prepared by:

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820 North Montana Avenue, Suite A
Helena, MT 59601

December 2009

PBS&J Project No: 0B4308802.04.02

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1.0 INTRODUCTION

The Montana Department of Transportation (MDT) in cooperation with the Bureau of Indian Affairs (BIA) and the Blackfeet Nation's Environmental Office and Fish & Wildlife Department, designed and built a wetland restoration project within a historic lakebed (Southeast Alkali Lake) on the Blackfeet Indian Reservation in Pondera County, Montana (**Figure 1**). The Alkali Lake restoration project was originally proposed in 1996 by the Blackfeet Nation Fish & Wildlife program and the U.S. Fish and Wildlife Service (USFWS) as a means to re-establish shorebird and wetland habitat to the southeastern arm of Alkali Lake. The project was not pursued as it was considered to be extremely cost prohibitive at the time. In 2002, the Blackfeet Tribal Fish & Game Office and Environmental Office approached MDT to re-examine Alkali Lake. A feasibility study produced in 2003 indicated that Alkali Lake would be a suitable area for wetland restoration (Land and Water Consulting [LWC] 2003).

The Alkali Lake Wetland Mitigation project comprises approximately 175 acres of historic lakebed. The mitigation project was constructed and flooded in late summer/early fall of 2005 (**Appendix D**). Hydrology was restored to the lakebed by constructing a pipeline from the Birch Creek Main Canal to Blacktail Creek; water then flows from a diversion in Blacktail Creek into the Badger Fisher Main Canal, K Canal, and 19K Canal where another pipeline was built to deliver water to the Alkali Lake site (**Figure 1**). Project goals are to restore/re-establish approximately 74.42 acres of historic wetlands (an estimated 20-30 acres of which were dominated by remnant hydrophytic vegetation, but lacked wetland hydrology); restore/re-establish approximately 101.4 acres of historic open water/lakebed (some or much of which could also conceivably result in wetland restoration); and provide fencing and an upland buffer. The project credit ratios approved by the Corps of Engineers (Steinle pers. Comm.; Steinle 2006) and the Blackfeet Tribe (Adams pers. comm.; Weatherwax 2005) are presented in **Table 1**.

MDT pursued wetland mitigation at this site to offset wetland impacts associated with the MDT Meriwether-East highway reconstruction project on the Blackfeet Reservation. Any leftover wetland credits would be held in reserve for application against future highway project-related wetland impacts on the Blackfeet Reservation.

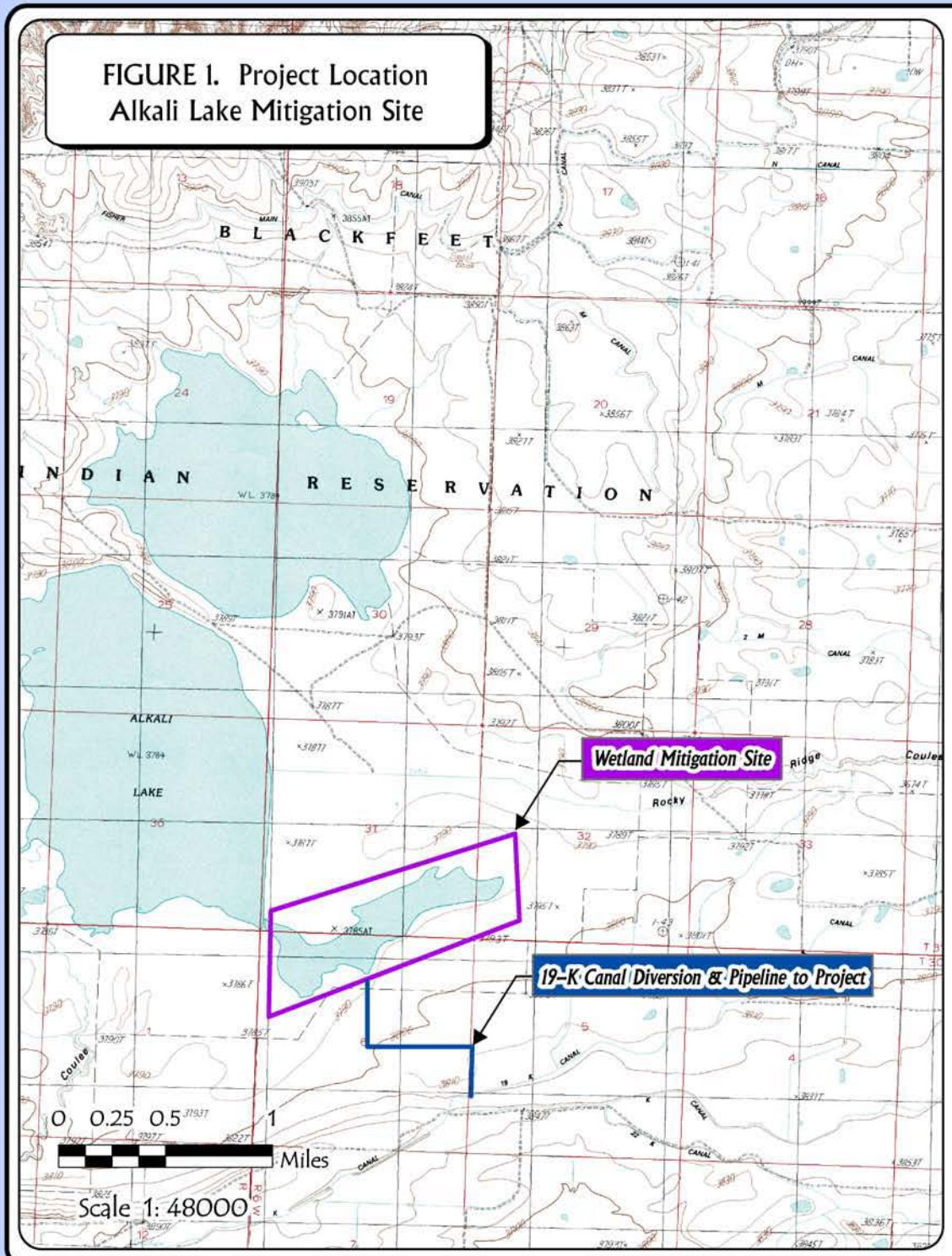
Final approved performance standards (Steinle 2004a and 2004b) are as follows:

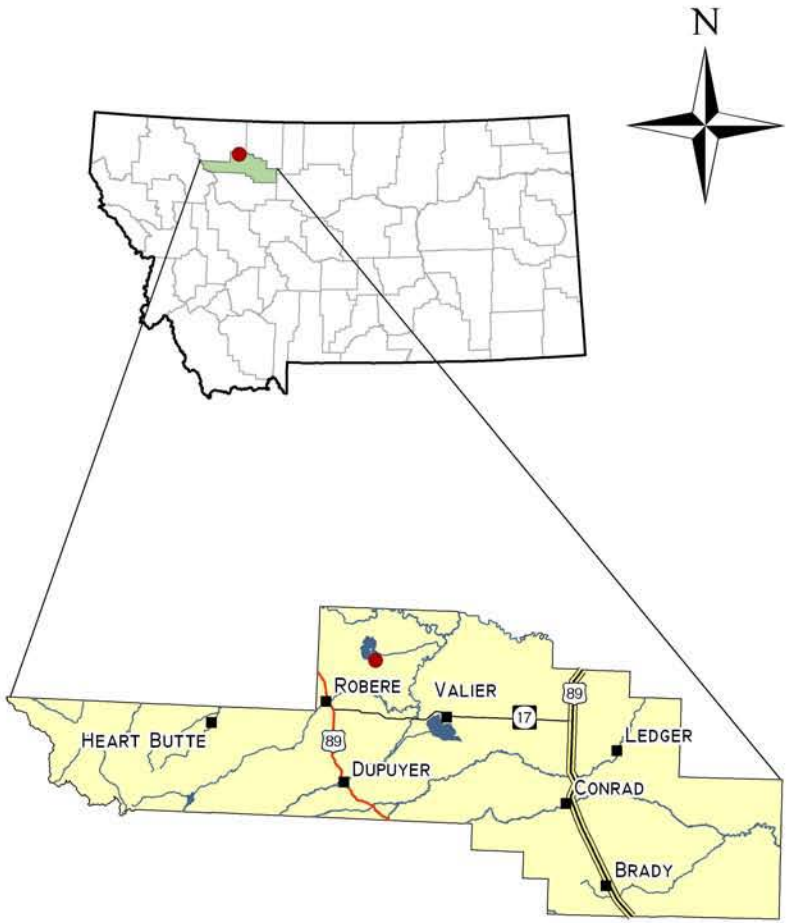
Wetland Hydrology Success will be achieved where wetland hydrology is present as per the technical guidelines in the 1987 COE Wetland Delineation Manual.

Hydric Soil Success will be achieved where hydric soil conditions are present (per the most recent NRCS definitions for hydric soil) or appear to be forming, the soil is sufficiently stable to prevent erosion, and the soil is able to support plant cover. Since typical hydric soil indicators may require long periods to form, a lack of distinctive hydric soil features will not be considered a failure if hydrologic and vegetation success is achieved.

Hydrophytic Vegetation Success will be achieved where wetland vegetation is dominant as per the technical guidelines in the 1987 COE Wetland Delineation Manual, canopy cover of facultative or wetter species is ≥ 50%, and noxious weeds do not exceed 10% cover.

FIGURE 1. Project Location
Alkali Lake Mitigation Site





PROJECT #: B43054.00 0507
DATE: November 2006
LOCATION: Alkali Lake
PROJECT MANAGER: A. Pipp
DRAWN BY: MSA

PBS&J
801 N. Last Chance Gulch, Ste. 101 Helena, MT 59601

Table 1: ***Final Tribal and Corps of Engineers credit ratios for the Alkali Lake Wetland Mitigation Project, August 2005.***

Proposed Mitigation Feature	Form of Mitigation Using Tribal Definitions[1]	Form of Mitigation Using Corps of Engineers Definitions[2]	Mitigation Site Established Prior to Impacts	
			Tribal Credit Ratio / Credit[1]	Corps of Engineers Credit Ratio / Credit[2]
Primary wetland restoration area consisting of approximately 74.42 acres between elevations 3785.0 and 3786.0 that would flood to depths between 0 and 1 foot.	Primary Restoration	Restoration: Re-establishment	1:2.5 ratio 29.77 acres credit	1:1 ratio 74.42 acres credit
Approximately 101.4 acres of the site between elevations 3784.0 and 3785.0 that would flood to depths between 1 and 2 feet (48.77 acres at 1-1.5 feet, 49.55 acres at 1.5-2 feet, 3.08 acres at 2 feet), which may result in additional wetland restoration, but was conservatively estimated to result in open water for purposes of credit calculation. For Corps of Engineers crediting, open water credit would be limited to an amount matching wetland restoration credit (74.42 acres).	Primary Restoration	Restoration: Re-establishment	1:2.5 ratio 40.56 acres credit	1:1 ratio for open water up to an amount matching wetland restoration credit 74.42 acres credit[3]
Approximately 45.12 acres of a 100 foot-wide upland buffer, which is proposed within the fenced easement along the lakebed's north, east, and south perimeter.	Upland Buffer	Upland Buffer	1:4 ratio 11.28 acres credit	1:4 ratio on maximum 50-foot width (22.56 acres) 5.64 acres credit
		TOTAL	**81.61 acres**	**154.48 acres[3]**

[1] From Blackfeet Tribe's Mitigation Policy.
[2] From COE (2005) *Wetland Compensatory Mitigation Ratios, Montana Regulatory Program.*
[3] Credit could exceed this amount depending on whether any of the 1- to 2-foot deep areas restore to wetlands, rather than open water, to a maximum of 181.46 acres if the entire lakebed restores to wetland.

The following concept of "dominance", as defined in the 1987 Army COE wetland delineation manual, will be employed during future routine wetland determinations in created / restored wetlands: "*Subjectively determine the dominant species by estimating those having the largest relative basal area (woody overstory), greatest height (woody understory), greatest percentage of aerial cover (herbaceous understory), and/or greatest number of stems (woody vines).*"

No vegetative diversity standard is required at this site as many of the native wetland communities exhibit relatively low diversity in this alkaline environment. One such community, Nuttall's alkaligrass, was fairly dominant in the project area but had lacked wetland hydrology. Efforts to increase vegetative diversity on the site included seeding the entire lakebed with eight native saline-tolerant and clay soil-adapted species suited for different inundation depths.

Upland Buffer Success will be achieved when the site is fenced and noxious weeds do not exceed 10% cover within the buffer. Further, any area within the creditable buffer zone disturbed by project construction must have at least 50% cover of non-weed species by the end of the monitoring period.

This report documents the third full year of monitoring results at the constructed mitigation site. (**Figure 2** in **Appendix A**).

2.0 METHODS

2.1 Monitoring Dates and Activities

The site was visited on May 19th (spring bird survey), August 24-25th (mid-season survey), and October 30th (fall bird survey) of 2009. All information contained on the Wetland Mitigation Site Monitoring Form was collected during these site visits (**Appendix B**). Monitoring activity locations are illustrated on **Figure 2** (**Appendix A**). Activities conducted and information collected included: wetland delineation; vegetation community mapping; vegetation transect monitoring; soils data collection; hydrology data collection; bird and wildlife use documentation; macroinvertebrate sampling; photographing; and a non-engineering examination of the site.

2.2 Hydrology

Hydrologic indicators were evaluated during all site visits. During the mid-season visit wetland hydrology indicators were recorded using procedures outlined in the COE 1987 Wetland Delineation Manual (Environmental Laboratory 1987). Hydrology data were recorded on COE Routine Wetland Delineation Data Forms and on the mitigation site monitoring form (**Appendix B**).

There are no groundwater monitoring wells at the site. Soil pits excavated for wetland delineation purposes were also used to evaluate the presence of groundwater if occurring within 12 inches from the ground surface; data was recorded on the routine wetland delineation data form (**Appendix B**).

2.3 Vegetation

General dominant species-based vegetation community types were delineated in the field during the mid-summer field visit. Standardized community mapping was not employed as many of these systems are geared towards climax vegetation. Estimated percent cover of the dominant species in each community type was recorded on the site monitoring form (**Appendix B**).

Annual changes in vegetation, especially the establishment and increase of hydrophytic plants, were evaluated through the use of belt transects. Three vegetation belt transects of approximately 10 feet wide and of various lengths were established in the fall of 2004 and spring of 2006 (**Figure 2** in **Appendix A**). The transect locations were recorded with a global positioning system (GPS) unit in 2009. Percent cover was estimated for each successive vegetative species encountered within the "belt" using the following values: + (<1%); 1 (1-5%); 2 (6-10%); 3 (11-20%); 4 (21-50%); and 5 (>50%). Photographs were taken at the start of each transect during the mid-season visit (**Appendix C**).

No woody species were planted at the site. Consequently, no monitoring relative to the survival of such species was conducted. To help prevent weed dispersal, PBS&J vehicles were washed prior to each site visit.

2.4 Soils

Soil information was obtained from the Soil Survey for *Glacier County Area and Part of Pondera County, Montana* (NRCS 1980). Soils were evaluated during the mid-season visit according to procedures outlined in the COE 1987 Wetland Delineation Manual. In the field, surface soils were evaluated for signs of wetland formation during the mid-season visit. If wetland indicators for hydrology or plants were found then a soil pit was excavated to evaluate hydric soil formation. Soil data were then recorded on the COE Routine Wetland Delineation Form (**Appendix B**).

The U.S. Environmental Protection Agency's (EPA) conditional 401 certification for this wetland restoration project directed MDT to monitor soils for metals, particularly for selenium enrichment. Soil samples were collected at seven locations within the South Alkali Lake, North Alkali Lake, and Alkali Lake (project area) during August 2009. The South and North Alkali Lake soil samples serve as a comparison for the Alkali Lake soil samples. Soil was collected using a covered shovel blade. Soil in the upper six inches of a 1-foot radius was removed, bagged, and labeled at each sample site. Soil samples were analyzed for arsenic, cadmium, nickel, and selenium by Energy Laboratories in Billings, Montana (**Appendix G**).

2.5 Wetland Delineation

Wetland delineation was conducted during the mid-season visit according the 1987 COE Wetland Delineation Manual. In July 2008, consultation with the COE (Steinle pers. comm.) confirmed that, where the 1987 manual was used to establish baseline wetland conditions at MDT wetland mitigation sites, it should continue to be applied at such sites for the duration of the monitoring period. Consequently, application of the new *Interim Regional Supplement to the*

Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (COE 2008) was not required or undertaken at this site in 2008 or 2009.

The monitoring area was investigated for the presence of wetland hydrology, hydrophytic vegetation, and hydric soils. The indicator status of vegetation was derived from the National List of Plant Species that Occur in Wetlands: Northwest Region 9 (Reed 1988). The information was recorded on a COE Routine Wetland Delineation Data Form (**Appendix B**).

2.6 Fish and Wildlife

Mammal, reptile, and amphibian species observations and other positive indicators of use, such as vocalizations, were recorded on the wetland monitoring form during the site visits. Indirect use indicators, including tracks, scat, burrow, eggshells, skins, and bones, were also recorded. These signs were recorded as the observer traversed the site while conducting other required activities. Direct sampling methods, such as snap traps, live traps, and pitfall traps, were not used. A comprehensive wildlife species list for the entire site was compiled.

2.7 Birds

Bird observations were recorded during all site visits. No formal census plots, spot mapping, point counts, or strip transects were conducted. However, bird observations were recorded in compliance with the Bird Survey Protocol during the spring and fall visits (**Appendix E**). During the mid-season visit, bird observations were recorded incidental to other monitoring activity observations. Observations were categorized by species, activity code, and general habitat association (Bird Survey Field Data Sheets in **Appendix B**). A comprehensive bird species list was compiled.

2.8 Macroinvertebrates

One macroinvertebrate sample was collected during the mid-season visit (**Figure 2** in **Appendix A**). The sample was collected and preserved according to the Macroinvertebrate Sampling Protocol (**Appendix F**). Laboratory analysis of the sample and reporting were conducted by Rhithron Associates, Inc. in Missoula, Montana.

2.9 Functional Assessment

In 2006 and 2007 a functional assessment was completed using the 1999 MDT Montana Wetland Assessment Method. In 2008 to 2009 the 2008 MDT Montana Wetland Assessment Method (Berglund and McEldowney 2008) was applied. Field data necessary for this assessment were primarily collected during the mid-season site visit. The remainder of the functional assessment was completed in the office. For each wetland or group of wetlands a Functional Assessment Form was completed (**Appendix B**).

2.10 Photographs

Photographs were taken in 2009 to show the current land use surrounding the site, the upland buffer, the monitored area, and the vegetation transects. Three photograph points were established and their location recorded with a resource grade GPS unit in 2009 (**Figure 2** in **Appendix A**). Panoramic photographs were taken at each point.

2.11 GPS Data

During the 2009 monitoring season, site features and survey points were collected with a resource grade GPS unit following the GPS protocols (**Appendix E**). In addition, some site features were hand-mapped onto an aerial photograph and then digitized. Site features and survey points that were mapped included fence boundaries, photograph points, transect beginnings and endings, wetland boundaries, non-wetland plant community boundaries, and a macroinvertebrate sampling location.

2.12 Maintenance Needs

The inlet channel, fencing, and other features were examined during the site visits for obvious signs of breaching, damage, or other problems. This did not constitute an engineering-level structural inspection, but rather a cursory examination.

3.0 RESULTS

3.1 Hydrology

Hydrology was restored to the lakebed by constructing an irrigation pipeline from the Birch Creek Main Canal to Blacktail Creek, which then connected to the Badger Fisher Main Canal, K Canal, and 19K Canal. Another pipeline was built to deliver water from the 19K Canal to the Alkali Lake site. The Blackfeet Tribe was to supply 200-acre feet of water between the dates of April 15th and May 15th (LWC 2004a). Upon filling of the 178-acre site, the flow rate was to be reduced to 0.7 cubic feet per second (or less) until June 1st, when inflow was to be terminated (LWC 2004a).

On May 19th irrigation water had not yet been turned on. It was estimated that about 80% of the lakebed was inundated from remnant 2008 surface water and 2009 precipitation. During the August 24-25th visit irrigation water was virtually off, though minor surface water was entering into the site. It was assumed that irrigation water filled the site sometime after May 19th, but then was turned off to allow surface water to subside. On October 30th irrigation water to the 19-K Canal had been shut off and no water was entering into the mitigation site.

Although hydrology is primarily supplied from applied water rights, direct precipitation also influences wetland development. It was assumed that precipitation levels measured at the Valier Weather Station serve as an indicator of precipitation received at the mitigation site. From January to August of 2008 9.22 inches (in) of precipitation was measured at the Valier Weather

Station (#248501) (Western Regional Climate Center [WRCC] 2008). This represents about 93% of the mean (9.92 in) precipitation recorded between January and July from 1911 to August 2009 (WRCC 2009). This January to August period in 2009 was drier than this period in 2008[1] (10.1 in[1]) and 2006 (10.1 in), but wetter than in 2007 (5.7 in) (WRCC 2009).

3.2 Vegetation

Vegetation community types were based on topography, hydrology, and plant composition. Plant species observed at the site have been compiled into a comprehensive list (**Table 2**). In 2003 *Salicornia rubra* (pickleweed) was observed in the northwest corner of the site, and not observed again until 2009. A healthy population was discovered in August 2009 (**Photo 6** in **Appendix C**).

Vegetation communities found in 2009 were Type 1 – Upland, Type 3 – *Hordeum* Wetland (formerly named *Puccinellia* Wetland), Type 4 – *Scirpus* Wetland, Type 5 - *Suaeda* Wetland, and Type 6 – Aquatic Wetland. The Type 5 – *Suaeda* Wetland was absent in 2008, but re-emerged where water was receding.

Table 2: ***Vegetation species observed from 2006 to 2009 at the Alkali Lake Wetland Mitigation Site.***

Scientific Name	Indicator Status[1]	Scientific Name	Indicator Status[1]
Agropyron smithii	FACU	*Juncus balticus*	OBL
Alisma gramineum	OBL	*Juncus torreyi*	FACW
Alopecurus arundinaceus	NI	*Koeleria macrantha* [syn. *K. cristata*]	---
Aster campestris	---	*Lactuca serriola*	FAC-
Aster falcatus	FACU	*Lepidium* (*ramossissimum*)	(---)
Astragalus (*bisulcatus*)	(---)	*Melilotus* spp.	---
Atriplex gardneri [syn. *A. nuttallii*]	---	*Najas guadalupensis*	OBL
Atriplex patula	FACW	*Poa juncifolia*	FACU+
Chenopodium glaucum	FAC	*Polygonum* (*amphibium*) [syn. *P. coccineum*]	(OBL)
Cirsium arvense [2]	FACU+	*Polygonum ramosissimum*	FAC-
Distichlis spicata	FAC+	*Potamogeton* spp.	---
Eleocharis acicularis	OBL	*Puccinellia nuttalliana*	OBL
Eleocharis palustris	OBL	*Rumex crispus*	FACW
Grindelia squarrosa	FACU	***Salicornia rubra***	**OBL**
Gutierrezia sarothrae	---	*Sarcobatus vermiculatus*	FACU+
green algae	---	*Scirpus acutus*	OBL
Helianthus (*nuttallii*)	(FACW-)	*Scirpus pungens* [syn. *S. americanus*]	OBL
Hordeum brachyantherum	FACW	*Suaeda calceoliformis* [syn. *S. depressa*]	FACW-
Hordeum jubatum	FAC+	***Triglochin maritimum***	**OBL**
Iva axillaris	FAC	*Typha latifolia*	OBL

[1] Specific Epithets in parenthesis are not verified.
[2] Plant is designated as noxious in Montana. In 2008-2009 the Botanist pulled and bagged at least 5 non-flowering stems.
Bolded species were documented within the project area for the first time in 2008.

[1] The WRCC website reported 7.5 in. of precipitation from January to August of 2008; however, this number did not include June because the data were unavailable at the time the website was accessed.

Vegetation Community Type 1 – Upland was comprised of a few wetland plants and a dominance of native upland plant species: *Atriplex gardneri, Poa juncifolia, Agropyron smithii, Aster campestris, Sarcobatus vermiculatus, Hordeum jubatum,* and *Suaeda calceoliformis* (**Figure 3** in **Appendix A; Photos 18** in **Appendix C**).

Vegetation Community Type 3 – *Hordeum* Wetland decreased slightly in 2009 (**Figure 3** in **Appendix A; Photos 13, 15-16, 21-22** in **Appendix C**). Type 3 wetland was able to expand into some of the lower lying areas of former upland; however, along the wetter perimeter Type 3 converted into Type 5 wetland.

Vegetation Community Type 4 – *Scirpus* Wetland continued to expand in size, but had fewer occurrences in 2009 (**Figure 3** in **Appendix A**; **Photos 14** and **24** in **Appendix C**). Type 4 – *Scirpus* Wetland polygons either consisted of *Scirpus pungens* or of *Eleocharis palustris* or an assemblage of *S. pungens, S. acutus, Eleocharis acicularis, E. palustris,* and *Juncus torreyi*. The large Type 4 – *Scirpus* polygon near the inlet was inundated and plants were actively growing and flowering (**Photo 14** in **Appendix C**). For all other *Scirpus* occurrences, *S. pungens* plants were young and in good health (see 2008 report).

Vegetation Community Type 5 – *Suaeda* Wetland re-appeared in 2009 and occupied its greatest extent to date (**Figure 3** in **Appendix A**; **Photos 6, 17, 19-20** in **Appendix C**). This community appears to respond to a short period of inundation followed by a long period of recession. The Type 5 wetland is dominated by *Suaeda calceoliformis* and *Chenopodium glaucum*, and mixed in places with *Salicornia rubra*, *Atriplex patula*, *Iva axillaris*, and *Polygonum ramosissimum*. These plants colonize saturated mudflat and will extend into very shallow water.

Vegetation Community Type 6 – Aquatic Wetland was mapped in two locations near the inlet (**Figure 3** in **Appendix A**; **Photos 4** in **Appendix C**). The more extensive Type 6 community in 2008 was absent and replaced by Type 5 wetland. Type 6 – Aquatic Wetland was comprised of *Eleocharis acicularis* with patchy occurrences of *Potamogeton* spp. and *Najas guadalupensis. Eleocharis acicularis* was occasionally found elsewhere within the site. In addition, it was characterized as being inundated and lacking a dominance of *Hordeum* or *Scirpus* species.

The remainder of the project site was mapped as Transitional Open Water (**Figure 3** in **Appendix A**). Transitional Open Water was characterized by inundated soils and an absence of plant life (**Photo 1-3** in **Appendix C**). Mudflat, which is characterized by saturated soils with an absence of plant life, was not present in 2009.

The first noxious weed occurrence was found in 2008 and observed again in 2009. The flowerless stems of *Cirsium arvense* were growing in the rocks of the inlet in August and October. All plants were pulled, bagged, and removed by the PBS&J Botanist. Since 2006, PBS&J vehicles have been washed prior to entering the project site; this helps reduce the risk of introducing noxious weeds. PBS&J will continue to monitor for and pull small occurrences of noxious weeds. Also at the rocks of the inlet a few *Melilotus* plants were found in 2008-2009, which the Botanist was not able to remove. This sweet clover is not noxious, but can be a nuisance plant.

In 2008 an extensive green algal bloom was observed along the shores on the north-eastern half of the project site. Although green algae were present throughout the site, this extensive bloom was not found. Water was clear. It is assumed that a change in livestock management around the site contributed to clearer water. In August livestock were kept in a different pasture not adjacent to the fence line.

Three vegetation transects were monitored at Alkali Lake in 2009 (**Figure 2** in **Appendix A**). Data recorded from Transect 1 (**Monitoring Form** in **Appendix B**) was summarized in tabular format (**Table 3**) and graphically illustrated (**Charts 1** and **2**). The start and end of Transect 1 were photographed (**Photos 7-8** in **Appendix C**). Overall wetland habitat and plant diversity both increased while plant cover remained the same (**Table 3; Chart 1**). Transect 1 was comprised of three wetland communities and Transitional Open Water (**Chart 2**).

Table 3: ***Data summary for Transect 1 at the Alkali Wetland Mitigation Site.***

Monitoring Year	2006	2007	2008	2009
Transect Length (feet)	175	412	412	412
# Vegetation Community Transitions along Transect	1	3	2	6
# Vegetation Communities along Transect	1	4	3	3
# Hydrophytic Vegetation Communities along Transect	1	3	3	3
Total Vegetative Species	5	9	7	12
Total Hydrophytic Species	4	5	6	10
Total Upland Species	1	4	1	2
Estimated % Total Vegetative Cover	70	50	50	50
% Transect Length Comprised of Hydrophytic Vegetation Communities	100	62	63	85
% Transect Length Comprised of Upland Vegetation Communities	0	2	0	0
% Transect Length Comprised of Unvegetated Open Water	0	0	37	15
% Transect Length Comprised of Bare Substrate	0	36	0	0

Chart 1: ***Length of habitat types within Transect 1 during 2006 to 2009.***

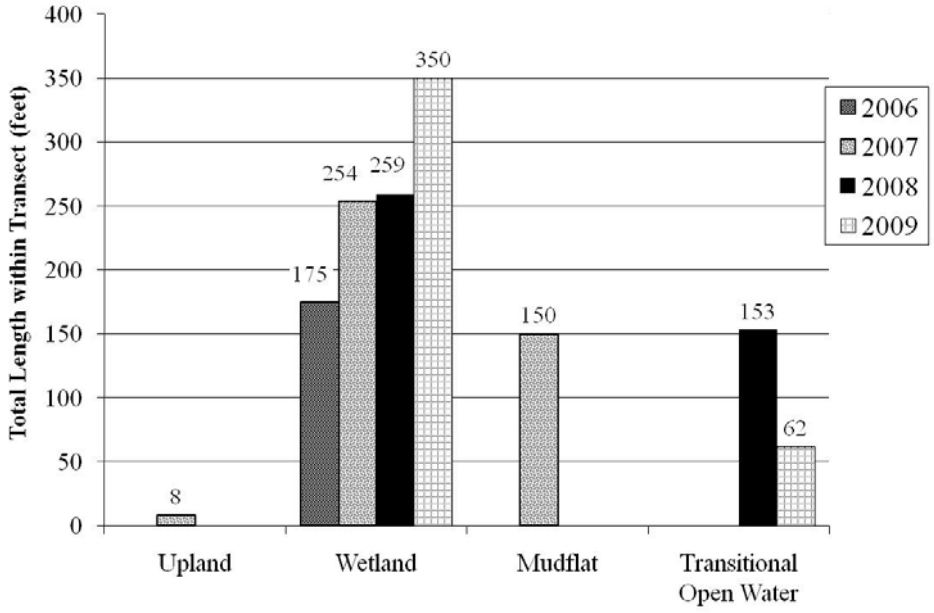
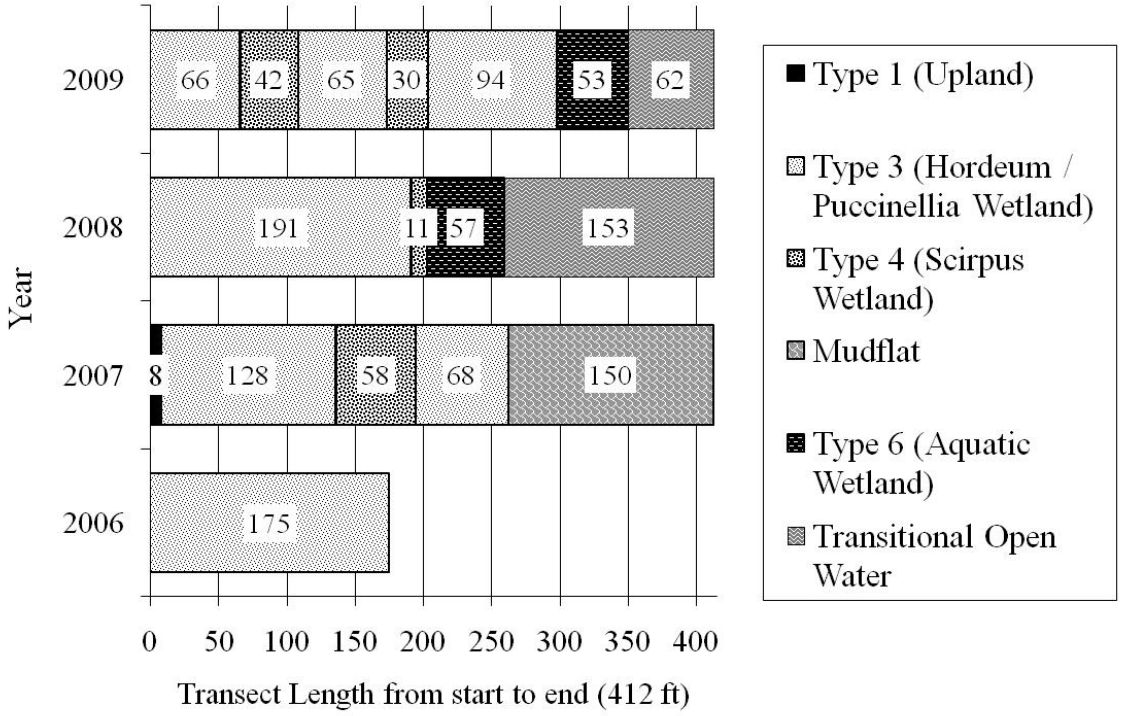


Chart 2: ***Transect maps showing habitat types of Transect 1 from start (0 feet) to end (175 feet in 2006 and 412 feet in 2007 to 2009).***



Data recorded from Transect 2 (**Monitoring Form** in **Appendix B**) were summarized in tabular format (**Table 4**) and graphically illustrated (**Charts 3** and **4**). Transect 2 was lengthened in 2007 in order to capture the diversity of developing habitats. The start and end of Transect 2 were photographed (**Photos 9-10** in **Appendix C**). The number of wetland communities remained the same from 2008, but the amount of wetland increased (**Table 4**; **Chart 3**). Wetland plant diversity increased slightly (**Table 4**). The type of wetland communities changed from 2008 to 2009 (**Chart 4**).

Table 4: ***Data summary for Transect 2 at the Alkali Wetland Mitigation Site.***

Monitoring Year	2006	2007	2008	2009
Transect Length (feet)	175	297	297	297
# Vegetation Community Transitions along Transect	1	2	2	2
# Vegetation Communities along Transect	2	3	3	3
# Hydrophytic Vegetation Communities along Transect	1	2	2	2
Total Vegetative Species	8	10	7	8
Total Hydrophytic Species	3	5	5	6
Total Upland Species	5	5	2	2
Estimated % Total Vegetative Cover	70	57	57	70
% Transect Length Comprised of Hydrophytic Vegetation Communities	74	72	43	89
% Transect Length Comprised of Upland Vegetation Communities	3	20	2	2
% Transect Length Comprised of Unvegetated Open Water	23	0	55	9
% Transect Length Comprised of Bare Substrate	0	8	0	0

Chart 3: ***Length of habitat types within Transect 2 during 2006 to 2009.***

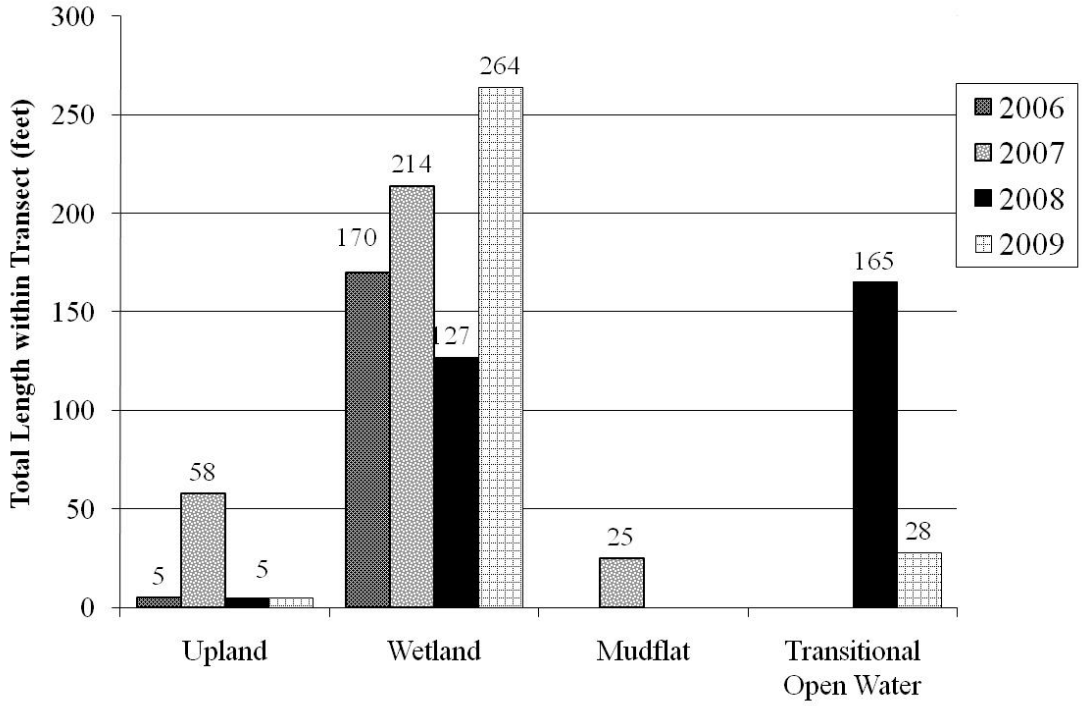
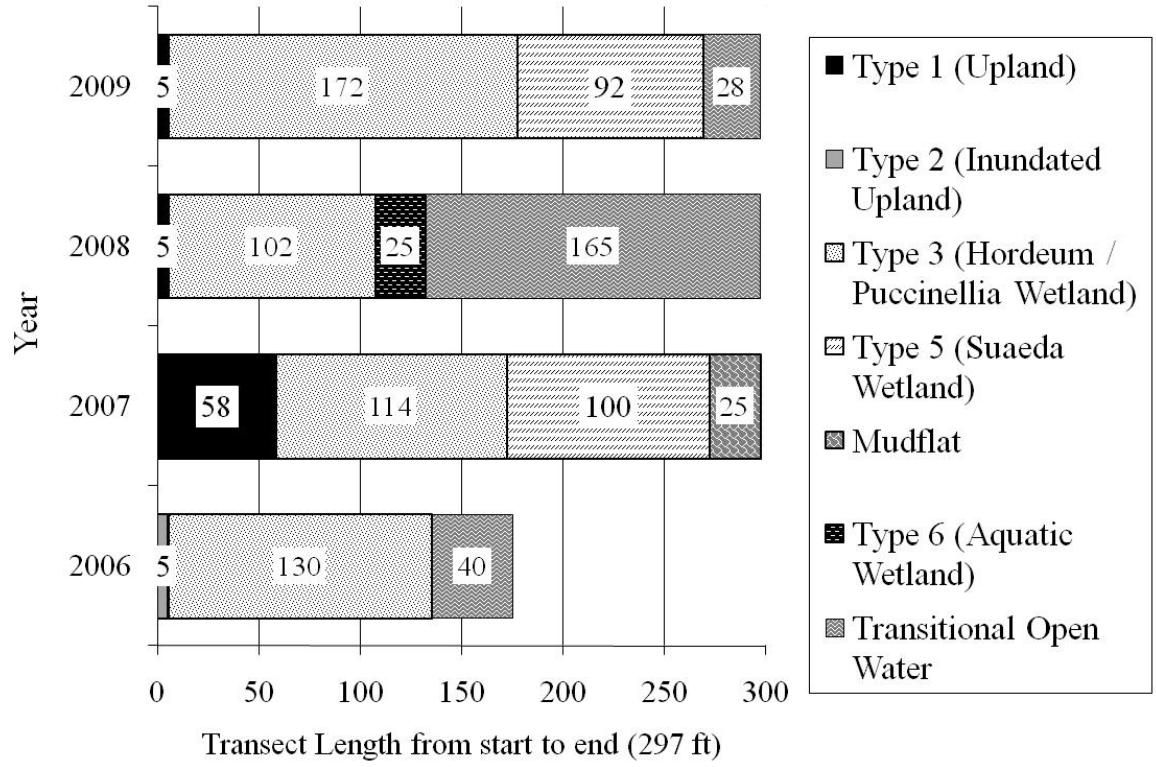


Chart 4: ***Transect maps showing habitat types of Transect 2 from start (0 feet) to end (175 feet in 2006 and 297 feet in 2007 to 2009).***



Data recorded from Transect 3 (**Monitoring Form** in **Appendix B**) were summarized in tabular format (**Table 5**) and graphically illustrated (**Charts 5** and **6**). The start and end of Transect 3 were photographed (**Photos 11-12** in **Appendix C**). Wetland habitat increased in size and plant diversity (**Table 5**; **Chart 5**). The types of wetland habitat diversified along Transect 3 in 2009 (**Chart 6**). This resulted when transitional open water was allowed to recede (**Table 5**; **Chart 6**).

Table 5: ***Data summary for Transect 3 at the Alkali Wetland Mitigation Site.***

Monitoring Year	2006	2007	2008	2009
Transect Length (feet)	100	173	173	173
# Vegetation Community Transitions along Transect	1	2	0	1
# Vegetation Communities along Transect	2	3	1	2
# Hydrophytic Vegetation Communities along Transect	1	2	1	2
Total Vegetative Species	8	10	7	8
Total Hydrophytic Species	5	6	5	6
Total Upland Species	3	4	2	2
Estimated % Total Vegetative Cover	55	53	50	75
% Transect Length Comprised of Hydrophytic Vegetation Communities	63	52	95	100
% Transect Length Comprised of Upland Vegetation Communities	37	19	0	0
% Transect Length Comprised of Unvegetated Open Water	0	0	5	0
% Transect Length Comprised of Bare Substrate	0	0	0	0

Chart 5: ***Length of habitat types within Transect 3 during 2006 to 2009.***

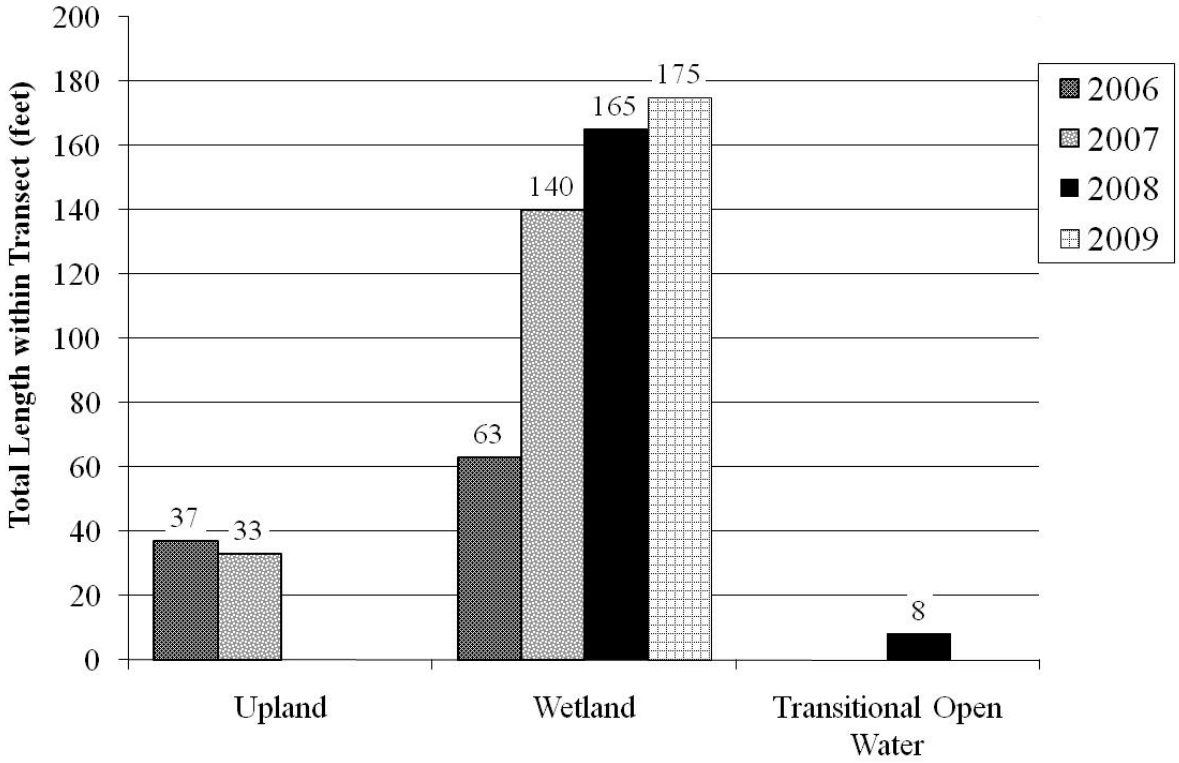
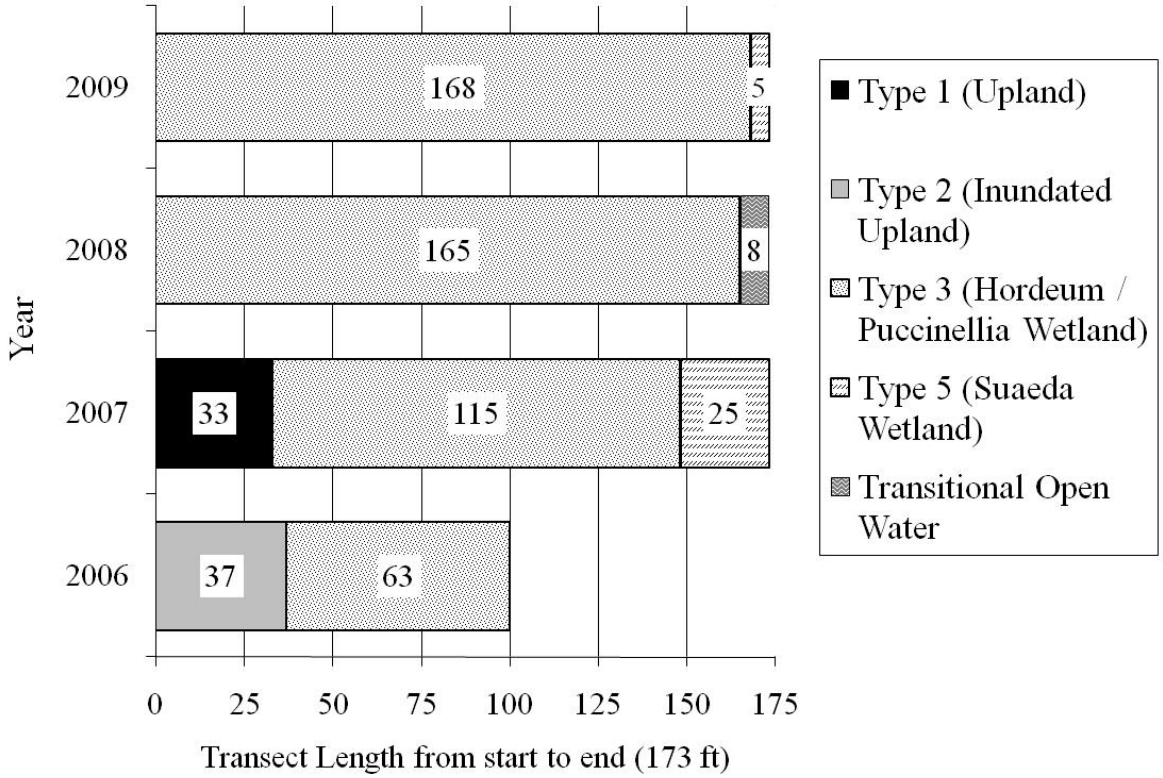


Chart 6: ***Transect maps showing habitat types of Transect 3 from start (0 feet) to end (100 feet in 2006 and 173 feet in 2007 to 2009).***



3.3 Soils

Prior to construction of this wetland mitigation site, the project site was mapped as 'lakebed' with no soil mapping conducted (NRCS 1980). In 2004, nine soil pits sampled within the project area revealed dry, clay soils with matrix soil colors ranging from 2.5Y 4/1 (1 pit) to 2.5Y 4/2 (8 pits) to 2.5Y 5/2 (1 pit) (LWC 2005). Of these nine pits, three had mottle colors of 2.5Y 5/6 or 10YR 5/6 (LWC 2005). In 2009, 11 soil pits were dug, revealing moist to saturated clay soils with matrix colors of 2.5Y 4/1 to 2.5Y 5/1 (**COE Forms** in **Appendix B**). Of these 11 soil pits, ten had mottle colors ranging from of 2.5Y 4/4 to 10YR 4/6. Since 2004, the number of soil pits with mottles has increased (**COE Forms** in **Appendix B**).

In June 2004, baseline soil data was collected from 10 sites and analyzed for arsenic, cadmium, nickel, and selenium (**Figure 4**, **Table 12**, and **Charts 8-11** in **Appendix G**). Soils collected from the North Alkali and South Alkali Lakes were used as a comparison for the Alkali Lake (project area) samples. It is important to note that the water source for North and South Alkali Lakes differ from that of Alkali Lake and no water flows between the North/South Alkali lakes and Alkali Lake (project area). In order to evaluate metals levels from these 10 sites, health guidelines were assembled from a number of sources (LWC 2004b) (**Table 6**). Analysis in 2004 demonstrated that all soil metals were below the recommended limits for protection of aquatic life, with one exception (LWC 2004b). In 2004 the M1 soil site, on the eastern side of Alkali Lake, registered 9.7 mg/kg for arsenic; this falls within the low end of the concern range using the National Irrigation Water Quality Program guideline. In 2004 paired soil samples were

collected to determine if vegetated and barren patches differed in their metals contents. The 2004 data showed that metals levels in vegetated and barren soils that occurred within 100 feet of each other were very similar. Thus it was decided that collecting paired soil samples were not necessary (MDT 2006). In 2006 to 2009 soils were collected and analyzed for these metals at 10, 6, 7 and 7 sites, respectively (**Appendix G**).

Table 6: ***Guidelines for metals in sediment for the protection of aquatic life (LWC 2004b).***

SOURCE	LEVEL	ARSENIC (As) mg/kg	CADMIUM (Cd) mg/kg	NICKEL (Ni) mg/kg	SELENIUM (Se) mg/kg
CAN [1]	Aquatic Life Criteria	17	3.5	---	4
NIWQP [2]	Concern	8.2 to 70	---	---	1 to 4
NIWQP [2]	Toxicity	70	---	---	> 4
NEPC [3]	Health Investigation Level	100	20	600	---
NEPC [3]	Ecological Investigation Level	20	3	60	---

[1] Canadian Interim sediment quality guideline for protection of aquatic life, probably effect level, and freshwater values for constituents in sediment.
[2] National Irrigation Water Quality Program, toxicity threshold for constituents in sediment. Selenium applies only in Western U.S. and includes the Rocky Mountains.
[3] National Environment Protection Measure.

In 2009 seven soil samples were collected at or near the 2004 and 2008 sampling locations (inundation prevented access to some locations) (**Figure 4** and **Table 12** in **Appendix G**). Arsenic, cadmium, nickel, and selenium levels were measured in each soil sample collected in 2009 (**Table 7**). The pre- (2004) and post- (2006-2008) project data for each metal concentration was graphed (**Charts 8 - 11** in **Appendix G**).

Table 7: ***2009 soil metals analyses for North Alkali, South Alkali, and Alkali Lakes.***

LAKE LOCATION	SOIL SAMPLE MAP LOCATION[1]	ARSENIC (As) mg/kg	CADMIUM (Cd) mg/kg	NICKEL (Ni) mg/kg	SELENIUM (Se) mg/kg
North Alkali	B2	4.24	0.25	11.9	0.18
South Alkali	D	7.83	0.49	24.0	0.17
South Alkali	F	7.25	0.50	20.9	0.24
Alkali	J	4.85	0.37	15.2	0.12
Alkali	L1	3.44	0.24	10.3	0.06
Alkali	M1	5.03	0.34	14.2	0.15
Alkali	O	5.12	0.38	15.2	0.41

[1] Soil sample map is provided in **Appendix G**.

Arsenic concentrations in North and South Alkali Lakes were mostly higher in 2009 than in 2004 (**Chart 8** in **Appendix G**). None of the three samples from North and South Alkali Lakes fell within the NIWQP range of concern for Arsenic (**Tables 6** and **7**). Within the project site (Alkali Lake), arsenic levels were near to or lower in 2009 than in 2004, and all were all below recommended guidelines for protection of aquatic life (**Tables 6** and **7**; **Chart 8** in **Appendix G**). In 2009, the mean arsenic level (6.44 mg/kg) for three collections outside the project area was higher than the mean (4.61 mg/kg) for four collections within the project area (**Table 7**).

Cadmium concentrations in North and South Alkali Lakes were higher in 2009 than in 2004, but were all below the recommended guidelines for protection of aquatic life (**Tables 6** and **7**; **Chart 9** in **Appendix G**). Within the project site, cadmium concentrations were also higher in 2009 than in 2004 (**Chart 9** in **Appendix G**). All soil samples had cadmium concentrations below the recommended guidelines for protection of aquatic life (**Tables 6** and **7)**. In 2009, the mean cadmium level (0.41 mg/kg) for three collections outside the project area was higher than the mean (0.33 mg/kg) for four collections within the project area (**Table 7**).

Nickel concentrations in North and South Alkali Lakes were mostly higher in 2009 than in 2004, but all were below the recommended guidelines for protection of aquatic life (**Tables 6** and **7**; **Chart 10** in **Appendix G**). Within the project site, nickel concentrations were lower in 2009 than in 2004, and all were below the recommended guidelines for protection of aquatic life (**Tables 6** and **7**; **Chart 10** in **Appendix G**). In 2009, the mean nickel level (18.93 mg/kg) for three collections outside the project area was higher than the mean (13.73 mg/kg) for four collections within the project area (**Table 7**).

Selenium concentrations in North and South Alkali Lakes were similar or lower in 2009 when compared to 2004, but all samples were below those recommended for protection of aquatic life (**Tables 6** and **7**; **Chart 11** in **Appendix G**). Within the project site, selenium concentrations were lower in 2009 than in 2004, and all were below the recommended guidelines for protection of aquatic life (**Tables 6** and **7**; **Chart 11** in **Appendix G**). In 2009, the mean selenium level (0.20 mg/kg) for three collections outside the project area was slightly higher than the mean (0.19 mg/kg) for four collections within the project area (**Table 7**).

3.4 Wetland Delineation

Prior to project implementation, wetland vegetation was ephemeral, hydric soils were present, and hydrology was absent within the lakebed. Therefore, no baseline wetlands were delineated. Following construction in the fall of 2005, the site was inundated and has been periodically filled each year from 2006 through 2009 (see Section 3.1 Hydrology).

The amount of wetland habitat has varied since 2006 and is dependent upon the duration and timing of water recession (**Table 8**). Wetland habitat increased in size and type during 2009 (**Table 8**).

Table 8: ***Aquatic and wetland habitat types and acreages from 2006 to 2009 at the Alkali Lake Wetland Mitigation Site.***

AQUATIC AND WETLAND HABITATS	ACREAGE			
	2006	2007	2008	2009
Type 3 – *Hordeum*/*Puccinellia* Wetland	38.22	24.35	51.22	46.70
Type 3/5 – *Hordeum*/*Suaeda* Wetland	---	37.78	---	---
Type 4 – *Scirpus* Wetland	0.48	0.33	0.62	0.89
Type 5 – *Suaeda* Wetland	---	22.31	---	48.75
Type 6 – Aquatic Wetland	---	---	4.92	0.09
Mudflat and/or Transitional Open Water	118.69	81.79	130.18	85.59
Total	157.39	166.56	186.94	182.02

3.5 Fish and Wildlife

Direct observations of all wildlife species and their sign (indicating presence) were recorded in 2009 and have been compiled since 2006 (**Table 8**; **Monitoring Forms** in **Appendix B**). Tracks, scat, and/or burrows of ground squirrels, deer, coyotes, and raccoons were observed. Dead deer mice and fish that had been washed out of the culvert were observed in May. Juvenile fish were observed in the inlet channel in August and October. During the August visit ten horses were found grazing in the project site. The first post-construction observations of an amphibian and a reptile were recorded in 2009: one western chorus frog (*Pseudacris triseriata*) and one plains garter snake (*Thamnophis radix*).

Birds are the most abundant type of wildlife using the project area (**Table 8**). Upon filling of the site in fall 2005, a diversity of waterfowl species has been observed. In 2009, about 27 bird species were observed using the site (**Bird Survey Forms** in **Appendix B**). The most abundant species found in 2009 included American Avocets (*Recurvirostra americana*), American White Pelicans (*Pelecanus erythrorhynchos*), and Northern Shovelers (*Anas clypeata*).

From 2007 through 2009 Piping Plovers (*Charadrius melodus*) have been observed at the mitigation site. In 2007, two Piping Plovers, presumably a pair, were sighted during the May surveys. In 2008 one Piping Plover was seen foraging at the site. In 2009 eight Piping Plovers were observed foraging at the site (**Bird Survey Forms** in **Appendix B**; **Photo 5** in **Appendix C**).

Since 1985 the Piping Plover has been federally listed as a threatened species, and in 2002 critical habitat was designated in Montana (USFWS 2002 and 2009). Although the Alkali Lake area was not designated as critical habitat, it does provide habitat for the Piping Plover. The Alkali Lake area represents the western-most location in which Piping Plovers have been known to nest in the United States (Haneberry 1995). Nesting was documented along the North Alkali Lake in 1990 and 1992. According to the USFWS, Southeast Alkali Lake may contain the best potential plover habitat of the Alkali Lake complex (Martin 1996). A secondary purpose of this wetland mitigation project has been to manage water levels such that they may create habitat for the Piping Plover. Nesting Piping Plovers require unvegetated or sparsely-vegetated gravel and sand beaches located adjacent to alkaline wetlands (Root et al. 1998). Although nesting was not confirmed, Piping Plovers have been documented for three consecutive springs, indicating that the importance of managing the habitat and the water levels to facilitate use by the Piping Plover.

Table 9: ***Fish and wildlife species observed from 2006 to 2009 at the Alkali Lake Wetland Mitigation Site.***

FISH, AMPHIBIAN, REPTILE	
juvenile fish (unidentified species)	**plains garter snake (*Thamnophis radix*)**
Pacific chorus frog (*Pseudacris regilla*)	
BIRD	
American Avocet (*Recurvirostra americana*)	**Mallard (*Anas platyrhynchos*)**
American Coot (*Fulica americana*)	**Marbled Godwit (*Limosa fedoa*)**
American White Pelican (*Pelecanus erythrorhynchos*)	**Northern Harrier (*Circus cyaneus*)**
American Wigeon (*Anas americana*)	**Northern Pintail (*Anas acuta*)**
Blue-winged Teal (*Anas discors*)	**Northern Shoveler (*Anas clypeata*)**
Brewer's Blackbird (*Euphagus cyanocephalus*)	Osprey (*Pandion haliaetus*)
Bufflehead (*Bucephala albeola*)	**Piping Plover (*Charadrius melodus*)**
Canada Goose (*Branta Canadensis*)	Prairie Falcon (*Falco mexicanus*)[1]
Canvasback (*Aythya valisineria*)	Red-winged Blackbird (*Agelaius phoeniceus*)
Cinnamon Teal (*Anas cyanoptera*)	Ring-necked Duck (*Aythya collaris*)
Common Goldeneye (*Bucephala clangula*)	**Ring-necked Pheasant (*Phasianus colchicus*)**
Common Raven (*Corvus corax*)	Ruddy Duck (*Oxyura jamaicensis*)
Common Snipe (*Gallinago gallinago*)	Sanderling (*Calidris alba*)
Common Tern (*Sterna hirundo*)	**Sandhill Crane (*Grus Canadensis*)**
Franklin's Gull (*Larus pipixcan*)	**Savannah Sparrow (*Passerculus sandwichensis*)**
Gadwall (*Anas strepera*)	Short-billed Dowitcher (*Limnodromus griseus*)
Golden Eagle (*Aquila chrysaetos*)	Snow Bunting (*Plectrophenax nivalis*)
Gadwall (*Anas strepera*)	**Sparrow (unidentified species)**
Grasshopper Sparrow (*Ammodramus savannarum*)	Swallow (unidentified species)
Greater Yellowlegs (*Tringa melanoleuca*)	Tundra Swan (*Cygnus columbianus*)
Green-winged Teal (*Anas crecca*)	**Vesper Sparrow (*Pooecetes gramineus*)**
Gull (California, *Larus californixus,*	**Western Meadowlark (*Sturnella neglecta*)**
and/or **Ring-bill, *L. delawarensis*)**	Western Sandpiper (*Calidris mauri*)
Horned Lark (*Eremophila alpestris*)	**Willet (*Catoptrophorus semipalmatus*)**
Killdeer (*Charadrius vociferous*)	**Wilson's Phalarope (*Phalaropus tricolor*)**
Lesser Yellowlegs (*Tringa flavipes*)	Yellow-headed Blackbird (*Xanthocephalus xanthocephalus*)
Long-billed Curlew (*Numenius americanus*)	
Long-billed Dowitcher (*Limnodromus scolopaceus*)	
MAMMAL	
American badger (*Taxidea taxus*)	**raccoon (*Procyon lotor*)**
black bear (*Ursus americanus*)	**Richardson's ground squirrel (*Spermophilus richardsonii*)**
coyote (*Canis latrans*)	**striped skunk (*Mephitis mephitis*)**
fox (unidentified species)	Vole (unidentified species)
mouse (unidentified species)	white-tailed jack rabbit (*Lepus townsendii*)
porcupine (*Erethizon dorsatum*)	**white-tailed deer (*Odocoileus virginianus*)**
pronghorn (*Antilocapra americana*)	

Bolded species were observed in 2009.

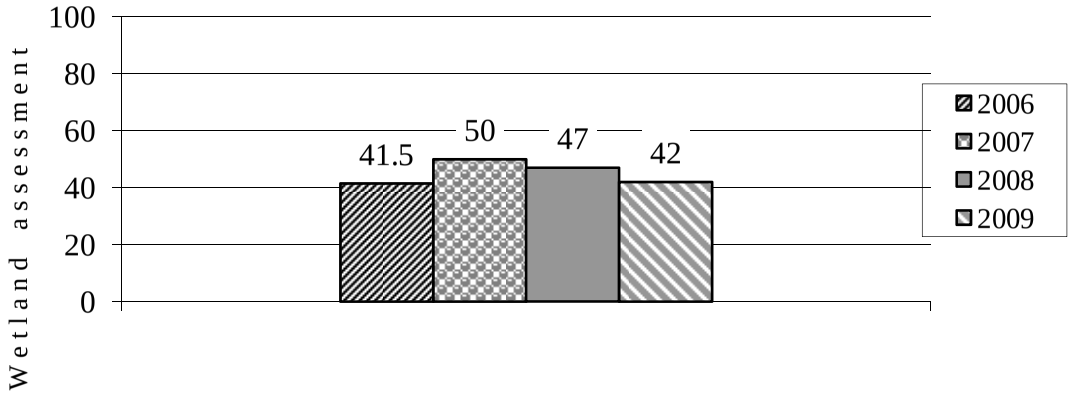
3.6 Macroinvertebrates

Macroinvertebrate sampling occurred at one location, in an area slowly converting into Type 4 - Scirpus Wetland (**Figure 2** in **Appendix A; Photo 24** in **Appendix C**). The 2009 macroinvertebrate data is presented in Appendix F and summarized below, in italics, by Rhithron and Associates.

> *The invertebrate fauna of Alkali Lake was dominated by midges and gnats in 2009: biting midges (Ceratopogonidae) were also well-represented, suggesting the proximity of cattle. Similar to 2008, invertebrates were not abundant at this site. However, the diversity of the assemblage was significantly higher in 2009 compared to the previous year. A drastic functional shift was evident in the sampled animals between 2008 and 2009 as well; in the latter year, the mix was dominated by gatherers and predators. It is not clear whether this shift indicates an alteration of habitats and feeding, or whether it represents a change in sampling method. Thermal preference of the assemblage was estimated to be 16.6ºC. The bioassessment index indicates "optimal" conditions at this site (**Chart 7**).*

In general macroinvertebrate diversity increased in 2009; although abundance has remained low since 2007. In 2009, 100 individuals representing 18 taxa were found in the macroinvertebrate sample (**Taxa Listing** in **Appendix F**). Members of the Families Corixidae (water boatman), Hydrophilidae (water scavenger beetle), Ceratopogonidae (biting midges), Coenagrionidae (pond damselflies) and Chironomidae (non-biting midges) were found. The dominance of non-insect species (i.e. nematodes, snails, seed shrimps (ostracods), and clitellate oligochaete worms) declined from a 75% (2007) to a 35% (2008) to a 2% (2009) occurrence (**Appendix F**). The Family Corixidae (water boatman) increased from 17% (2007) to 49% (2008), but then decreased to a 1% occurrence in 2009 (**Appendix F**). The Family Ceratopogonidae (biting midges) were absent in 2007, had a 1% occurrence in 2008, and, increased greatly to 30% occurrence in 2009. The biting midges and non-biting midges accounted for 86% of the macroinvertebrate sample in 2009. As stated by Rhithron and Associates, this represents a drastic functional change. This functional change was influenced by a change in habitat and the presence of domesticated animals within the site, and not by sampling intensity. The macroinvertebrate sample was collected near to the 2008 site, but in 2009 the habitat increased in plant diversity to include *Scirpus, Eleocharis*, *Hordeum Puccinellia*, and others. Transect 1 where bulrushes, aquatic plants, and grasses dominated. A detailed report is provided in **Appendix F**.

Chart 7: ***Bioassessment scores using the wetland index for 2006 (average of two samples) and 2007 to 2009 (one sample).***



3.7 Functional Assessment

As the Alkali wetland develops, its environmental functions and values also increase. In 2009, the Alkali Lake Wetland Mitigation Site continued to rate as a Category II wetland (**Table 10**). The amount of wetland increased this year, but total aquatic habitat decreased slightly resulting in a slightly lower functional unit score. The site continued to rate as exceptional or high for General Wildlife Habitat and Short and Long Term Surface Water Storage (**Table 10**). Only general comparisons of the 2006-2007 and 2008-2009 functional assessments can be made as they were completed with different versions of the MWAM.

Table 10: ***Summary of 2006 to 2009 wetland function/value ratings and functional points at the Alkali Lake Wetland Mitigation Site.***

Function and Value Parameters from the Montana Wetland Assessment Method	2006[1]	2007[1]	2008[2]	2009[2]
Listed/Proposed T&E Species Habitat	Low (0.3)	Mod (0.8)	Mod (0.8)	Mod (0.8)
MTNHP Species Habitat	Mod (0.6)	Mod (0.6)	Mod (0.5)	Mod (0.5)
General Wildlife Habitat	High (0.9)	Exc (1.0)	Exc (1.0)	Exc (1.0)
General Fish/Aquatic Habitat	N/A	N/A	N/A	N/A
Flood Attenuation	N/A	N/A	N/A	N/A
Short and Long Term Surface Water Storage	High (0.9)	High (0.9)	High (0.9)	High (0.9)
Sediment/Nutrient/Toxicant Removal	Mod (0.7)	Mod (0.7)	Mod (0.7)	Mod (0.7)
Sediment/Shoreline Stabilization	Low (0.2)	Low (0.3)	Low (0.2)	Low (0.2)
Production Export/Food Chain Support	Mod (0.6)	Mod (0.7)	Mod (0.7)	High (0.8)
Groundwater Discharge/Recharge	Low (0.1)	Low (0.1)	Low (0.1)	Low (0.1)
Uniqueness	Mod (0.5)	Mod (0.5)	Mod (0.5)	Mod (0.5)
Recreation/Education Potential	Mod (0.7)	Mod (0.7)	Low (0.05)	Low (0.1)
Actual Points/Possible Points	**5.5 / 10**	**6.3 / 10.0**	**5.45 / 9.0**	**5.6 / 9.0**
% of Possible Score Achieved	**55%**	**63%**	**61%**	**62%**
Overall Category	**II**	**II**	**II**	**II**
Total Acreage of Assessed Wetlands and Other Aquatic Habitats within Site Boundaries (ac)	**157.31**	**166.43**	**186.94**	**182.01**
Functional Units (acreage x actual points)	**865.2**	**1048.50**	**1037.52**	**1019.25**

[1] 1999 MDT MWAM.
[2] 2008 MDT MWAM. The 2009 functional assessment form is in **Appendix B**.

3.8 Photographs

The 2009 aerial photograph was taken on July 2nd and used to create **Figures 2** and **3** (**Appendix A**). Representative photos were taken of the mitigation site, upland surroundings, transect starts and ends, and/or at permanent photo-points (**Photos 1-24** in **Appendix C**). Panoramic photos were taken at the three photo point locations (**Appendix C**).

3.9 Maintenance Needs / Recommendations

The excavated inlet channel was in good condition during all site visits. Fencing, control structures, and the western berm were also in good condition.

How water is managed at Alkali Lake is dependent upon availability and the goals set for wetland and wildlife management. Type 4 and Types 3/5 wetland habitats require opposing amounts of water. Likewise, Piping Plovers and waterfowl/shorebird species require opposing amounts of water. In 2006 and 2008 the abundance of irrigation water promoted the development of Type 4 wetland and the use of the site by waterfowl and shorebirds throughout the entire growing season. In 2007 and 2009, the site was inundated and water was allowed to recede from late spring to early fall. This promoted development of the Type 3 and Type 5 wetland areas and potential breeding habitat for the Piping Plover; water levels were sufficient to maintain foraging habitat for a large variety of shorebirds and waterfowl.

A herd of ten horses were found grazing within the site in August. Although they were later removed, it was evident on October 30th that cows had entered the site through two open gates and had grazed in the site. Grazing by cows and livestock has the potential to change the development of wetland within the site by removing vegetation, compacting soils, and dispersing noxious and exotic plants. The first sighting of a mushroom species was found growing from horse dung in 2009.

3.10 Current Credit Summary

In 2009, approximately 96 acres of emergent wetlands were delineated at the mitigation site. These acres satisfied soils, hydrology, and vegetation performance standards listed in **Section 1.0**. All together, about 182 acres of aquatic habitat were mapped in 2009. To date the site has achieved the required wetland, upland, and open water goals as determined by the Tribe and COE (**Table 11**). The upland buffer also satisfied applicable performance standards as listed in **Section 1.0**. The 2009 credits at the site, applying Tribal and COE credit ratios, are presented in **Table 11**. The key to developing wetland habitat will come from managing the water levels that create the Transitional Open Water zone.

Table 11: ***2009 Tribal and Corps of Engineers credits at the Alkali Lake Wetland Mitigation Site.***

Proposed Feature	2009 Delineated Acres	Tribal Credit Ratio and 2009 Calculated Credit	Tribal Credit Target	Corps Credit Ratio and 2009 Calculated Credit[a]	Corps Credit Target
Primary emergent wetland restoration	96.42	1:2.5 credit ratio 38.57 credit acres	29.77 credit acres	1:1 credit ratio 96.42 credit acres	74.42 credit acres
Shallow open water restoration	85.59	1:2.5 credit ratio 34.24 credit acres	40.56 credit acres	1:1 credit ratio (to a max. matching wetland acres) 85.59 credit acres	74.42 credit acres
100-ft-wide upland buffer	45.12	1:4 credit ratio 11.28 credit acres	11.28 credit acres	1:4 credit ratio (on max. 50-ft width) 5.64 credit acres	1:4 credit ratio (on max. 50-ft width) 5.64 credit acres
TOTALS	182.01 (aquatic only)	**84.08 credit acres**	81.61 credit acres	**187.65 credit acres[a]**	154.48 credit acres

[a] Maximum credits as of 2009. Final credits are subject to compliance with the performance standards at the end of the monitoring period.

4.0 REFERENCES

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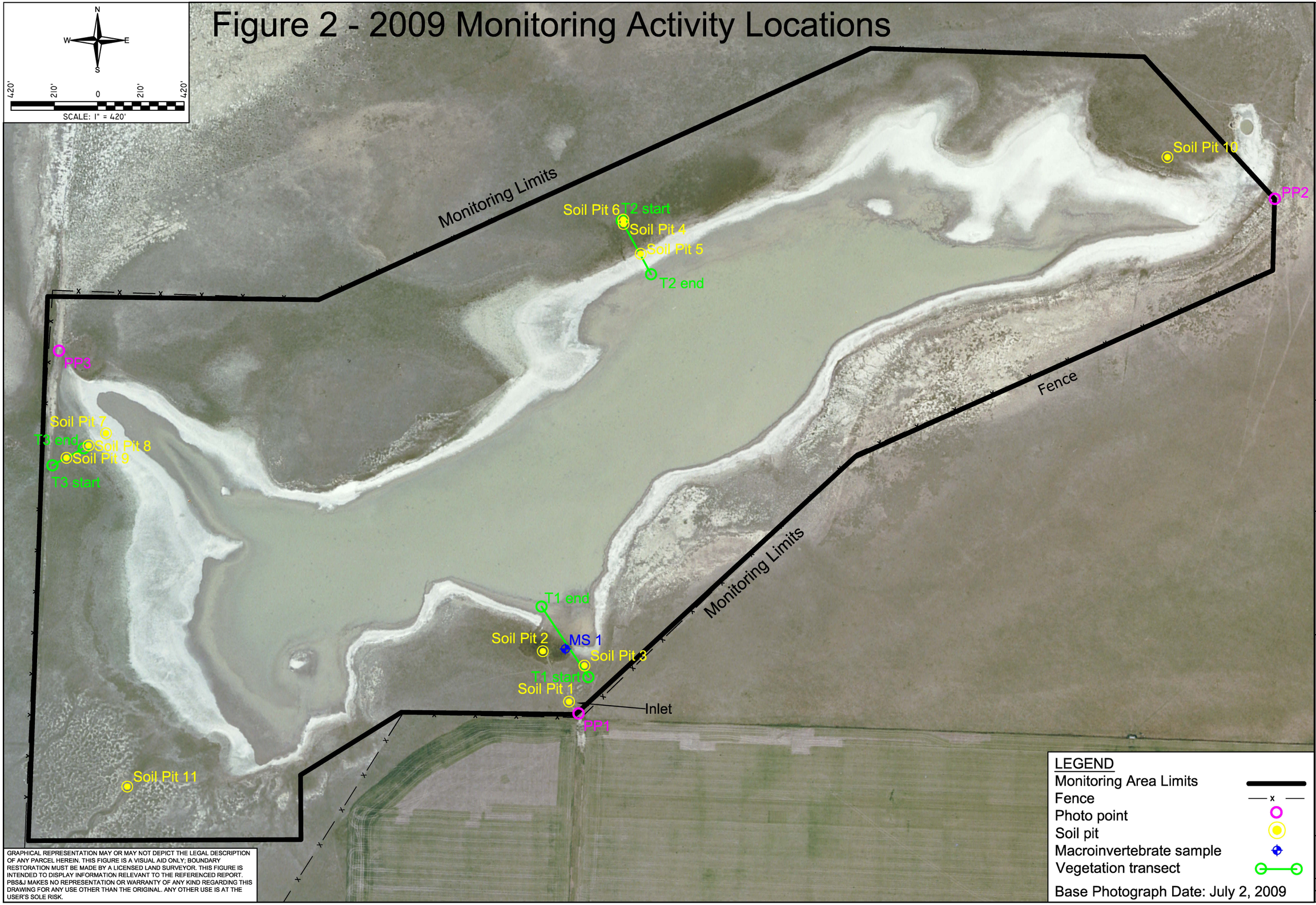
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Appendix A

FIGURES 2 & 3

MDT Wetland Mitigation Monitoring
Alkali Lake
Pondera County, Montana

Figure 2 - 2009 Monitoring Activity Locations



LEGEND

- Monitoring Area Limits
- Fence
- Photo point
- Soil pit
- Macroinvertebrate sample
- Vegetation transect

Base Photograph Date: July 2, 2009

GRAPHICAL REPRESENTATION MAY OR MAY NOT DEPICT THE LEGAL DESCRIPTION OF ANY PARCEL HEREIN. THIS FIGURE IS A VISUAL AID ONLY; BOUNDARY RESTORATION MUST BE MADE BY A LICENSED LAND SURVEYOR. THIS FIGURE IS INTENDED TO DISPLAY INFORMATION RELEVANT TO THE REFERENCED REPORT. PBS&J MAKES NO REPRESENTATION OR WARRANTY OF ANY KIND REGARDING THIS DRAWING FOR ANY USE OTHER THAN THE ORIGINAL. ANY OTHER USE IS AT THE USER'S SOLE RISK.

ALKALI LAKE WETLAND MITIGATION SITE

2009 MONITORING ACTIVITY LOCATIONS

PROJ NO:	0B43088802 04.02
LOCATION:	CUT BANK, MT
SCALE:	NOTED
FILE NAME:	BASE2009.dwg
DRAWN:	JR
PROJ MGR:	J. BERGLUND
CHECKED:	AP
APPVD:	JB
PLOTTED:	Nov/10/2009

801 N. Last Chance Gulch
Suite 101
Helena, MT 59601

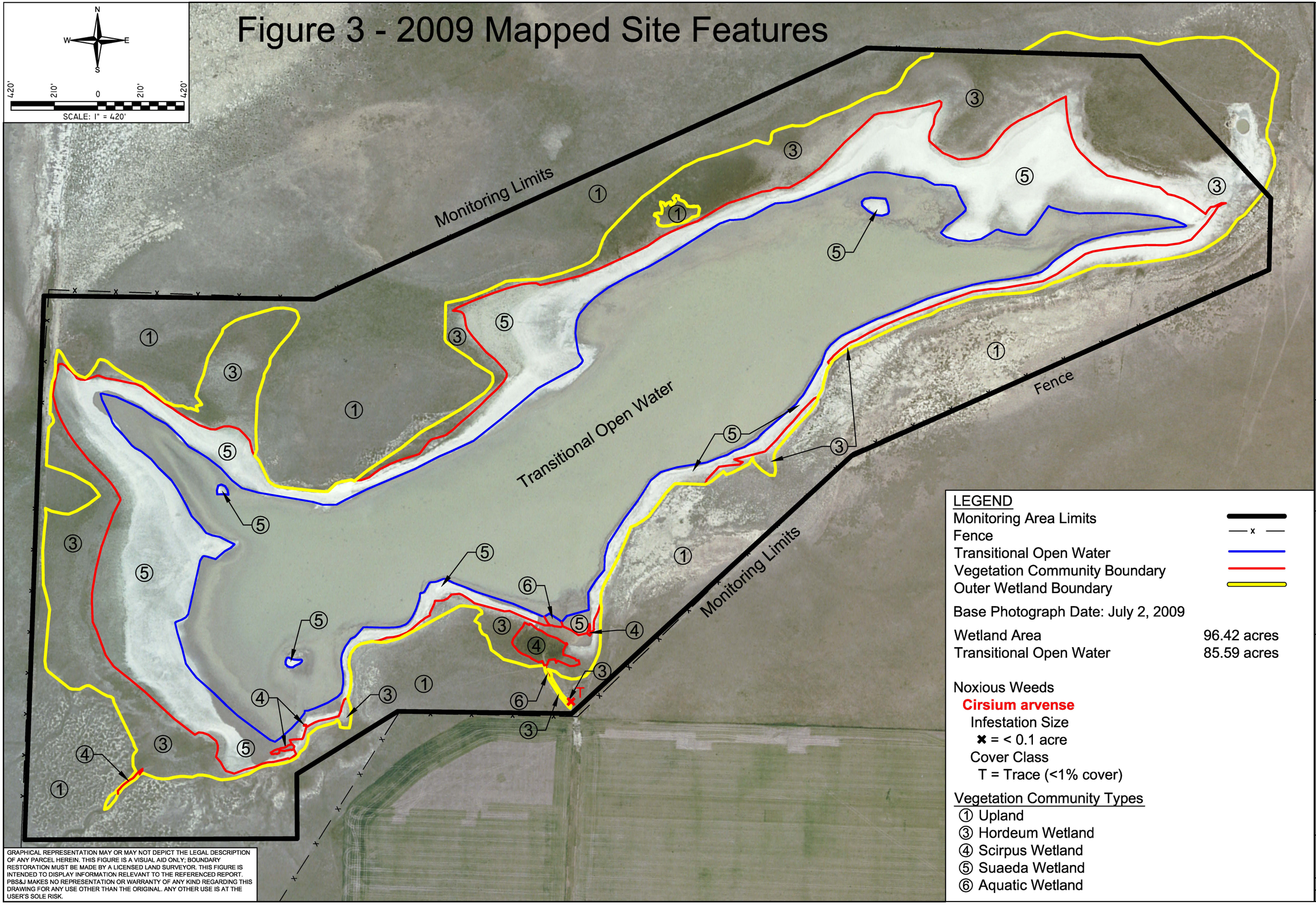
PBSJ

FIGURE 2

REV -

DATE 11/02/2009

Figure 3 - 2009 Mapped Site Features



LEGEND

- Monitoring Area Limits
- Fence
- Transitional Open Water
- Vegetation Community Boundary
- Outer Wetland Boundary

Base Photograph Date: July 2, 2009

Wetland Area	96.42 acres
Transitional Open Water	85.59 acres

Noxious Weeds

Cirsium arvense

Infestation Size

✖ = < 0.1 acre

Cover Class

T = Trace (<1% cover)

Vegetation Community Types

① Upland
③ Hordeum Wetland
④ Scirpus Wetland
⑤ Suaeda Wetland
⑥ Aquatic Wetland

GRAPHICAL REPRESENTATION MAY OR MAY NOT DEPICT THE LEGAL DESCRIPTION OF ANY PARCEL HEREIN. THIS FIGURE IS A VISUAL AID ONLY; BOUNDARY RESTORATION MUST BE MADE BY A LICENSED LAND SURVEYOR. THIS FIGURE IS INTENDED TO DISPLAY INFORMATION RELEVANT TO THE REFERENCED REPORT. PBS&J MAKES NO REPRESENTATION OR WARRANTY OF ANY KIND REGARDING THIS DRAWING FOR ANY USE OTHER THAN THE ORIGINAL. ANY OTHER USE IS AT THE USER'S SOLE RISK.

ALKALI LAKE WETLAND MITIGATION SITE

2009 MAPPED SITE FEATURES

DRAWN: JR
PROJ MGR: J. BERGLUND
CHECKED: AP
APPVD: JB
PROJ NO: 0B4308802 04.02
PLOTTED: Nov/10/2009
LOCATION: CUT BANK, MT
SCALE: NOTED
FILE NAME: BASE2009.dwg

801 N. Last Chance Gulch
Suite 101
Helena, MT 59601

FIGURE
3

REV -

DATE 11/02/2009

Appendix B

2009 WETLAND MITIGATION SITE MONITORING FORM
2009 BIRD SURVEY FORM
2009 COE WETLAND DELINEATION FORMS
2009 MDT FUNCTIONAL ASSESSMENT FORM

MDT Wetland Mitigation Monitoring
Alkali Lake
Pondera County, Montana

PBS&J / MDT WETLAND MITIGATION SITE MONITORING FORM

Project Name: **Alkali Lake** Project Number: **0B4308802-04.02**
Assessment Date: **August 24-25, 2009** Person(s) conducting the assessment: **A. Pipp**
Location: **14 miles NW of Valier** MDT District: **Great Falls** Milepost: ____
Legal Description: T **31N** R **6W** Section **31 T 30N R 6W** Section **6**
Weather Conditions: **sunny, low 80's, 0-5mph wind** Time of Day: **0800 to 1900**
Initial Evaluation Date: **August 22, 2006** Monitoring Year: **4** # Visits in Year: **3**
Size of evaluation area: **178 acres** Land use surrounding wetland: **rangeland & cropland**

HYDROLOGY

Surface Water Source: **Birch Creek Canal**
Inundation: **Present** Average Depth: **1.0 feet** Range of Depths: **1-18 inches**
Percent of assessment area under inundation: **%**
Depth at emergent vegetation-open water boundary: **0.5 feet**
If assessment area is not inundated then are the soils saturated within 12 inches of surface: _
Other evidence of hydrology on the site (ex. – drift lines, erosion, stained vegetation, etc.):
drift lines and cracked surface soil

Groundwater Monitoring Wells: **Absent**
Record depth of water below ground surface (in feet):

Well Number	Depth	Well Number	Depth	Well Number	Depth

Additional Activities Checklist:
☒ Map emergent vegetation-open water boundary on aerial photograph.
☒ Observe extent of surface water during each site visit and look for evidence of past surface water elevations (drift lines, erosion, vegetation staining, etc.)
☐ Use GPS to survey groundwater monitoring well locations, if present.

COMMENTS / PROBLEMS:
On May 19th, irrigation water was not flowing into the site; however, the site was about 80% full. On August 24-25, 2009, 10 horses were found grazing within the site. Water was seeping into the inlet ditch and the site was about 50% full. Water had drawn down and as a result, wetland vegetation was developing nicely.

VEGETATION COMMUNITIES

Community Number: **1** Community Title (main spp): **Type 1 - Dry Upland**

Dominant Species	% Cover	Dominant Species	% Cover
Agropyron smithii	5 = > 50%	Grindelia squarrosa	2 = 6-10%
Koeleria macrantha	1 = 1-5%	Gutierrezia sarothrae	2 = 6-10%
Poa juncifolia	4 = 21-50%	Suaeda calceoliformis	1 = 1-5%
Puccinellia nuttalliana	1 = 1-5%	Sarcobatus vermiculatus	1 = 1-5%
Astragalus (bisulcatus)	1 = 1-5%		
Atriplex nuttallii	4 = 21-50%		

Comments / Problems: **Community present in 2006-2008.**

Community Number: **2** Community Title (main spp): **Type 2 - Inundated Upland**

Dominant Species	% Cover	Dominant Species	% Cover
Agropyron smithii	5 = > 50%	Lepidium (ramosissimum)	1 = 1-5%
Poa juncifolia	4 = 21-50%	Polygonum spp.	1 = 1-5%
Puccinellia nuttalliana	1 = 1-5%		
Hordeum jubatum	2 = 6-10%		
Astragalus (bisulcatus)	1 = 1-5%		
Iva axillaris	2 = 6-10%		

Comments / Problems: **Community present in 2006, but absent in 2007- 2009.**

Community Number: **3** Community Title (main spp): **Type 3 - Hordeum Wetland**

Dominant Species	% Cover	Dominant Species	% Cover
Agropyron smithii	2 = 6-10%	Chenopodium glaucum	2 = 6-10%
Puccinellia nuttalliana	3 = 11-20%	Polygonum ramossissimum	1 = 1-5%
Hordeum jubatum	5 = > 50%	Atriplex patula	1 = 1-5%
Astragalus (bisulcatus)	+ = < 1%	Hordeum brachyantherum	
Iva axillaris	3 = 11-20%	Alopecurus arundinaceus	
Suaeda calceoliformis	1 = 1-5%		

Comments / Problems: **Same community as in 2006 (Type 3-Puccinellia Wetland). Community flourished in 2007 - 2009.**

Community Number: **4** Community Title (main spp): **Type 4 - Scirpus Wetland**

Dominant Species	% Cover	Dominant Species	% Cover
Scirpus pungens	3 = 11-20%	Eleocharis acicularis	1 = 1-5%
Scirpus acutus	2 = 6-10%	Najas guadalupensis	+ = < 1%
Typha latifolia (not observed in 2007-2009)		Scirpus validus	2 = 6-10%
Puccinellia nuttalliana	2 = 6-10%	Alopecurus arundinaceus	+ = < 1%
Hordeum jubatum	3 = 11-20%	Eleocharis palustris	3 = 11-20%
Juncus torreyi	2 = 6-10%		

Comments / Problems: **Since 2006 this community has increased in area and species diversity. Three species of Scirpus were found in 2009.**

VEGETATION COMMUNITIES (continued)

Community Number: **5** Community Title (main spp): **Type 5 - Suaeda Wetland**

Dominant Species	% Cover	Dominant Species	% Cover
Suaeda calceoliformis	3 = 11-20%	Atriplex patula	1 = 1-5%
Chenopodium glaucum	4 = 21-50%	Iva axillaris	+ = < 1%
Hordeum jubatum	2 = 6-10%	Salicornia rubra	+ = < 1%
Puccinellia nuttalliana	1 = 1-5%		
Scirpus pungens	+ = < 1%		
Polygonum ramossissimum	+ = < 1%		

Comments / Problems: **Wetland community developed and flourished in 2007 and 2009. In 2008 it was absent and converted to Hordeum wetland.**

Community Number: **6** Community Title (main spp): **Type 6 - Aquatic Wetland**

Dominant Species	% Cover	Dominant Species	% Cover
Eleocharis acicularis	3 = 11-20%		
Potamogeton spp.	1 = 1-5%		
Najas guadalupensis	1 = 1-5%		
Green Algae			

Comments / Problems: **Community is characterized by a consistent presence of Eleocharis acicularis and inundated soils. The green algae exhibited as a bloom in 2008 was absent in 2009; although, green algae was still present in 2009.**

Community Number: ___ Community Title (main spp): _____

Dominant Species	% Cover	Dominant Species	% Cover

Comments / Problems: _____

Community Number: ___ Community Title (main spp): _____

Dominant Species	% Cover	Dominant Species	% Cover

Comments / Problems: _____

Additional Activities Checklist:

☒ Record and map vegetative communities on aerial photograph.

COMPREHENSIVE VEGETATION LIST

Plant Species	Vegetation Community Number (s)	Plant Species	Vegetation Community Number (s)
Agropyron smithii	1-3	Triglochin maritimum	4
Alisma gramineum	3	Typha latifolia	4
Alopecurus arundinaceus	3		
Aster campestris	1		
Aster falcatus	1		
Asteraceae	5		
Astragalus bisulcatus	1-3		
Atriplex nuttallii	1		
Atriplex patula	1-5		
Chenopodium glaucum	1-5		
Cirsium arvense (pulled)	1		
Distichlis spicata	1, 3		
Eleocharis acicularis	3, 4		
Eleocharis palustris	3		
Grindelia squarrosa	1		
Gutierrezia sarothrae	1		
Helianthus (nuttalii)	5		
Hordeum brachyantherum	3		
Hordeum jubatum	1-5		
Iva axillaris	1-5		
Juncus balticus	1		
Juncus torreyi	4		
Koeleria macrantha	1		
Lactuca serriola	1		
Lepidium (ramosissimum)	1-3		
Melilotus offinalis	1		
Najas guadalupensis	5, 6		
Poa juncifolia	1, 2		
Polygonum amphibium [syn. P. coccinea]	4		
Polygonum ramosissimum	3-5		
Potamogeton spp.	6		
Puccinellia nuttalliana	1-5		
Rumex crispus	3		
Salicornia rubra	5		
Sarcobatus vermiculatus	1		
Scirpus acutus	4		
Scirpus pungens	3, 4, 5		
Scirpus validus	4		
Suaeda calceoliformis [syn. S. depressa]	1-5		

Comments / Problems: _____

PLANTED WOODY VEGETATION SURVIVAL

Plant Species	Number Originally Planted	Number Observed	Mortality Causes
Plants were seeded (see below).			

Comments / Problems: **Seeded species were: Eleocharis palustris, Juncus balticus, Juncus torreyi, Puccinellia nuttalliana, Scirpus acutus, Scirpus americanus (syn. S. pungens), Scirpus maritimus, and Triglochin maritima.**

WILDLIFE

Birds

Were man-made nesting structures installed? **No**
If yes, type of structure: _____ How many? _____
Are the nesting structures being used? **NA**
Do the nesting structures need repairs? _____

Mammals and Herptiles and Fish

Mammal and Herptile Species	Number Observed	Indirect Indication of Use			
		Tracks	Scat	Burrows	Other
Richardson's ground squirrel		☐	☐	☒	
fish, juvenile	1	☐	☐	☐	dead in inlet
domestic horse	10	☐	☐	☐	
		☐	☐	☐	
		☐	☐	☐	
		☐	☐	☐	
		☐	☐	☐	
	2	☐	☐	☐	

Additional Activities Checklist:
Yes Macroinvertebrate Sampling (if required)

Comments / Problems: August: Many types of aquatic insects were observed in water and on the vegetation.

PHOTOGRAPHS

Using a camera with a 50mm lens and color film take photographs of the following permanent reference points listed in the check list below. Record the direction of the photograph using a compass. When at the site for the first time, establish a permanent reference point by setting a ½ inch rebar or fencepost extending 2-3 feet above ground. Survey the location with a resource grade GPS and mark the location on the aerial photograph.

Photograph Checklist:

- ☒ One photograph for each of the four cardinal directions surrounding the wetland.
- ☒ At least one photograph showing upland use surrounding the wetland. If more than one upland exists then take additional photographs.
- ☒ At least one photograph showing the buffer surrounding the wetland.
- ☒ One photograph from each end of the vegetation transect, showing the transect.

Location	Photograph Frame #	Photograph Description	Compass Reading (°)
		see photo sheets	

Comments / Problems: _____

GPS SURVEYING

Using a resource grade GPS survey the items on the checklist below. Collect at least 3 location points set at a 5 second recording rate. Record file numbers for site in designated GPS field notebook.

GPS Checklist:

- ☒ Jurisdictional wetland boundary.
- ☒ 4-6 landmarks that are recognizable on the aerial photograph.
- ☒ Start and End points of vegetation transect(s).
- ☒ Photograph reference points.
- ☐ Groundwater monitoring well locations.

Comments / Problems: _____

WETLAND DELINEATION

(attach COE delineation forms)

At each site conduct these checklist items:

- ☒ Delineate wetlands according to the 1987 Army COE manual.
- ☒ Delineate wetland – upland boundary onto aerial photograph.

Yes Survey wetland – upland boundary with a resource grade GPS survey.

Comments / Problems: _____

FUNCTIONAL ASSESSMENT

(Complete and attach full MDT Montana Wetland Assessment Method field forms.)
(Also attach any completed abbreviated field forms, if used)

Comments / Problems: _____

MAINTENANCE

Were man-made nesting structure installed at this site? **No**
If yes, do they need to be repaired? **NA**
If yes, describe the problems below and indicate if any actions were taken to remedy the problems.

Were man-made structures built or installed to impound water or control water flow into or out of the wetland? **Yes**
If yes, are the structures working properly and in good working order? **Yes**
If no, describe the problems below.

Comments / Problems: **Pipeline diversion from 19-K Canal was examined as well as culvert at inlet. No problems were encountered.**

MDT WETLAND MONITORING – VEGETATION TRANSECT

Site: **Alkali Lake** Date: **August 24, 2009** Examiner: **A. Pipp**
Transect Number: **T-1** Approximate Transect Length: **412 feet** Compass Direction from Start: **311˚** Note: **Compass at 0 declination.**

Vegetation Type A: **Type 3 - Hordeum Wetland (dry surface soils)**	
Length of transect in this type: 0 - 66 feet	
Plant Species	**Cover**
Hordeum jubatum	4 = 21-50%
Iva axillaris	+ = < 1%
Agropyron smithii	+ = < 1%
Puccinellia nuttalliana	2 = 6-10%
Bare Ground (40%)	
Total Vegetative Cover:	60%

Vegetation Type B: **Type 4 - Scirpus Wetland**	
Length of transect in this type: 66 - 108 feet	
Plant Species	**Cover**
Scirpus pungens	+ = < 1%
Puccinellia nuttalliana	1 = 1-5%
Eleocharis palustris	3 = 11-20%
Alisma gramineum	+ = < 1%
Polygonum ramisossimum	1 = 1-5%
Chenopodium glaucum	+ = < 1%
Hordeum jubatum	4 = 21-50%
Bare Ground (40%)	
Total Vegetative Cover:	60%

Vegetation Type C: **Type 3 - Hordeum Wetland**	
Length of transect in this type: 108-173 feet	
Plant Species	**Cover**
Puccinellia nuttalliana	2 = 6-10%
Hordeum jubatum	4 = 21-50%
Eleocharis acicularis	3 = 11-20%
Polygonum ramisossimum	1 = 1-5%
Chenopodium glaucum	1 = 1-5%
Bare Ground (40%)	
Total Vegetative Cover:	60%

Vegetation Type D: **Type 4 - Scirpus Wetland**	
Length of transect in this type: 173-203 feet	
Plant Species	**Cover**
Hordeum jubatum	4 = 21-50%
Eleocharis acicularis	2 = 6-10%
Scirpus pungens	1 = 1-5%
Eleocharis palustris	3 = 11-20%
Triglochin maritimum	+ = < 1%
Puccinellia nuttalliana	+ = < 1%
Rumex crispus	+ = < 1%
green algae	1 = 1-5%
Bare Ground / Surface Water (30%)	
Total Vegetative Cover:	70%

MDT WETLAND MONITORING – VEGETATION TRANSECT

Site: **Alkali Lake** Date: **August 14, 2009** Examiner: **A. Pipp**
Transect Number: **T-1** Approximate Transect Length: **412 feet** Compass Direction from Start: **311˚** Note: **Compass at 0 declination.**

Vegetation Type A: **Type 3 - Hordeum Wetland**	
Length of transect in this type: 203-297 feet	
Plant Species	**Cover**
Hordeum jubatum	4 = 21-50%
Eleocharis acicularis	1 = 1-5%
Chenopodium glaucum	1 = 1-5%
Total Vegetative Cover:	40%

Vegetation Type B: **Type 6 - Aquatic Wetland**	
Length of transect in this type: 297-350 feet	
Plant Species	**Cover**
Eleocharis acicularis	3 = 11-20%
Hordeum jubatum	1 = 1-5%
Total Vegetative Cover:	15%

Vegetation Type C: **Transitional Open Water**	
Length of transect in this type: 350-412 feet	
Plant Species	**Cover**
No vegetation.	
Total Vegetative Cover:	0%

Vegetation Type D:	
Length of transect in this type: feet	
Plant Species	**Cover**
Total Vegetative Cover:	%

MDT WETLAND MONITORING – VEGETATION TRANSECT

Site: **Alkali Lake** Date: **August 24, 2009** Examiner: **A. Pipp**
Transect Number: **T-2** Approximate Transect Length: **297 feet** Compass Direction from Start: **136˚** Note: **Compass at 0 declination.**

Vegetation Type E: **Type 1 - Upland**	
Length of transect in this type: 0 - 5 feet	
Plant Species	**Cover**
Agropyron smithii	3 = 11-20%
Astragalus (bisulcatus) (absent in 2009)	
Iva axillaris	2 = 6-10%
Atriplex patula (absent in 2009)	
Hordeum jubatum	3 = 11-20%
Puccinellia nuttalliana (absent in 2009)	
Bare Ground (25%)	
Total Vegetative Cover:	75%

Vegetation Type F: **Type 3 - Hordeum Wetland**	
Length of transect in this type: 5 - 177 feet	
Plant Species	**Cover**
Agropyron smithii	1 = 1-5%
Hordeum jubatum	4 = 21-50%
Iva axillaris	3 = 11-20%
Polygonum ramosissimum	1 = 1-5%
Atriplex patula	+ = < 1%
Puccinellia nuttalliana	1 = 1-5%
Bare ground (25%)	
Total Vegetative Cover:	75%

Vegetation Type G: **Type 5 - Suaeda Wetland**	
Length of transect in this type: 177-269 feet	
Plant Species	**Cover**
Suaeda calceoliformis	1 = 1-5%
Chenopodium glaucum	4 = 21-50%
Puccinellia nuttaliana	1 = 1-5%
Hordeum jubatum	1 = 1-5%
Bare ground / water (40%)	
Total Vegetative Cover:	60%

Vegetation Type H: **Transitional Open Water**	
Length of transect in this type: 269-297 feet	
Plant Species	**Cover**
No vegetation.	
Total Vegetative Cover:	0%

MDT WETLAND MONITORING – VEGETATION TRANSECT

Site: **Alkali Lake** Date: **August 24, 2009** Examiner: **A. Pipp**
Transect Number: **T-3** Approximate Transect Length: **173 feet** Compass Direction from Start: **46˚** Note: **Compass at 0 declination**

Vegetation Type I: **Type 3 - Hordeum Wetland**	
Length of transect in this type: 0 - 168 feet	
Plant Species	**Cover**
Agropyron smithii	1 = 1-5%
Hordeum jubatum	4 = 21-50%
Iva axillaris	+ = < 1%
Hordeum brachyantherum (absent in 2009)	
Polygonum ramosissimum	3 = 11-20%
Puccinellia nuttalliana	1 = 1-5%
Suaeda calceoliformis	+ = < 1%
Scirpus pungens (absent in 2009)	
Atriplex patula	2 = 6-10%
Bare Ground (25%)	
Total Vegetative Cover:	75%

Vegetation Type J: **Type 5 - Suaeda Wetland**	
Length of transect in this type: 168-173 feet	
Plant Species	**Cover**
Atriplex patula	4 = 21-50%
Hordeum jubatum	2 = 6-10%
Suaeda calceoliformis	4 = 21-50%
Chenopodium glaucum	4 = 21-50%
Bare Ground, saturated (25%)	
Total Vegetative Cover:	75%

Vegetation Type K:	
Length of transect in this type: feet	
Plant Species	**Cover**
Total Vegetative Cover:	%

Vegetation Type L:	
Length of transect in this type: feet	
Plant Species	**Cover**
Total Vegetative Cover:	%

MDT WETLAND MONITORING – VEGETATION TRANSECT

Cover Estimate		Indicator Class	Source
+ = < 1%	3 = 11-10%	+ = Obligate	P = Planted
1 = 1-5%	4 = 21-50%	- = Facultative/Wet	V = Volunteer
2 = 6-10%	5 = > 50%	0 = Facultative	

Percent of perimeter developing wetland vegetation (excluding dam/berm structures): **100%**

Establish transects perpendicular to the shoreline (or saturated perimeter). The transect should begin in the upland area. Permanently mark this location with a standard metal fencepost. Extend the imaginary transect line towards the center of the wetland, ending at the 3 foot depth (in open water), or at the point where water depths or saturation are maximized. Mark this location with another metal fencepost.

Estimate cover within a 10 foot wide "belt" along the transect length. At a minimum, establish a transect at the windward and leeward sides of the wetland. Remember that the purpose of this sampling is to monitor, not inventory, representative portions of the wetland site.

Comments: **The levels and timing of water are dictating the type of wetland that develops. The extensive area of Suaeda wetland that were seen in 2007, but absent in 2008, emerged again in 2009. The Suaeda community developed where surface water was receding. The Scirpus community near the inlet continued to flourish in 2009. The Hordeum wetland was extensive and healthy. Scirpus wetland patches decreased in frequency in 2009. This was not surprising, as all but two Scirpus communities were over-browsed.**

BIRD SURVEY – FIELD DATA SHEET

Site: **Alkali Lake** Date: **5/19/09**
Survey Time: **9:00 am** to **1:00 pm**

Bird Species	#	Behavior	Habitat	Bird Species	#	Behavior	Habitat
Vesper Sparrow	6	F	UP				
Common Raven	2	F	UP				
Long-billed Curlew	1	F	UP				
American Avocet	50	F	MF MA				
Northern Shoveler	25	F	OW MA				
Mallard	6	F	OW MA				
Marbled Godwit	15	F	MF MA				
Northern Pintail	4	F	OW				
Savannah Sparrow	2	F	UP				
American Coot	10	F	OW MA				
Willet	10	F	MF MA				
Western Meadowlark	2	F	UP				
Am. White Pelican	40	FO	OW				
Ring-necked Pheasant	1	F	UP				
Horned Lark	6	F	UP				
Gadwall	10	F	OW MA				
Canada Goose	2	F	OW				
Blue-winged Teal	6	F	OW MA				
Piping Plover	8	F	US MF				
Gull	4	FO	OW				
Killdeer	3	F	MF US				
Wilson's Phalarope	12	F BD	US MF				
Northern Harrier	1	F	MA				
Semipalmated Plover	1	F	MF US				

BEHAVIOR CODES
BP = One of a breeding pair
BD = Breeding display
F = Foraging
FO = Flyover
L = Loafing
N = Nesting

HABITAT CODES
AB = Aquatic bed
FO = Forested
I = Island
MA = Marsh
MF = Mud Flat
OW = Open Water
SS = Scrub/Shrub
UP = Upland buffer
WM = Wet meadow
US = Unconsolidated shore

Weather: **Skies partly cloudy to full sun; calm wind.**

Notes: **Official Spring Bird Survey conducted by Larry Urban (MDT) and Jeff Berglund (PBS&J). Lakebed was inundated from precipitation (snow and rain), approximately 80% of full pool. Irrigation water had not been turned on. Canal had no water except for a few remnant pools from precipitation (rain and snow).**
Also saw about 10 (dead) deer mice that had been washed out of culvert; coyote tracks/scat; 1 western chorus frog; 1 plains garter snake; deer tracks; and raccoon tracks; and a dead fish.

BIRD SURVEY – FIELD DATA SHEET

Site: **Alkali Lake** Date: **8/24-25/09**
Survey Time: **8:00 am** to **7:00 pm**

Bird Species	#	Behavior	Habitat	Bird Species	#	Behavior	Habitat
Sandhill Crane	4	F	MA UP				
Horned Lark	20	F L	MA UP				
American Avocet	5	F	OW				
Northern Shoveller	5	F L	OW				
Blue-winged Teal	2	F L	OW				
Franklin's Gull	40	F L	OW				
Northern Harrier	1	F	OW MA				
Marbled Godwit	15	F FO	OW				

BEHAVIOR CODES
BP = One of a breeding pair
BD = Breeding display
F = Foraging
FO = Flyover
L = Loafing
N = Nesting

HABITAT CODES
AB = Aquatic bed
FO = Forested
I = Island
MA = Marsh
MF = Mud Flat
OW = Open Water
SS = Scrub/Shrub
UP = Upland buffer
WM = Wet meadow
US = Unconsolidated shore

Weather: **Sunny; high 70's; wind about 10 mph.**

Notes: **General bird species were noted while focusing on other wetland monitoring activities. In general, a large variety of shorebird species were using the site. Birds were often grouped and in fairly large numbers. Birds were using the open water, marsh, and unconsolidated shoreline for foraging and loafing. Canada geese were present, but duck, swan, and other geese species were not seen.**

BIRD SURVEY – FIELD DATA SHEET

Site: **Alkali Lake** Date: **10/30/09**
Survey Time: **10:45 am** to **12:20 pm**

Bird Species	#	Behavior	Habitat	Bird Species	#	Behavior	Habitat
Canada Goose	2	FO	MA UP OW				
Horned Lark	15	F L	UP				
Killdeer	1	F L	MA MF				
Northern Shoveller	11	F	OW				
Blue-winged Teal	3	F	OW				
sparrow (unid. spp.)	15	F L	UP				
Mallards (?)	4	F	OW				
Am. White Pelican	5	FO	OW MA UP				

BEHAVIOR CODES
BP = One of a breeding pair
BD = Breeding display
F = Foraging
FO = Flyover
L = Loafing
N = Nesting

HABITAT CODES
AB = Aquatic bed
FO = Forested
I = Island
MA = Marsh
MF = Mud Flat
OW = Open Water
SS = Scrub/Shrub
UP = Upland buffer
WM = Wet meadow
US = Unconsolidated shore

Weather: **Cloudy with some sun; 50's; winds about 30 mph.**

Notes: **Official Fall Bird Survey conducted by Andrea Pipp (PBS&J). Two gates had been left opened and cows had been in project area; no livestock present during this survey. Surface water has been receding - about 40% full.**
Saw four white-tailed deer , 1 grouse, and 1 pheasant outside of the project site. Juvenile fish were in culvert of inlet. Pulled one Cirsium arvense rosette from the rocks of the inlet.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Alkali Lake Wetland Mitigation - 2009	**Project No:** 0B4308802	**Date:** 24-Aug-2009
Applicant/Owner: -Montana Department of Transportation-		**County:** Pondera
Investigators: andrea pipp		**State:** Montana
		Plot ID: Soil Pit 1

Do Normal Circumstances exist on the site? (Yes) No	**Community ID:** Emergent
Is the site significantly disturbed (Atypical Situation:)? Yes (No)	**Transect ID:**
Is the area a potential Problem Area? Yes (No)	**Field Location:**
(If needed, explain on the reverse side)	Inlet

VEGETATION **(USFWS Region No. 9)**

Dominant Plant Species(Latin/Common)	Stratum	Indicator	Plant Species(Latin/Common)	Stratum	Indicator
Iva axillaris	Herb	FAC	*Juncus torreyi*	Herb	FACW
Sumpweed,Small-Flower			Rush,Torrey's		
Eleocharis palustris	Herb	OBL	*Alopecurus arundinaceus*	Herb	NI
Spikerush,Creeping			Foxtail,Creeping		

Percent of Dominant Species that are OBL, FACW or FAC: (excluding FAC-) 3/3 = 100.00%	**FAC Neutral:** 2/2 = 100.00% **Numeric Index:** 6/3 = 2.00

Remarks:

HYDROLOGY

NO **Recorded Data(Describe in Remarks):**
- N/A **Stream, Lake or Tide Gauge**
- N/A **Aerial Photographs**
- N/A **Other**

YES **No Recorded Data**

Field Observations

Depth of Surface Water:	N/A *(in.)*
Depth to Free Water in Pit:	N/A *(in.)*
Depth to Saturated Soil:	= 0.0 *(in.)*

Wetland Hydrology Indicators

Primary Indicators
- NO **Inundated**
- YES **Saturated in Upper 12 Inches**
- NO **Water Marks**
- NO **Drift Lines**
- NO **Sediment Deposits**
- YES **Drainage Patterns in Wetlands**

Secondary Indicators
- NO **Oxidized Root Channels in Upper 12 Inches**
- NO **Water-Stained Leaves**
- NO **Local Soil Survey Data**
- YES **FAC-Neutral Test**
- NO **Other(Explain in Remarks)**

Remarks:
Water was trickling through inlet.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Alkali Lake Wetland Mitigation - 2009	**Project No:** 0B4308802	**Date:** 24-Aug-2009
Applicant/Owner: -Montana Department of Transportation-		**County:** Pondera
Investigators: andrea pipp		**State:** Montana
		Plot ID: Soil Pit 1

SOILS

Map Unit Name (Series and Phase): Alkali Lake-not mapped as a soil unit
Map Symbol: unk. **Drainage Class:** unknown **Mapped Hydric Inclusion?**
Taxonomy (Subgroup): unknown **Field Observations Confirm Mapped Type?** Yes (No)
Profile Description

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle Abundance/Contrast		Texture, Concretions, Structure, etc
0-12	A/B	2.5Y4/1	2.5Y4/4	N/A	N/A	Clay

Hydric Soil Indicators:
- NO **Histosol**
- NO **Histic Epipedon**
- NO **Sulfidic Odor**
- NO **Aquic Moisture Regime**
- NO **Reducing Conditions**
- YES **Gleyed or Low Chroma Colors**
- NO **Concretions**
- NO **High Organic Content in Surface Layer in Sandy Soils**
- NO **Organic Streaking in Sandy Soils**
- NO **Listed on Local Hydric Soils List**
- NO **Listed on National Hydric Soils List**
- NO **Other (Explain in Remarks)**

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Yes) No		Is the Sampling Point within the Wetland? (Yes) No
Wetland Hydrology Present? (Yes) No		
Hydric Soils Present? (Yes) No		

Remarks:

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Alkali Lake Wetland Mitigation - 2009	**Project No:** 0B4308802	**Date:** 24-Aug-2009
Applicant/Owner: -Montana Department of Transportation-		**County:** Pondera
Investigators: andrea pipp		**State:** Montana
		Plot ID: Soil Pit 2

Do Normal Circumstances exist on the site?	(Yes) No	**Community ID:** Emergent
Is the site significantly disturbed (Atypical Situation:)?	Yes (No)	**Transect ID:**
Is the area a potential Problem Area?	Yes (No)	**Field Location:**
(If needed, explain on the reverse side)		Type 4 near Inlet.

VEGETATION (USFWS Region No. 9)

Dominant Plant Species(Latin/Common)	Stratum	Indicator	Plant Species(Latin/Common)	Stratum	Indicator
Puccinellia nuttalliana	Herb	OBL	*Juncus torreyi*	Herb	FACW
Grass,Nuttall's Alkali			Rush,Torrey's		
Eleocharis palustris	Herb	OBL	*Hordeum jubatum*	Herb	FAC+
Spikerush,Creeping			Barley,Fox-Tail		
Alopecurus arundinaceus	Herb	NI	*Scirpus pungens*	Herb	OBL
Foxtail,Creeping			Bulrush,Three-Square		

Percent of Dominant Species that are OBL, FACW or FAC:	**FAC Neutral:** 4/4 = 100.00%
(excluding FAC-) 5/5 = 100.00%	**Numeric Index:** 8/5 = 1.60

Remarks:

HYDROLOGY

NO **Recorded Data(Describe in Remarks):**
- N/A **Stream, Lake or Tide Gauge**
- N/A **Aerial Photographs**
- N/A **Other**

YES **No Recorded Data**

Field Observations

Depth of Surface Water:	= 1.0 *(in.)*
Depth to Free Water in Pit:	N/A *(in.)*
Depth to Saturated Soil:	N/A *(in.)*

Wetland Hydrology Indicators

Primary Indicators
- YES **Inundated**
- YES **Saturated in Upper 12 Inches**
- NO **Water Marks**
- NO **Drift Lines**
- NO **Sediment Deposits**
- NO **Drainage Patterns in Wetlands**

Secondary Indicators
- NO **Oxidized Root Channels in Upper 12 Inches**
- NO **Water-Stained Leaves**
- NO **Local Soil Survey Data**
- YES **FAC-Neutral Test**
- NO **Other(Explain in Remarks)**

Remarks:

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Alkali Lake Wetland Mitigation - 2009	**Project No:** 0B4308802	**Date:** 24-Aug-2009
Applicant/Owner: -Montana Department of Transportation-		**County:** Pondera
Investigators: andrea pipp		**State:** Montana
		Plot ID: Soil Pit 2

SOILS

Map Unit Name (Series and Phase): Alkali Lake-not mapped as a soil unit
Map Symbol: unk. **Drainage Class:** unknown **Mapped Hydric Inclusion?**
Taxonomy (Subgroup): unknown **Field Observations Confirm Mapped Type?** Yes (No)
Profile Description

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc
0-5	A	2.5Y5/1	10YR4/6	Common Prominent	Clay
5-12	B	2.5Y5/1	N/A	N/A N/A	Clay

Hydric Soil Indicators:

NO **Histosol**	NO **Concretions**
NO **Histic Epipedon**	NO **High Organic Content in Surface Layer in Sandy Soils**
NO **Sulfidic Odor**	NO **Organic Streaking in Sandy Soils**
NO **Aquic Moisture Regime**	NO **Listed on Local Hydric Soils List**
NO **Reducing Conditions**	NO **Listed on National Hydric Soils List**
YES **Gleyed or Low Chroma Colors**	NO **Other (Explain in Remarks)**

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	(Yes) No	Is the Sampling Point within the Wetland? (Yes) No
Wetland Hydrology Present?	(Yes) No	
Hydric Soils Present?	(Yes) No	

Remarks:

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Alkali Lake Wetland Mitigation - 2009	**Project No:** 0B4308802	**Date:** 24-Aug-2009
Applicant/Owner: -Montana Department of Transportation-		**County:** Pondera
Investigators: andrea pipp		**State:** Montana
		Plot ID: Soil Pit 3

Do Normal Circumstances exist on the site?	(Yes) No	**Community ID:** Emergent
Is the site significantly disturbed (Atypical Situation:)?	Yes (No)	**Transect ID:**
Is the area a potential Problem Area?	Yes (No)	**Field Location:**
(If needed, explain on the reverse side)		In Type 3 of Transect 1.

VEGETATION **(USFWS Region No. 9)**

Dominant Plant Species(Latin/Common)	Stratum	Indicator	Plant Species(Latin/Common)	Stratum	Indicator
Hordeum jubatum	Herb	FAC+	*Eleocharis palustris*	Herb	OBL
Barley,Fox-Tail			Spikerush,Creeping		
Polygonum ramosissimum	Herb	FAC-			
Knotweed,Bushy					

Percent of Dominant Species that are OBL, FACW or FAC: (excluding FAC-) 2/3 = 66.67%

FAC Neutral: 1/1 = 100.00%
Numeric Index: 7/3 = 2.33

Remarks:

HYDROLOGY

NO **Recorded Data(Describe in Remarks):**
- N/A **Stream, Lake or Tide Gauge**
- N/A **Aerial Photographs**
- N/A **Other**

YES **No Recorded Data**

Field Observations

Depth of Surface Water:	N/A *(in.)*
Depth to Free Water in Pit:	= 5.0 *(in.)*
Depth to Saturated Soil:	= 0.0 *(in.)*

Wetland Hydrology Indicators

Primary Indicators
- NO **Inundated**
- YES **Saturated in Upper 12 Inches**
- NO **Water Marks**
- NO **Drift Lines**
- NO **Sediment Deposits**
- YES **Drainage Patterns in Wetlands**

Secondary Indicators
- NO **Oxidized Root Channels in Upper 12 Inches**
- NO **Water-Stained Leaves**
- NO **Local Soil Survey Data**
- YES **FAC-Neutral Test**
- NO **Other(Explain in Remarks)**

Remarks:

WetForm™

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Alkali Lake Wetland Mitigation - 2009	**Project No:** 0B4308802	**Date:** 24-Aug-2009
Applicant/Owner: -Montana Department of Transportation-		**County:** Pondera
Investigators: andrea pipp		**State:** Montana
		Plot ID: Soil Pit 3

SOILS

Map Unit Name (Series and Phase): Alkali Lake-not mapped as a soil unit
Map Symbol: unk. **Drainage Class:** unknown **Mapped Hydric Inclusion?**
Taxonomy (Subgroup): unknown **Field Observations Confirm Mapped Type?** Yes (No)
Profile Description

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle Abundance/Contrast		Texture, Concretions, Structure, etc
0-5	A	2.5YR5/1	N/A	N/A	N/A	Clay
5-12	B	2.5YR5/1	2.5Y5/4	Many	Distinct	Clay

Hydric Soil Indicators:

NO **Histosol**	NO **Concretions**
NO **Histic Epipedon**	NO **High Organic Content in Surface Layer in Sandy Soils**
NO **Sulfidic Odor**	NO **Organic Streaking in Sandy Soils**
NO **Aquic Moisture Regime**	NO **Listed on Local Hydric Soils List**
NO **Reducing Conditions**	NO **Listed on National Hydric Soils List**
YES **Gleyed or Low Chroma Colors**	NO **Other (Explain in Remarks)**

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	(Yes) No	Is the Sampling Point within the Wetland? (Yes) No
Wetland Hydrology Present?	(Yes) No	
Hydric Soils Present?	(Yes) No	

Remarks:

WetForm™

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Alkali Lake Wetland Mitigation - 2009	**Project No:** 0B4308802	**Date:** 24-Aug-2009
Applicant/Owner: -Montana Department of Transportation-		**County:** Pondera
Investigators: andrea pipp		**State:** Montana
		Plot ID: Soil Pit 4

Do Normal Circumstances exist on the site? (Yes) No	**Community ID:** Emergent
Is the site significantly disturbed (Atypical Situation:)? Yes (No)	**Transect ID:**
Is the area a potential Problem Area? Yes (No)	**Field Location:**
(If needed, explain on the reverse side)	In Type 3 of Transect 2.

VEGETATION **(USFWS Region No. 9)**

Dominant Plant Species(Latin/Common)	Stratum	Indicator	Plant Species(Latin/Common)	Stratum	Indicator
Hordeum jubatum	Herb	FAC+	*Puccinellia nuttalliana*	Herb	OBL
Barley,Fox-Tail			Grass,Nuttall's Alkali		
Iva axillaris	Herb	FAC			
Sumpweed,Small-Flower					

Percent of Dominant Species that are OBL, FACW or FAC:	**FAC Neutral:** 1/1 = 100.00%
(excluding FAC-) 3/3 = 100.00%	**Numeric Index:** 7/3 = 2.33

Remarks:
Present, but not dominant is Agropyron smithii.

HYDROLOGY

NO **Recorded Data(Describe in Remarks):**
- N/A **Stream, Lake or Tide Gauge**
- N/A **Aerial Photographs**
- N/A **Other**

YES **No Recorded Data**

Field Observations

Depth of Surface Water:	N/A *(in.)*
Depth to Free Water in Pit:	N/A *(in.)*
Depth to Saturated Soil:	= 8.0 *(in.)*

Wetland Hydrology Indicators

Primary Indicators
- NO **Inundated**
- YES **Saturated in Upper 12 Inches**
- NO **Water Marks**
- NO **Drift Lines**
- NO **Sediment Deposits**
- YES **Drainage Patterns in Wetlands**

Secondary Indicators
- YES **Oxidized Root Channels in Upper 12 Inches**
- NO **Water-Stained Leaves**
- NO **Local Soil Survey Data**
- YES **FAC-Neutral Test**
- NO **Other(Explain in Remarks)**

Remarks:

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Alkali Lake Wetland Mitigation - 2009	**Project No:** 0B4308802	**Date:** 24-Aug-2009
Applicant/Owner: -Montana Department of Transportation-		**County:** Pondera
Investigators: andrea pipp		**State:** Montana
		Plot ID: Soil Pit 4

SOILS

Map Unit Name (Series and Phase): Alkali Lake-not mapped as a soil unit
Map Symbol: unk. **Drainage Class:** unknown **Mapped Hydric Inclusion?**
Taxonomy (Subgroup): unknown **Field Observations Confirm Mapped Type?** Yes (No)
Profile Description

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle Abundance/Contrast		Texture, Concretions, Structure, etc
0-8	A	2.5Y5/1	N/A	N/A	N/A	Clay
8-12	B	2.5Y5/1	2.5Y5/6	Common	Distinct	Clay

Hydric Soil Indicators:

NO **Histosol**	NO **Concretions**
NO **Histic Epipedon**	NO **High Organic Content in Surface Layer in Sandy Soils**
NO **Sulfidic Odor**	NO **Organic Streaking in Sandy Soils**
NO **Aquic Moisture Regime**	NO **Listed on Local Hydric Soils List**
NO **Reducing Conditions**	NO **Listed on National Hydric Soils List**
YES **Gleyed or Low Chroma Colors**	NO **Other (Explain in Remarks)**

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	(Yes) No	Is the Sampling Point within the Wetland? (Yes) No
Wetland Hydrology Present?	(Yes) No	
Hydric Soils Present?	(Yes) No	

Remarks:

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Alkali Lake Wetland Mitigation - 2009	**Project No:** 0B4308802	**Date:** 24-Aug-2009
Applicant/Owner: -Montana Department of Transportation-		**County:** Pondera
Investigators: andrea pipp		**State:** Montana
		Plot ID: Soil Pit 5

Do Normal Circumstances exist on the site?	(Yes) No	**Community ID:** Emergent
Is the site significantly disturbed (Atypical Situation:)?	Yes (No)	**Transect ID:**
Is the area a potential Problem Area?	Yes (No)	**Field Location:**
(If needed, explain on the reverse side)		Type 5 on Transect 2.

VEGETATION (USFWS Region No. 9)

Dominant Plant Species(Latin/Common)	Stratum	Indicator	Plant Species(Latin/Common)	Stratum	Indicator
Chenopodium glaucum	Herb	FAC	*Suaeda depressa*	Herb	FACW-
Goosefoot,Oakleaf			Seepweed,Pursh		
Hordeum jubatum	Herb	FAC+	*Puccinellia nuttalliana*	Herb	OBL
Barley,Fox-Tail			Grass,Nuttall's Alkali		

Percent of Dominant Species that are OBL, FACW or FAC: (excluding FAC-) 4/4 = 100.00%
FAC Neutral: 2/2 = 100.00%
Numeric Index: 9/4 = 2.25

Remarks:
S. depressa = S. calceoliformis.

HYDROLOGY

NO **Recorded Data(Describe in Remarks):**
- N/A **Stream, Lake or Tide Gauge**
- N/A **Aerial Photographs**
- N/A **Other**

YES **No Recorded Data**

Field Observations

Depth of Surface Water:	N/A *(in.)*
Depth to Free Water in Pit:	N/A *(in.)*
Depth to Saturated Soil:	= 0.0 *(in.)*

Wetland Hydrology Indicators

Primary Indicators
- NO **Inundated**
- YES **Saturated in Upper 12 Inches**
- NO **Water Marks**
- NO **Drift Lines**
- NO **Sediment Deposits**
- YES **Drainage Patterns in Wetlands**

Secondary Indicators
- NO **Oxidized Root Channels in Upper 12 Inches**
- NO **Water-Stained Leaves**
- NO **Local Soil Survey Data**
- YES **FAC-Neutral Test**
- NO **Other(Explain in Remarks)**

Remarks:

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Alkali Lake Wetland Mitigation - 2009	**Project No:** 0B4308802	**Date:** 24-Aug-2009
Applicant/Owner: -Montana Department of Transportation-		**County:** Pondera
Investigators: andrea pipp		**State:** Montana
		Plot ID: Soil Pit 5

SOILS

Map Unit Name (Series and Phase): Alkali Lake-not mapped as a soil unit
Map Symbol: unk. **Drainage Class:** unknown **Mapped Hydric Inclusion?**
Taxonomy (Subgroup): unknown **Field Observations Confirm Mapped Type?** Yes (No)
Profile Description

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc
0-14	A	2.5Y5/1	2.5Y5/6	Common Distinct	Clay

Hydric Soil Indicators:

NO **Histosol**	NO **Concretions**
NO **Histic Epipedon**	NO **High Organic Content in Surface Layer in Sandy Soils**
NO **Sulfidic Odor**	NO **Organic Streaking in Sandy Soils**
NO **Aquic Moisture Regime**	NO **Listed on Local Hydric Soils List**
NO **Reducing Conditions**	NO **Listed on National Hydric Soils List**
YES **Gleyed or Low Chroma Colors**	NO **Other (Explain in Remarks)**

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	(Yes) No	Is the Sampling Point within the Wetland? (Yes) No
Wetland Hydrology Present?	(Yes) No	
Hydric Soils Present?	(Yes) No	

Remarks:

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Alkali Lake Wetland Mitigation - 2009 **Project No:** 0B4308802
Applicant/Owner: -Montana Department of Transportation-
Investigators: andrea pipp
Date: 24-Aug-2009
County: Pondera
State: Montana
Plot ID: Soil Pit 6

Do Normal Circumstances exist on the site? (Yes) No
Is the site significantly disturbed (Atypical Situation:)? Yes (No)
Is the area a potential Problem Area? Yes (No)
(If needed, explain on the reverse side)

Community ID: Emergent
Transect ID:
Field Location: Upland on Transect 2.

VEGETATION (USFWS Region No. 9)

Dominant Plant Species(Latin/Common)	Stratum	Indicator	Plant Species(Latin/Common)	Stratum	Indicator
Agropyron smithii / Wheatgrass,Western	Herb	FACU	*Iva axillaris* / Sumpweed,Small-Flower	Herb	FAC

Percent of Dominant Species that are OBL, FACW or FAC: (excluding FAC-) 1/2 = 50.00%
FAC Neutral: 0/1 = 0.00%
Numeric Index: 7/2 = 3.50

Remarks:

HYDROLOGY

NO **Recorded Data(Describe in Remarks):**
- N/A **Stream, Lake or Tide Gauge**
- N/A **Aerial Photographs**
- N/A **Other**

YES **No Recorded Data**

Field Observations

Depth of Surface Water: N/A *(in.)*
Depth to Free Water in Pit: N/A *(in.)*
Depth to Saturated Soil: > 13 *(in.)*

Wetland Hydrology Indicators
Primary Indicators
- NO **Inundated**
- NO **Saturated in Upper 12 Inches**
- NO **Water Marks**
- NO **Drift Lines**
- NO **Sediment Deposits**
- NO **Drainage Patterns in Wetlands**

Secondary Indicators
- YES **Oxidized Root Channels in Upper 12 Inches**
- NO **Water-Stained Leaves**
- NO **Local Soil Survey Data**
- NO **FAC-Neutral Test**
- NO **Other(Explain in Remarks)**

Remarks:
Soil was dry from 0-6 inches and very moist from 6 - 12 inches; Soils were probably saturated earlier in the growing season for a long enough period.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Alkali Lake Wetland Mitigation - 2009 **Project No:** 0B4308802
Applicant/Owner: -Montana Department of Transportation-
Investigators: andrea pipp
Date: 24-Aug-2009
County: Pondera
State: Montana
Plot ID: Soil Pit 6

SOILS

Map Unit Name (Series and Phase): Alkali Lake-not mapped as a soil unit
Map Symbol: unk. **Drainage Class:** unknown
Taxonomy (Subgroup): unknown
Mapped Hydric Inclusion?
Field Observations Confirm Mapped Type? Yes (No)

Profile Description

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle Abundance	Mottle Contrast	Texture, Concretions, Structure, etc
0-6	A	2.5Y5/1	N/A	N/A	N/A	Clay
6-12	B	2.5Y5/1	N/A	N/A	N/A	Clay

Hydric Soil Indicators:
- NO **Histosol**
- NO **Histic Epipedon**
- NO **Sulfidic Odor**
- NO **Aquic Moisture Regime**
- NO **Reducing Conditions**
- YES **Gleyed or Low Chroma Colors**
- NO **Concretions**
- NO **High Organic Content in Surface Layer in Sandy Soils**
- NO **Organic Streaking in Sandy Soils**
- NO **Listed on Local Hydric Soils List**
- NO **Listed on National Hydric Soils List**
- NO **Other (Explain in Remarks)**

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes (No)
Wetland Hydrology Present? Yes (No)
Hydric Soils Present? (Yes) No

Is the Sampling Point within the Wetland? Yes (No)

Remarks:

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Alkali Lake Wetland Mitigation - 2009	**Project No:** 0B4308802	**Date:** 24-Aug-2009
Applicant/Owner: -Montana Department of Transportation-		**County:** Pondera
Investigators: andrea pipp		**State:** Montana
		Plot ID: Soil Pit 7

Do Normal Circumstances exist on the site?	(Yes) No	**Community ID:** Emergent
Is the site significantly disturbed (Atypical Situation:)?	Yes (No)	**Transect ID:**
Is the area a potential Problem Area?	Yes (No)	**Field Location:**
(If needed, explain on the reverse side)		In Type 5 on Transect 3.

VEGETATION **(USFWS Region No. 9)**

Dominant Plant Species(Latin/Common)	Stratum	Indicator	Plant Species(Latin/Common)	Stratum	Indicator
Chenopodium glaucum	Herb	FAC	*Hordeum jubatum*	Herb	FAC+
Goosefoot,Oakleaf			Barley,Fox-Tail		
Suaeda depressa	Herb	FACW-			
Seepweed,Pursh					

Percent of Dominant Species that are OBL, FACW or FAC: (excluding FAC-) 3/3 = 100.00%	**FAC Neutral:** 1/1 = 100.00% **Numeric Index:** 8/3 = 2.67

Remarks:

HYDROLOGY

NO **Recorded Data(Describe in Remarks):**
- N/A **Stream, Lake or Tide Gauge**
- N/A **Aerial Photographs**
- N/A **Other**

YES **No Recorded Data**

Field Observations

Depth of Surface Water:	= 4.0 *(in.)*
Depth to Free Water in Pit:	N/A *(in.)*
Depth to Saturated Soil:	N/A *(in.)*

Wetland Hydrology Indicators

Primary Indicators
- YES **Inundated**
- YES **Saturated in Upper 12 Inches**
- NO **Water Marks**
- NO **Drift Lines**
- NO **Sediment Deposits**
- YES **Drainage Patterns in Wetlands**

Secondary Indicators
- NO **Oxidized Root Channels in Upper 12 Inches**
- NO **Water-Stained Leaves**
- NO **Local Soil Survey Data**
- YES **FAC-Neutral Test**
- NO **Other(Explain in Remarks)**

Remarks:

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Alkali Lake Wetland Mitigation - 2009	**Project No:** 0B4308802	**Date:** 24-Aug-2009
Applicant/Owner: -Montana Department of Transportation-		**County:** Pondera
Investigators: andrea pipp		**State:** Montana
		Plot ID: Soil Pit 7

SOILS

Map Unit Name (Series and Phase): Alkali Lake-not mapped as a soil unit
Map Symbol: unk. **Drainage Class:** unknown **Mapped Hydric Inclusion?**
Taxonomy (Subgroup): unknown **Field Observations Confirm Mapped Type?** Yes (No)
Profile Description

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle Abundance/Contrast		Texture, Concretions, Structure, etc
0-9	A	2.5Y5/1	N/A	N/A	N/A	Clay
9-14	B	2.5Y4/2	2.5Y5/6	Few	Faint	Clay

Hydric Soil Indicators:

NO **Histosol**	NO **Concretions**
NO **Histic Epipedon**	NO **High Organic Content in Surface Layer in Sandy Soils**
NO **Sulfidic Odor**	NO **Organic Streaking in Sandy Soils**
NO **Aquic Moisture Regime**	NO **Listed on Local Hydric Soils List**
NO **Reducing Conditions**	NO **Listed on National Hydric Soils List**
YES **Gleyed or Low Chroma Colors**	NO **Other (Explain in Remarks)**

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	(Yes) No	Is the Sampling Point within the Wetland? (Yes) No
Wetland Hydrology Present?	(Yes) No	
Hydric Soils Present?	(Yes) No	

Remarks:

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Alkali Lake Wetland Mitigation - 2009	**Project No:** 0B4308802	**Date:** 24-Aug-2009
Applicant/Owner: -Montana Department of Transportation-		**County:** Pondera
Investigators: andrea pipp		**State:** Montana
		Plot ID: Soil Pit 8

Do Normal Circumstances exist on the site?	(Yes) No	**Community ID:** Emergent
Is the site significantly disturbed (Atypical Situation:)?	Yes (No)	**Transect ID:**
Is the area a potential Problem Area? (If needed, explain on the reverse side)	Yes (No)	**Field Location:** In mixed Atriplex/Hordeum on Transect 3.

VEGETATION **(USFWS Region No. 9)**

Dominant Plant Species(Latin/Common)	Stratum	Indicator	Plant Species(Latin/Common)	Stratum	Indicator
Atriplex patula	Herb	FACW	*Suaeda depressa*	Herb	FACW-
Saltbush,Halberd-Leaf			Seepweed,Pursh		
Hordeum jubatum	Herb	FAC+			
Barley,Fox-Tail					

Percent of Dominant Species that are OBL, FACW or FAC: (excluding FAC-) 3/3 = 100.00%

FAC Neutral: 2/2 = 100.00%

Numeric Index: 7/3 = 2.33

Remarks:

HYDROLOGY

NO **Recorded Data(Describe in Remarks):**
- N/A **Stream, Lake or Tide Gauge**
- N/A **Aerial Photographs**
- N/A **Other**

YES **No Recorded Data**

Field Observations

Depth of Surface Water:	N/A *(in.)*
Depth to Free Water in Pit:	N/A *(in.)*
Depth to Saturated Soil:	= 10 *(in.)*

Wetland Hydrology Indicators

Primary Indicators
- NO **Inundated**
- YES **Saturated in Upper 12 Inches**
- NO **Water Marks**
- NO **Drift Lines**
- NO **Sediment Deposits**
- YES **Drainage Patterns in Wetlands**

Secondary Indicators
- NO **Oxidized Root Channels in Upper 12 Inches**
- NO **Water-Stained Leaves**
- NO **Local Soil Survey Data**
- YES **FAC-Neutral Test**
- NO **Other(Explain in Remarks)**

Remarks:
Soil was dry from 0-2 inches, moist from 2-10 inches, and saturated at 10 inches. Surface soils are cracked to a depth of about 1 inch.

WetForm™

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Alkali Lake Wetland Mitigation - 2009	**Project No:** 0B4308802	**Date:** 24-Aug-2009
Applicant/Owner: -Montana Department of Transportation-		**County:** Pondera
Investigators: andrea pipp		**State:** Montana
		Plot ID: Soil Pit 8

SOILS

Map Unit Name (Series and Phase): Alkali Lake-not mapped as a soil unit

Map Symbol: unk. **Drainage Class:** unknown **Mapped Hydric Inclusion?**

Taxonomy (Subgroup): unknown **Field Observations Confirm Mapped Type?** Yes (No)

Profile Description

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle Abundance/Contrast		Texture, Concretions, Structure, etc
0-10	A	2.5Y4/1	N/A	N/A	N/A	Clay
10-14	B	2.5Y5/1	2.5Y5/6	Many	Distinct	Clay

Hydric Soil Indicators:
- NO **Histosol**
- NO **Histic Epipedon**
- NO **Sulfidic Odor**
- NO **Aquic Moisture Regime**
- NO **Reducing Conditions**
- YES **Gleyed or Low Chroma Colors**
- NO **Concretions**
- NO **High Organic Content in Surface Layer in Sandy Soils**
- NO **Organic Streaking in Sandy Soils**
- NO **Listed on Local Hydric Soils List**
- NO **Listed on National Hydric Soils List**
- NO **Other (Explain in Remarks)**

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	(Yes) No	Is the Sampling Point within the Wetland?	(Yes) No
Wetland Hydrology Present?	(Yes) No		
Hydric Soils Present?	(Yes) No		

Remarks:

WetForm™

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Alkali Lake Wetland Mitigation - 2009	**Project No:** 0B4308802	**Date:** 24-Aug-2009
Applicant/Owner: -Montana Department of Transportation-		**County:** Pondera
Investigators: andrea pipp		**State:** Montana
		Plot ID: Soil Pit 9

Do Normal Circumstances exist on the site?	(Yes) No	**Community ID:** Emergent
Is the site significantly disturbed (Atypical Situation:)?	Yes (No)	**Transect ID:**
Is the area a potential Problem Area? (If needed, explain on the reverse side)	Yes (No)	**Field Location:** In Type 3 on Transect 3.

VEGETATION **(USFWS Region No. 9)**

Dominant Plant Species(Latin/Common)	Stratum	Indicator	Plant Species(Latin/Common)	Stratum	Indicator
Hordeum jubatum	Herb	FAC+	*Atriplex patula*	Herb	FACW
Barley,Fox-Tail			Saltbush,Halberd-Leaf		
Polygonum ramosissimum	Herb	FAC-	*Puccinellia nuttalliana*	Herb	OBL
Knotweed,Bushy			Grass,Nuttall's Alkali		

Percent of Dominant Species that are OBL, FACW or FAC: (excluding FAC-) 3/4 = 75.00%
FAC Neutral: 2/2 = 100.00%
Numeric Index: 9/4 = 2.25

Remarks:

HYDROLOGY

NO **Recorded Data(Describe in Remarks):**
N/A **Stream, Lake or Tide Gauge**
N/A **Aerial Photographs**
N/A **Other**
YES **No Recorded Data**

Field Observations

Depth of Surface Water:	N/A *(in.)*
Depth to Free Water in Pit:	N/A *(in.)*
Depth to Saturated Soil:	= 8.0 *(in.)*

Wetland Hydrology Indicators
Primary Indicators
NO **Inundated**
YES **Saturated in Upper 12 Inches**
NO **Water Marks**
NO **Drift Lines**
NO **Sediment Deposits**
YES **Drainage Patterns in Wetlands**
Secondary Indicators
NO **Oxidized Root Channels in Upper 12 Inches**
NO **Water-Stained Leaves**
NO **Local Soil Survey Data**
YES **FAC-Neutral Test**
NO **Other(Explain in Remarks)**

Remarks:
Soils were dry from 0-6 inches, moist from 6-8 inches, and saturated at 8 inches.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Alkali Lake Wetland Mitigation - 2009	**Project No:** 0B4308802	**Date:** 24-Aug-2009
Applicant/Owner: -Montana Department of Transportation-		**County:** Pondera
Investigators: andrea pipp		**State:** Montana
		Plot ID: Soil Pit 9

SOILS

Map Unit Name (Series and Phase): Alkali Lake-not mapped as a soil unit
Map Symbol: unk. **Drainage Class:** unknown **Mapped Hydric Inclusion?**
Taxonomy (Subgroup): unknown **Field Observations Confirm Mapped Type?** Yes (No)
Profile Description

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc
0-14	A/B	2.5Y5/1	10YR5/6	Common Prominent	Clay

Hydric Soil Indicators:

NO **Histosol**	NO **Concretions**
NO **Histic Epipedon**	NO **High Organic Content in Surface Layer in Sandy Soils**
NO **Sulfidic Odor**	NO **Organic Streaking in Sandy Soils**
NO **Aquic Moisture Regime**	NO **Listed on Local Hydric Soils List**
NO **Reducing Conditions**	NO **Listed on National Hydric Soils List**
YES **Gleyed or Low Chroma Colors**	NO **Other (Explain in Remarks)**

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	(Yes) No	Is the Sampling Point within the Wetland? (Yes) No
Wetland Hydrology Present?	(Yes) No	
Hydric Soils Present?	(Yes) No	

Remarks:

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Alkali Lake Wetland Mitigation - 2009	**Project No:** 0B4308802	**Date:** 25-Aug-2009
Applicant/Owner: -Montana Department of Transportation-		**County:** Pondera
Investigators: andrea pipp		**State:** Montana
		Plot ID: Soil Pit 10

Do Normal Circumstances exist on the site?	(Yes) No	**Community ID:** Emergent
Is the site significantly disturbed (Atypical Situation:)?	Yes (No)	**Transect ID:**
Is the area a potential Problem Area?	Yes (No)	**Field Location:**
(If needed, explain on the reverse side)		In northeast corner of Alkali site.

VEGETATION **(USFWS Region No. 9)**

Dominant Plant Species(Latin/Common)	Stratum	Indicator	Plant Species(Latin/Common)	Stratum	Indicator
Puccinellia nuttalliana	Herb	OBL	*Iva axillaris*	Herb	FAC
Grass,Nuttall's Alkali			Sumpweed,Small-Flower		

Percent of Dominant Species that are OBL, FACW or FAC: (excluding FAC-) 2/2 = 100.00%

FAC Neutral: 1/1 = 100.00%
Numeric Index: 4/2 = 2.00

Remarks:

HYDROLOGY

NO **Recorded Data(Describe in Remarks):**
- N/A **Stream, Lake or Tide Gauge**
- N/A **Aerial Photographs**
- N/A **Other**

YES **No Recorded Data**

Field Observations

Depth of Surface Water:	N/A *(in.)*
Depth to Free Water in Pit:	N/A *(in.)*
Depth to Saturated Soil:	> 12 *(in.)*

Wetland Hydrology Indicators

Primary Indicators
- NO **Inundated**
- YES **Saturated in Upper 12 Inches**
- NO **Water Marks**
- NO **Drift Lines**
- NO **Sediment Deposits**
- YES **Drainage Patterns in Wetlands**

Secondary Indicators
- NO **Oxidized Root Channels in Upper 12 Inches**
- NO **Water-Stained Leaves**
- NO **Local Soil Survey Data**
- YES **FAC-Neutral Test**
- YES **Other(Explain in Remarks)**

Remarks:
Soils were dry from 0-3 inches; Soils were cracked to a 2 inch depth. Soils were moist from 3-10 inches and were more moist and sticky at 10 inches. Soils would have been saturated earlier in the growing season for a long enough duration.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Alkali Lake Wetland Mitigation - 2009	**Project No:** 0B4308802	**Date:** 25-Aug-2009
Applicant/Owner: -Montana Department of Transportation-		**County:** Pondera
Investigators: andrea pipp		**State:** Montana
		Plot ID: Soil Pit 10

SOILS

Map Unit Name (Series and Phase): Alkali Lake-not mapped as a soil unit
Map Symbol: unk. **Drainage Class:** unknown **Mapped Hydric Inclusion?**
Taxonomy (Subgroup): unknown **Field Observations Confirm Mapped Type?** Yes (No)
Profile Description

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc
0-3	A	2.5Y5/1	N/A	N/A N/A	Clay
3-12	B	2.5Y5/1	10YR4/4	Common Prominent	Clay

Hydric Soil Indicators:

NO **Histosol**	NO **Concretions**
NO **Histic Epipedon**	NO **High Organic Content in Surface Layer in Sandy Soils**
NO **Sulfidic Odor**	NO **Organic Streaking in Sandy Soils**
NO **Aquic Moisture Regime**	NO **Listed on Local Hydric Soils List**
NO **Reducing Conditions**	NO **Listed on National Hydric Soils List**
YES **Gleyed or Low Chroma Colors**	NO **Other (Explain in Remarks)**

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	(Yes) No	Is the Sampling Point within the Wetland?	(Yes) No
Wetland Hydrology Present?	(Yes) No		
Hydric Soils Present?	(Yes) No		

Remarks:

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Alkali Lake Wetland Mitigation - 2009	**Project No:** 0B4308802	**Date:** 25-Aug-2009
Applicant/Owner: -Montana Department of Transportation-		**County:** Pondera
Investigators: andrea pipp		**State:** Montana
		Plot ID: Soil Pit 11

Do Normal Circumstances exist on the site?	(Yes) No	**Community ID:** Emergent
Is the site significantly disturbed (Atypical Situation:)?	Yes (No)	**Transect ID:**
Is the area a potential Problem Area? (If needed, explain on the reverse side)	Yes (No)	**Field Location:** In outlet.

VEGETATION **(USFWS Region No. 9)**

Dominant Plant Species(Latin/Common)	Stratum	Indicator	Plant Species(Latin/Common)	Stratum	Indicator
Hordeum jubatum	Herb	FAC+	*Eleocharis palustris*	Herb	OBL
Barley,Fox-Tail			Spikerush,Creeping		

Percent of Dominant Species that are OBL, FACW or FAC: (excluding FAC-) 2/2 = 100.00%
FAC Neutral: 1/1 = 100.00%
Numeric Index: 4/2 = 2.00

Remarks:
Present, but not dominant are: Polygonum ramosissimum, Iva axillaris, Atriplex patula.

HYDROLOGY

NO **Recorded Data(Describe in Remarks):**
- N/A **Stream, Lake or Tide Gauge**
- N/A **Aerial Photographs**
- N/A **Other**

YES **No Recorded Data**

Field Observations

Depth of Surface Water:	N/A *(in.)*
Depth to Free Water in Pit:	N/A *(in.)*
Depth to Saturated Soil:	> 12 *(in.)*

Wetland Hydrology Indicators
Primary Indicators
- NO **Inundated**
- YES **Saturated in Upper 12 Inches**
- NO **Water Marks**
- NO **Drift Lines**
- NO **Sediment Deposits**
- YES **Drainage Patterns in Wetlands**

Secondary Indicators
- NO **Oxidized Root Channels in Upper 12 Inches**
- NO **Water-Stained Leaves**
- NO **Local Soil Survey Data**
- YES **FAC-Neutral Test**
- NO **Other(Explain in Remarks)**

Remarks:
Soils were dry from 0-2 inches; Soils were cracked to a depth of 1 inch. At 2 inches soil was pliable and very moist. Soils would have been saturated earlier in the growing season for a long enough duration.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Alkali Lake Wetland Mitigation - 2009	**Project No:** 0B4308802	**Date:** 25-Aug-2009
Applicant/Owner: -Montana Department of Transportation-		**County:** Pondera
Investigators: andrea pipp		**State:** Montana
		Plot ID: Soil Pit 11

SOILS

Map Unit Name (Series and Phase): Alkali Lake-not mapped as a soil unit
Map Symbol: unk. **Drainage Class:** unknown **Mapped Hydric Inclusion?**
Taxonomy (Subgroup): unknown **Field Observations Confirm Mapped Type?** Yes (No)
Profile Description

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle Abundance/Contrast		Texture, Concretions, Structure, etc
0-4	A	2.5Y5/1	N/A	N/A	N/A	Clay
4-12	B	2.5Y5/1	10YR4/6	Common	Distinct	Clay

Hydric Soil Indicators:
- NO **Histosol**
- NO **Histic Epipedon**
- NO **Sulfidic Odor**
- NO **Aquic Moisture Regime**
- NO **Reducing Conditions**
- YES **Gleyed or Low Chroma Colors**
- NO **Concretions**
- NO **High Organic Content in Surface Layer in Sandy Soils**
- NO **Organic Streaking in Sandy Soils**
- NO **Listed on Local Hydric Soils List**
- NO **Listed on National Hydric Soils List**
- NO **Other (Explain in Remarks)**

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	(Yes) No	Is the Sampling Point within the Wetland? (Yes) No
Wetland Hydrology Present?	(Yes) No	
Hydric Soils Present?	(Yes) No	

Remarks:

MDT MONTANA WETLAND ASSESSMENT FORM (revised March 2008)

1. Project Name: Alkali Lake **2. MDT Project #:** STPX-NH-37(26) **3. Control #:** 5000

3. Evaluation Date: August 24-25, 2009 **4. Evaluator(s):** Andrea Pipp **5. Wetland/Site #(s):** Entire Alkali Site

6. Wetland Location(s): Township 31 N, Range 6 W, Section 31; Township 30 N, Range 6 W, Section 6

Approximate Stationing or Roadposts: _____

Watershed: 8 - Marias **County:** Pondera _____

7. Evaluating Agency: MDT

Purpose of Evaluation:

- ☐ **Wetland potentially affected by MDT project**
- ☐ **Mitigation wetlands; pre-construction**
- ☒ **Mitigation wetlands; post-construction**
- ☐ **Other** _____

8. Wetland Size (acre): _____ (visually estimated)
96.42 (measured, e.g. GPS)

9. Assessment Area (AA) Size (acre): _____ (visually estimated)
(see manual for determining AA) 182.01 (measured, e.g. GPS)

10. CLASSIFICATION OF WETLAND AND AQUATIC HABITATS IN AA (See manual for definitions.)

HGM Class (Brinson)	Class (Cowardin)	Modifier (Cowardin)	Water Regime	% OF AA
Depressional	Emergent Wetland	Impounded	Seasonal / Intermittent	53
Depressional	Aquatic Bed	Impounded	Seasonal / Intermittent	1
Depressional	Unconsolidated Bottom	Impounded	Permanent / Perennial	46

Comments: The Aquatic Bed component is present, but actually is 0.0005%.

11. ESTIMATED RELATIVE ABUNDANCE (of similarly classified sites within the same Major Montana Watershed Basin; see manual.)
rare

12. GENERAL CONDITION OF AA

i. Disturbance: Use matrix below to select the appropriate response; see manual for Montana listed noxious weed and aquatic nuisance vegetation species lists.

Conditions within AA	Predominant Conditions Adjacent to (within 500 feet of) AA		
	Managed in predominantly natural state; is not grazed, hayed, logged, or otherwise converted; does not contain roads or buildings; and noxious weed or ANVS cover is ≤15%.	Land not cultivated, but may be moderately grazed or hayed or selectively logged; or has been subject to minor clearing; contains few roads or buildings; noxious weed or ANVS cover is ≤30%.	Land cultivated or heavily grazed or logged; subject to substantial fill placement, grading, clearing, or hydrological alteration; high road or building density; or noxious weed or ANVS cover is >30%.
AA occurs and is managed in predominantly natural state; is not grazed, hayed, logged, or otherwise converted; does not contain roads or occupied buildings; and noxious weed or ANVS cover is ≤15%.	---	low disturbance	---
AA not cultivated, but may be moderately grazed or hayed or selectively logged; or has been subject to relatively minor clearing, fill placement, or hydrological alteration; contains few roads or buildings; noxious weed or ANVS cover is ≤30%.	---	---	---
AA cultivated or heavily grazed or logged; subject to relatively substantial fill placement, grading, clearing, or hydrological alteration; high road or building density; or noxious weed or ANVS cover is >30%.	---	---	---

Comments (types of disturbance, intensity, season, etc.)**:** _____

ii. Prominent noxious, aquatic nuisance, and other exotic vegetation species: Cirsium arvense and Melilotus spp. The Cirsium arvense has not flowered and stems have been pulled each year.

iii. Provide brief descriptive summary of AA and surrounding land use/habitat: AA is a wetland mitigation site that was impounded and flooded. The surrounding land use is rangeland that is grazed by cattle and agricultural fields where barley/wheat are cultivated.

13. STRUCTURAL DIVERSITY (Based on number of "Cowardin" ***vegetated*** classes present [do not include unvegetated classes]; see #10 above.)

Existing # of "Cowardin" Vegetated Classes in AA	Initial Rating	Is current management preventing (passive) existence of additional vegetated classes?		Modified Rating
≥3 (or 2 if one is forested) classes	---	NA	NA	NA
2 (or 1 if forested) classes	---	NA	NA	NA
1 class, but not a monoculture	mod	←NO	YES→	---
1 class, monoculture (1 species comprises ≥90% of total cover)	---	NA	NA	NA

Comments: _____

Wetland/Site #(s): Entire Site

14A. HABITAT FOR FEDERALLY LISTED OR PROPOSED THREATENED OR ENDANGERED PLANTS OR ANIMALS

i. AA is Documented (D) or Suspected (S) to contain: Check box based on definitions in manual.

Primary or critical habitat (**list species**) ☐ D ☐ S _____
Secondary habitat (**list species**) ☒ D ☐ S Piping Plover
Incidental habitat (**list species**) ☐ D ☐ S _____
No usable habitat ☐ S

ii. Rating: Based on the strongest habitat chosen in 14A(i) above, select the corresponding functional point and rating.

Highest Habitat Level	Doc/Primary	Sus/Primary	Doc/Secondary	Sus/Secondary	Doc/Incidental	Sus/Incidental	None
Functional Point/Rating	---	---	.8M	---	---	---	---

Sources for documented use (e.g. observations, records): Piping Plovers were observed in the project area on May 7, 2007 (1 bird), May 15, 2007 (Pair), May 16, 2008 (1 bird), and May 19, 2009 (8 birds); nesting was not documented. Nesting by Piping Plovers was documented along North Alkali Lake in 1990 and 1992.

14B. HABITAT FOR PLANTS OR ANIMALS RATED S1, S2, OR S3 BY THE MONTANA NATURAL HERITAGE PROGRAM
Do not include species listed in 14A above.

i. AA is Documented (D) or Suspected (S) to contain: Check box based on definitions in manual.

Primary or critical habitat (**list species**) ☐ D ☐ S _____
Secondary habitat (**list species**) ☐ D ☒ S Trumpeter Swan, Long-Billed Curlew
Incidental habitat (**list species**) ☒ D ☐ S American White Pelican
No usable habitat ☐ S

ii. Rating: Based on the strongest habitat chosen in 14A(i) above, select the corresponding functional point and rating.

Highest Habitat Level	Doc/Primary	Sus/Primary	Doc/Secondary	Sus/Secondary	Doc/Incidental	Sus/Incidental	None
S1 Species Functional Point/Rating	---	---	---	---	---	---	---
S2 and S3 Species Functional Point/Rating	---	---	---	.5M	---	---	---

Sources for documented use (e.g. observations, records): American White Pelicans nest in the North Lake and were observed at Alkali Lake in 2006-2007 and in 2009. Trumpeter Swan was observed at Alkali Lake in 2006. Long-billed curlews also use site grasslands, but not documented in AA.

14C. GENERAL WILDLIFE HABITAT RATING

i. Evidence of Overall Wildlife Use in the AA: Check substantial, moderate, or low based on supporting evidence.

☒ ***Substantial:*** Based on any of the following [check].
- ☒ observations of abundant wildlife #s or high species diversity (during any period)
- ☐ abundant wildlife sign such as scat, tracks, nest structures, game trails, etc.
- ☒ presence of extremely limiting habitat features not available in the surrounding area
- ☐ interview with local biologist with knowledge of the AA

☐ ***Minimal:*** Based on any of the following [check].
- ☐ few or no wildlife observations during peak use periods
- ☐ little to no wildlife sign
- ☐ sparse adjacent upland food sources
- ☐ interview with local biologist with knowledge of AA

☐ ***Moderate:*** Based on any of the following [check].
- ☐ observations of scattered wildlife groups or individuals or relatively few species during peak periods
- ☐ common occurrence of wildlife sign such as scat, tracks, nest structures, game trails, etc.
- ☐ adequate adjacent upland food sources
- ☐ interview with local biologist with knowledge of the AA

ii. Wildlife Habitat Features: Working from top to bottom, check appropriate AA attributes in matrix to arrive at rating. Structural diversity is from #13. For class cover to be considered evenly distributed, the most and least prevalent **vegetated** classes must be within 20% of each other in terms of their percent composition of the AA (see #10). Abbreviations for surface water durations are as follows: P/P = permanent/perennial; S/I = seasonal/intermittent; T/E = temporary/ephemeral; and A = absent [see manual for further definitions of these terms].

Structural Diversity (see #13)	☐ **High**								☒ **Moderate**								☐ **Low**			
Class Cover Distribution (all vegetated classes)	☐ **Even**				☐ **Uneven**				☒ **Even**				☐ **Uneven**				☐ **Even**			
Duration of Surface Water in ≥ 10% of AA	**P/P**	**S/I**	**T/E**	**A**	**P/P**	**S/I**	**T/E**	**A**	**P/P**	**S/I**	**T/E**	**A**	**P/P**	**S/I**	**T/E**	**A**	**P/P**	**S/I**	**T/E**	**A**
☒ **Low Disturbance** at AA (see #12i)	---	---	---	---	---	---	---	---	E	---	---	---	---	---	---	---	---	---	---	---
☐ **Moderate Disturbance** at AA (see #12i)	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
☐ **High Disturbance** at AA (see #12i)	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

iii. Rating: Use the conclusions from i and ii above and the matrix below to select the functional point and rating.

Evidence of Wildlife Use (i)	**Wildlife Habitat Features Rating (ii)** ☒ **Exceptional**	☐ **High**	☐ **Moderate**	☐ **Low**
☒ **Substantial**	1E	---	---	---
☐ **Moderate**	---	---	---	---
☐ **Minimal**	---	---	---	---

Comments: Numerous shorebirds and waterfowl have been using the site from Fall of 2005 through Fall of 2009.

Wetland/Site #(s): Entire Site

14D. GENERAL FISH HABITAT ☒ **NA** (proceed to 14E)

If the AA is not used by fish, fish use is not restorable due to habitat constraints, or is not desired from a management perspective [such as fish entrapped in a canal], then check the NA box and proceed to 14E.

Assess this function if the AA is used by fish or the existing situation is "correctable" such that the AA could be used by fish [i.e., fish use is precluded by perched culvert or other barrier].

Type of Fishery: ☐ Cold Water (**CW**) ☐ Warm Water (**WW**) **Use the CW or WW guidelines in the manual to complete the matrix.**

i. Habitat Quality and Known / Suspected Fish Species in AA: Use matrix to select the functional point and rating.

Duration of Surface Water in AA	☐ **Permanent / Perennial**						☐ **Seasonal / Intermittent**						☐ **Temporary / Ephemeral**					
Aquatic Hiding / Resting / Escape Cover	☐ **Optimal**		☐ **Adequate**		☐ **Poor**		☐ **Optimal**		☐ **Adequate**		☐ **Poor**		☐ **Optimal**		☐ **Adequate**		☐ **Poor**	
Thermal Cover: optimal / suboptimal	**O**	**S**	**O**	**S**	**O**	**S**	**O**	**S**	**O**	**S**	**O**	**S**	**O**	**S**	**O**	**S**	**O**	**S**
FWP Tier I fish species	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
FWP Tier II or **Native Game** fish species	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
FWP Tier III or **Introduced Game** fish	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
FWP Non-Game Tier IV or **No** fish species	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Sources used for identifying fish spp. potentially found in AA: _____

ii. Modified Rating: NOTE: Modified score cannot exceed 1.0 or be less than 0.1.

a) Is fish use of the AA significantly reduced by a culvert, dike, or other man-made structure or activity, ***or*** *is the waterbody included on the current final MDEQ list of waterbodies in need of TMDL development with listed "Probable Impaired Uses" including cold or warm water fishery or aquatic life support,* ***or*** *do aquatic nuisance plant or animal species (see* ***Appendix E****) occur in fish habitat?* ☐ **YES**, reduce score in **i** by 0.1 = __ or ☐ **N0**

b) Does the AA contain a documented spawning area or other critical habitat feature (i.e., sanctuary pool, upwelling area; specify in comments) for native fish or introduced game fish? ☐ **YES**, add to score in **i** or **iia** 0.1 = __ or ☐ **N0**

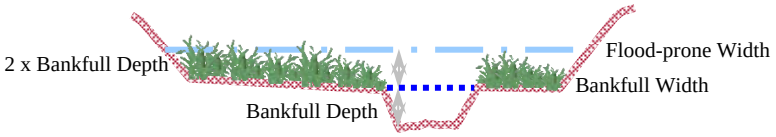
iii. Final Score and Rating: _ **Comments:** _____

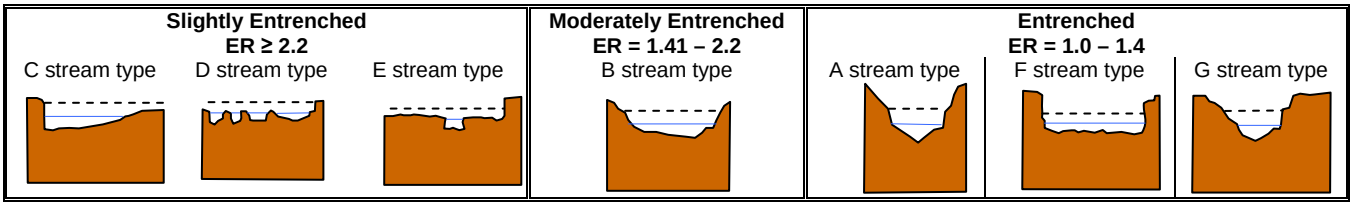
14E. FLOOD ATTENUATION ☒ **NA** (proceed to 14F)

Applies only to wetlands that are subject to flooding via in-channel or overbank flow.
If wetlands in AA are not flooded from in-channel or overbank flow, check the NA box and proceed to 14F.

Entrenchment Ratio (ER) Estimation (see manual for additional guidance). Entrenchment ratio = (flood-prone width) / (bankfull width).
Flood-prone width = estimated horizontal projection of where 2 X maximum bankfull depth elevation intersects the floodplain on each side of the stream.

_____ / _____ = _____
flood prone width / bankfull width = entrenchment ratio





i. Rating: Working from top to bottom, use the matrix below to select the functional point and rating.

Estimated or Calculated Entrenchment (Rosgen 1994, 1996)	☐ Slightly Entrenched C, D, E stream types			☐ Moderately Entrenched B stream type			☐ Entrenched A, F, G stream types		
Percent of Flooded Wetland Classified as Forested and/or Scrub/Shrub	☐ 75%	☐ 25-75%	☐ <25%	☐ 75%	☐ 25-75%	☐ <25%	☐ 75%	☐ 25-75%	☐ <25%
AA contains **no outlet or restricted outlet**	---	---	---	---	---	---	---	---	---
AA contains **unrestricted outlet**	---	---	---	---	---	---	---	---	---

ii. Are ≥10 acres of wetland in the AA subject to flooding AND are man-made features which may be significantly damaged by floods located within 0.5 mile downstream of the AA? ☐ YES ☐ NO **Comments:** _____

Wetland/Site #(s): Entire Site

14F. SHORT AND LONG TERM SURFACE WATER STORAGE ☐ **NA** (proceed to 14G)

Applies to wetlands that flood or pond from overbank or in-channel flow, precipitation, upland surface flow, or groundwater flow.
If no wetlands in the AA are subject to flooding or ponding, then check the NA box and proceed to 14G.

i. Rating: Working from top to bottom, use the matrix below to select the functional point and rating. Abbreviations for surface water durations are as follows: P/P = permanent/perennial; S/I = seasonal/intermittent; and T/E = temporary/ephemeral [see manual for further definitions of these terms].

Estimated Maximum Acre Feet of Water Contained in Wetlands within the AA that are Subject to Periodic Flooding or Ponding	☒ **>5 acre feet**			☐ **1.1 to 5 acre feet**			☐ **≤1 acre foot**		
Duration of Surface Water at Wetlands within the AA	☐ **P/P**	☒ **S/I**	☐ **T/E**	☐ **P/P**	☐ **S/I**	☐ **T/E**	☐ **P/P**	☐ **S/I**	☐ **T/E**
Wetlands in AA flood or pond **≥ 5 out of 10 years**	---	.9H	---	---	---	---	---	---	---
Wetlands in AA flood or pond **< 5 out of 10 years**	---	---	---	---	---	---	---	---	---

Comments: Since 2006 unconsolidated bottom habitat has had a permanent/perennial water regime. Wetland habitats have a seasonal/intermittent water regime.

14G. SEDIMENT / NUTRIENT / TOXICANT / RETENTION AND REMOVAL ☐ **NA** (proceed to 14H)

Applies to wetland with potential to receive sediments, nutrients, or toxicants through influx of surface or ground water or direct input.
If no wetlands in the AA are subject to such input, check the NA box and proceed to 14H.

i. Rating: Working from top to bottom, use the matrix below to select the functional point and rating.

Sediment, Nutrient, and Toxicant Input Levels within AA	**AA receives or surrounding land use has potential to deliver sediments, nutrients, or compounds at levels such that other functions are not substantially impaired. Minor sedimentation, sources of nutrients or toxicants, or signs of eutrophication present.**				**Waterbody is on MDEQ list of waterbodies in need of TMDL development for "probable causes" related to sediment, nutrients, or toxicants or AA receives or surrounding land use has potential to deliver high levels of sediments, nutrients, or compounds such that other functions are substantially impaired. Major sedimentation, sources of nutrients or toxicants, or signs of eutrophication present.**			
% Cover of Wetland Vegetation in AA	☐ **≥ 70%**		☒ **< 70%**		☐ **≥ 70%**		☐ **< 70%**	
Evidence of Flooding / Ponding in AA	☐ **Yes**	☐ **No**	☒ **Yes**	☐ **No**	☐ **Yes**	☐ **No**	☐ **Yes**	☐ **No**
AA contains **no or restricted outlet**	---	---	.7M	---	---	---	---	---
AA contains **unrestricted outlet**	---	---	---	---	---	---	---	---

Comments: _____

14H. SEDIMENT / SHORELINE STABILIZATION ☐ **NA** (proceed to 14I)

Applies only if AA occurs on or within the banks of a river, stream, or other natural or man-made drainage, or on the shoreline of a standing water body which is subject to wave action.
If 14H does not apply, check the NA box and proceed to 14I.

% Cover of Wetland Streambank or Shoreline by Species with Stability Ratings of ≥6 (see Appendix F).	**Duration of Surface Water Adjacent to Rooted Vegetation**		
	☐ **Permanent / Perennial**	☒ **Seasonal / Intermittent**	☐ **Temporary / Ephemeral**
☐ **≥ 65%**	---	---	---
☐ **35-64%**	---	---	---
☒ **< 35%**	---	.2L	---

Comments: Shoreline species are Puccinelia nuttalliana, Hordeum jubatum, Chenopodium glaucum, and Suaeda, which probably rate as a 3 or 4. Scirpus are present, but low in abundance and not along the shoreline.

14I. PRODUCTION EXPORT / FOOD CHAIN SUPPORT

i. Level of Biological Activity: Synthesis of wildlife and fish habitat rates (select).

General Fish Habitat Rating (14Diii)	**General Wildlife Habitat Rating (14Ciii)** ☒ **E/H**	☐ **M**	☐ **L**
☐ **E/H**	---	---	---
☐ **M**	---	---	---
☐ **L**	---	---	---
☒ **NA**	H	---	---

ii. Rating: Working from top to bottom, use the matrix below to select the functional point and rating. Factor A = acreage of vegetated wetland component in the AA; Factor B = level of biological activity rating from above (14Ii); Factor C = whether or not the AA contains a surface or subsurface outlet; the final three rows pertain to the duration of surface water in the AA, where P/P, S/I, and T/E were previously defined, and A = "absent" [see manual for further definitions of these terms].

A	☒ **Vegetated Component >5 acres**						☐ **Vegetated Component 1-5 acres**						☐ **Vegetated Component <1 acre**					
B	☒ **High**		☐ **Moderate**		☐ **Low**		☐ **High**		☐ **Moderate**		☐ **Low**		☐ **High**		☐ **Moderate**		☐ **Low**	
C	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**
P/P	---	.7M	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
S/I	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
T/E/A	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Wetland/Site #(s): Entire Site

14I. PRODUCTION EXPORT / FOOD CHAIN SUPPORT (continued)

iii. Modified Rating: Note: Modified score cannot exceed 1.0 or be less than 0.1.

Vegetated Upland Buffer: Area with ≥ 30% plant cover, ≤ 15% noxious weed or ANVS cover, AND that is not subjected to periodic mechanical mowing or clearing (unless for weed control).
Is there an average ≥ 50-foot wide vegetated upland buffer around ≥ 75% of the AA's perimeter? ☒ **YES**, add 0.1 to score in **ii** = 0.80 ☐ **NO**

iv. Final Score and Rating: .8H **Comments:** _____

14J. GROUNDWATER DISCHARGE / RECHARGE
Check the appropriate indicators in i and ii below.

i. Discharge Indicators
- ☐ The AA is a slope wetland.
- ☐ Springs or seeps are known or observed.
- ☐ Vegetation growing during dormant season/drought.
- ☐ Wetland occurs at the toe of a natural slope.
- ☐ Seeps are present at the wetland edge.
- ☐ AA permanently flooded during drought periods.
- ☐ Wetland contains an outlet, but no inlet.
- ☐ Shallow water table and the site is saturated to the surface.
- ☐ Other: _____

ii. Recharge Indicators
- ☐ Permeable substrate present without underlying impeding layer.
- ☐ Wetland contains inlet but no outlet.
- ☐ Stream is a known 'losing' stream. Discharge volume decreases.
- ☐ Other: _____

iii. Rating: Use the information from i and ii above and the table below to select the functional point and rating.

Criteria	Duration of Saturation at AA Wetlands ***FROM GROUNDWATER DISCHARGE*** or ***WITH WATER THAT IS RECHARGING THE GROUNDWATER SYSTEM*** ☐ **P/P**	☐ **S/I**	☐ **T**	☒ **None**
☒ **Groundwater Discharge or Recharge**	---	---	---	.1L
☐ **Insufficient Data/Information**	---			

Comments: Site is maintained strictly by irrigation water and precipitation. No natural discharge / recharge indicators of groundwater are present.

14K. UNIQUENESS

i. Rating: Working from top to bottom, use the matrix below to select the functional point and rating.

Replacement Potential	**AA contains fen, bog, warm springs or mature (>80 yr-old) forested wetland** OR **plant association listed as "S1" by the MTNHP**			**AA does not contain previously cited rare types** AND **structural diversity (#13) is high** OR **contains plant association listed as "S2" by the MTNHP**			**AA does not contain previously cited rare types** OR **associations** AND **structural diversity (#13) is low-moderate**		
Estimated Relative Abundance (#11)	☐ Rare	☐ Common	☐ Abundant	☐ Rare	☐ Common	☐ Abundant	☒ Rare	☐ Common	☐ Abundant
☒ **Low Disturbance** at AA (#12i)	---	---	---	---	---	---	.5M	---	---
☐ **Moderate Disturbance** at AA (#12i)	---	---	---	---	---	---	---	---	---
☐ **High Disturbance** at AA (#12i)	---	---	---	---	---	---	---	---	---

Comments: _____

14L. RECREATION / EDUCATION POTENTIAL ☐ NA (proceed to Overall Summary and Rating page)
Affords 'bonus' points if AA provides a recreational or educational opportunity.

i. Is the AA a known or potential recreational or educational site? ☒ **YES**, go to ii. ☐ **NO**, check the NA box.

ii. Check categories that apply to the AA: ☒ Educational/Scientific Study ☒ Consumptive Recreational ☒ Non-consumptive recreational
☐ Other: _____

iii. Rating: Use the matrix below to select the functional point and rating.

Known or Potential Recreational or Educational Area	**Known**	**Potential**
Public ownership or public easement with general public access (no permission required)	---	---
Private ownership with general public access (no permission required)	---	---
Private or public ownership without general public access, or requiring permission for public access	.1M	---

Comments: Mitigation site occurs on tribal property and could serve as an area for educational/scientific study, bird hunting, and birdwatching.

15. GENERAL SITE NOTES: The site does not support a fishery. However, juvenile fish have made it through the irrigation diversion pipes and have been observed in the inlet (in 2006 - 2009.

Wetland/Site #(s): Entire Alkali Site

Function & Value Variables	Rating – Actual Functional Points	Possible Functional Points	Functional Units: Actual Points x Estimated AA Acreage	Indicate the Four Most Prominent Functions with an Asterisk
A. Listed / Proposed T&E Species Habitat	mod 0.80	1.00		*
B. MT Natural Heritage Program Species Habitat	mod 0.50	1.00		*
C. General Wildlife Habitat	exc 1.00	1.00		
D. General Fish Habitat	NA	NA		
E. Flood Attenuation	NA	NA		
F. Short and Long Term Surface Water Storage	high 0.90	1.00		
G. Sediment / Nutrient / Toxicant Removal	mod 0.70	1.00		
H. Sediment / Shoreline Stabilization	low 0.20	1.00		
I. Production Export / Food Chain Support	high 0.80	1.00		
J. Groundwater Discharge / Recharge	low 0.10	1.00		
K. Uniqueness	mod 0.50	1.00		*
L. Recreation / Education Potential (bonus point)	mod 0.10			*
Total Points	**5.6**	**9**	**Total Functional Units**	
Percent of Possible Score 62% (round to nearest whole number)				

Category I Wetland: (must satisfy **one** of the following criteria; otherwise go to Category II)
- ☐ Score of 1 functional point for Listed/Proposed Threatened or Endangered Species; **or**
- ☐ Score of 1 functional point for Uniqueness; **or**
- ☐ Score of 1 functional point for Flood Attenuation **and** answer to Question 14E.ii is "yes"; **or**
- ☐ Percent of possible score > 80% (round to nearest whole #).

Category II Wetland: (Criteria for Category I not satisfied **and** meets any **one** of the following criteria; otherwise go to Category IV)
- ☐ Score of 1 functional point for MT Natural Heritage Program Species Habitat; **or**
- ☒ Score of .9 or 1 functional point for General Wildlife Habitat; **or**
- ☐ Score of .9 or 1 functional point for General Fish Habitat; **or**
- ☐ "High" to "Exceptional" ratings for **both** General Wildlife Habitat **and** General Fish/Aquatic Habitat; **or**
- ☐ Score of .9 functional point for Uniqueness; **or**
- ☐ Percent of possible score > 65% (round to nearest whole #).

☐ **Category III Wetland:** (Criteria for Categories I, II, or IV not satisfied)

Category IV Wetland: (Criteria for Categories I or II are not satisfied and all of the following criteria are met; if not go to Category III)
- ☐ "Low" rating for Uniqueness; **and**
- ☐ Vegetated wetland component < 1 acre (do not include upland vegetated buffer); **and**
- ☐ Percent of possible score < 35% (round to nearest whole #).

OVERALL ANALYSIS AREA (AA) RATING: Check the appropriate category based on the criteria outlined above.

☐ **I** ☒ **II** ☐ **III** ☐ **IV**

Appendix C

2009 REPRESENTATIVE PHOTOGRAPHS

MDT Wetland Mitigation Monitoring
Alkali Lake
Pondera County, Montana

2009 ALKALI LAKE WETLAND MITIGATION SITE



Photo 1: Photo Point 1 taken at inlet. View is north.



Photo 2: Photo Point 2 taken from the east side of Alkali Lake. View is west.

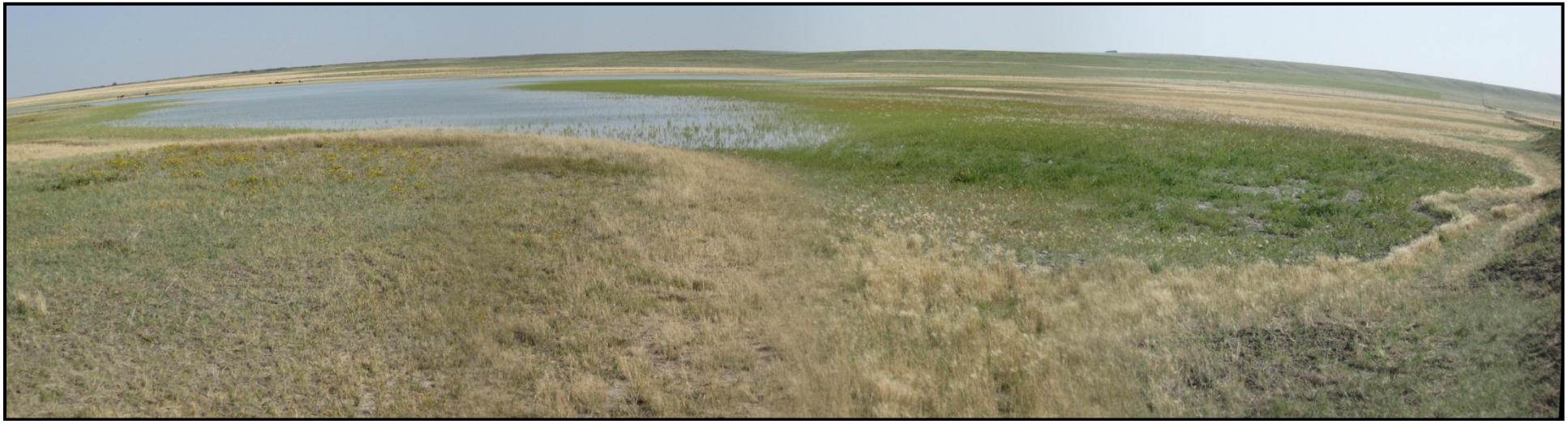


Photo 3: Photo Point 3 taken from the northwest corner of Alkali Lake. View is southeast.



Photo 4: *Eleocharis acicularis* (short plants) of the Type 6-Aquatic Wetland.



Photo 5: A Piping Plover observed at Alkali Lake on May 19, 2009.



Photo 6: Pickleweed (*Salicornia rubra*) observed in one area of Type 5 Wetland.



Photo 7: View is northwest (311˚) from Transect 1 start.



Photo 8: View is southeast (131˚) from Transect 1 end.



Photo 9: View is southeast (297˚) from Transect 2 start.



Photo 10: View is northwest (316˚) from Transect 2 end.



Photo 11: View is northeast from Transect 3 start.



Photo 12: View is southwest from Transect 3 end.



Photo 13: View is north at Soil Pit 1 in Type 3-*Hordeum* Wetland.



Photo 14: View is north at Soil Pit 2 in Type 4-*Scirpus* wetland.

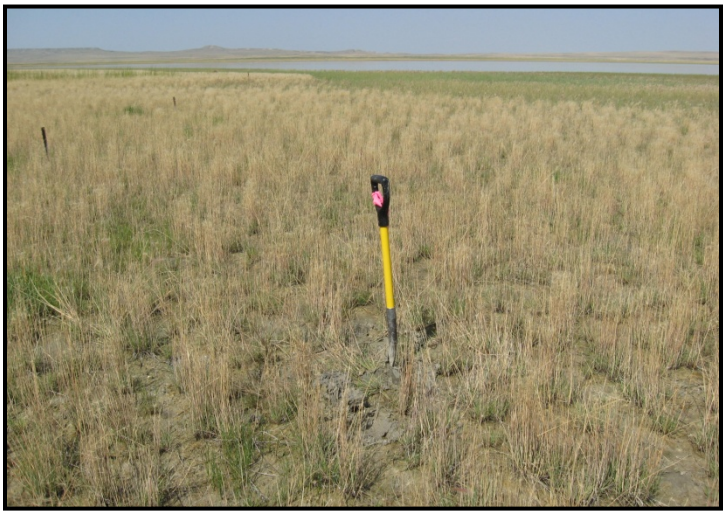


Photo 15: View is northwest at Soil Pit 3 in Type 5-*Hordeum* Wetland.



Photo 16: View is southeast at Soil Pit 4 in Type 4-*Hordeum* Wetland.

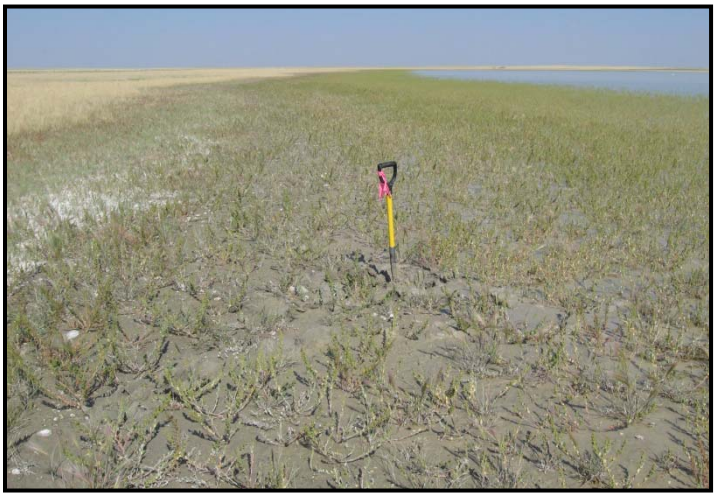


Photo 17: View is northeast at Soil Pit 5 in Type 5-*Suaeda*. Wetland.

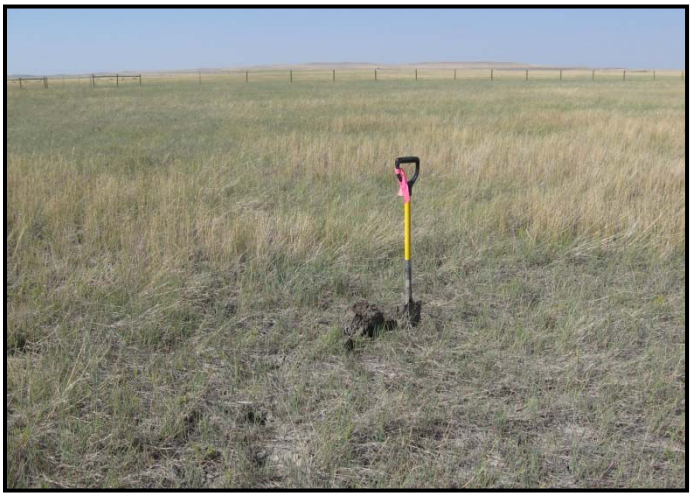


Photo 18: View is north at Soil Pit 6 in Type 1-Upland.



Photo 19: View is north northwest at Soil Pit 7 in Type 5 - *Suaeda* Wetland.

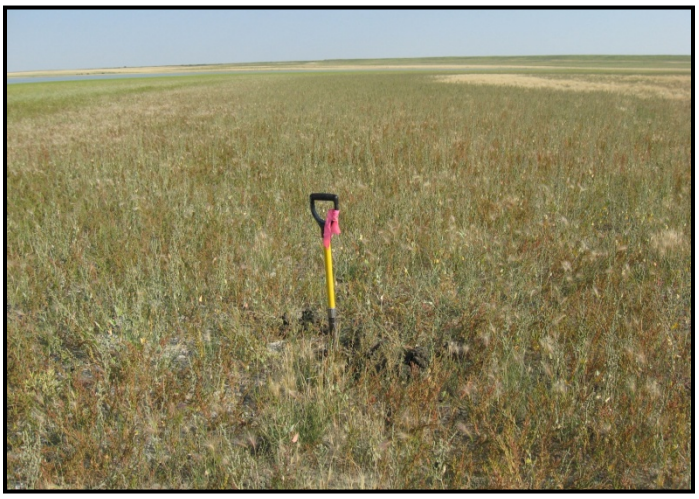


Photo 20: View is southeast at Soil Pit 8 in Type 5 - *Suaeda*, where *Suaeda* and *Atriplex patula* mix to form a distinct band.



Photo 21: View is northwest at Soil Pit 9 in Type 3 - *Hordeum* Wetland.



Photo 22: View is northeast at Soil Pit 10 in Type 3 - *Hordeum*. In this area, the grass is almost exclusively *Puccinellia*.

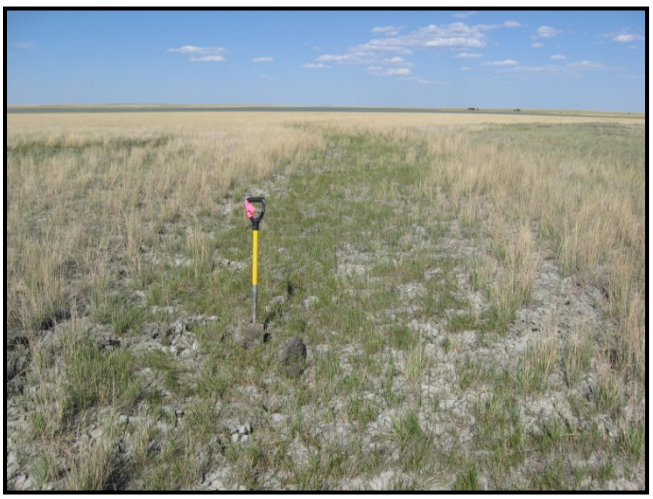


Photo 23: View is northeast at Soil Pit 11 in Type 4. In this area *Eleocharis palustris* dominates.

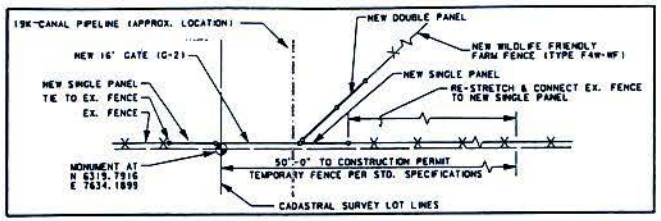


Photo 24: View is northeast at the macroinvertebrate sampling location (arrow).

Appendix D

PROJECT PLAN SHEET

MDT Wetland Mitigation Monitoring
Alkali Lake
Pondera County, Montana



DETAIL 'A'
(NO SCALE)

NOTES:

ALL PERMANENT FENCING IS WILDLIFE-FRIENDLY FARM FENCE TYPE F4W-WF. SEE DETAIL ON THIS SHEET.

SEE THE STANDARD SPECIFICATIONS FOR POST AND GATE REQUIREMENTS.

PLACE ALL FENCE WIRE ON OUTSIDE OF POST.

A DEADMAN MAY BE A PRECAST CONCRETE BLOCK, A CAST IN PLACE CONCRETE BLOCK, A ROCK OR OTHER APPROVED OBJECT WEIGHING AT LEAST 150 LB. BURY THE DEADMAN IN THE GROUND WITH AT LEAST 2'-0" OF COVER. ATTACH THE DEADMAN TO THE FENCE WITH 3 STRANDS OF 9 GAGE WIRE OR 6 STRANDS OF 12.5 GAGE WIRE. SEE THE FENCING DETAILS STANDARD DRAWING FOR ALTERNATE DEADMAN.

S = SINGLE PANEL

D = DOUBLE PANEL

UNLESS OTHERWISE NOTED, COORDINATES ARE FOR CADASTRAL SURVEY MONUMENTS. REFER TO RIGHT-OF-WAY PLANS FOR COMPLETE DESCRIPTIONS. DO NOT DISTURB MONUMENTS, BUT FENCE WITHIN THE BOUNDARIES ESTABLISHED BY THE MONUMENTS.

GATE COORDINATES ARE APPROXIMATE. SET GATES AND FENCING WITHIN THE LEGAL BOUNDARIES AS DISCUSSED ABOVE AND IN ACCORDANCE WITH GATE AND FARM FENCE STANDARD DETAILED DRAWINGS.

DISTANCES ARE BETWEEN MONUMENTS AS SHOWN IN THE RIGHT-OF-WAY PLANS UNLESS OTHERWISE NOTED.

STAYS
1. USE WIRE STAYS ON ALL FENCES.
2. LOCATE STAYS HALFWAY BETWEEN FENCE POSTS.
3. WIRE STAYS ARE 2 INCHES LONGER THAN THE DISTANCE BETWEEN THE TOP AND BOTTOM WIRES.

NOTES:
SEE THE STANDARD SPECIFICATIONS FOR POST REQUIREMENTS.

WIRE SPACING TABLE	
WILDLIFE-FRIENDLY FARM FENCE	
4'-0" FENCE HEIGHT	
BARBLESS WIRE (12.5 GAGE)	12"
BARB WIRE (12.5 GAGE)	10"
	10"
BARBLESS WIRE (12.5 GAGE)	16"
* DENOTES STAPLE LOCATIONS	

WILDLIFE-FRIENDLY FARM FENCE
(NO SCALE)

MONTANA DEPARTMENT OF TRANSPORTATION	SFILEABBREVS	DESIGNED BY		FENCING PLAN	REVISED	ALKALI LAKE	STPX-NH 37(26)
serving you with pride	SDATES	REVIEWED BY		PONDERA COUNTY		CSF = 0.0000000	UPN NUMBER 5000	SHEET 11 OF 20
	STIMES	CHECKED BY					

Appendix E

BIRD SURVEY PROTOCOL
GPS PROTOCOL

MDT Wetland Mitigation Monitoring
Alkali Lake
Pondera County, Montana

BIRD SURVEY PROTOCOL

This protocol was developed by the Montana Department of Transportation (MDT) to monitor bird use within their Wetland Mitigation Sites. Though each wetland mitigation site is vastly different, the bird survey data collection methods were standardized to order to increase repeatability. The protocol uses an "area search within a restricted time frame" to collect data on bird species, density, behavior, and habitat-type use.

Survey Area

Sites that can be entirely walked: Sites where the entire perimeter or area can be walked include, but are not limited to: small ponds, enhanced historic river channels, and wet meadows. If the wetland is not uncomfortably inundated, walk several meandering transects to sufficiently cover the wetland. Meandering transects can be used, even if a small portion of the area is inaccessible (e.g. cannot cross due to inundation). Use binoculars to identify the bird species, to count the number of individuals, and to identify their behavior and habitat type. Data can be recorded directly onto the bird survey form or into a field notebook. The number of meandering transects and their direction (or location) should be recorded in the field notebook and/or drawn onto the aerial photograph or topographic map. Meandering transects are not formal and should not be staked. Each site should be walked and surveyed to the fullest extent within the set time limit.

Sites than cannot be entirely walked: Sites where the entire perimeter or area cannot be walked include, but are not limited to: very large sites (i.e. perimeter of 2-3 miles), and large-bodied waters (i.e. reservoirs), where deep water habitat (> 6 feet) is close to shore. For large-bodied waters where only one area was graded to create or enhance the development of wetland, bird surveys should be walked along meandering transects within or around the graded area (see above.). For sites that cannot be walked, bird surveys should be conducted from many lookout posts, established at key vantage points. The general location of lookout posts should be recorded in the field notebook or drawn onto the aerial photograph or topographic map. Lookout post locations do not need to be staked. Both binoculars and spotting scopes may be used in order to accurately identify and count the birds. Depending upon the size of the open water, more time may be spent viewing the mitigation area from lookout posts than is spent traveling between posts.

Survey Time

Ideally, bird surveys should be conducted in the morning hours when bird activity is often greatest (i.e. sunrise to no later than 11:00 am). Surveys can be completed before 11am if all transects have been walked or all lookout posts have been viewed with no new bird activity observed. For some sites bird surveys may need to be performed in the late afternoon or evening due to traveling constraints or weather. The overall limiting time factor will be the number of budgeted hours for the project.

Data Recording

Bird Species List: Record each bird species observed onto the Bird Survey-Field Data Sheet (or field notebook). Record the bird's common name using the appropriate 4-letter code. The 4-letter code uses the first two letters of the first two word's of the bird's common name or if one name, the first four letters. For example, Mourning Dove is coded as MODO while Mallard is coded as MALL. If an unknown individual is observed, use the 4-letter protocol, but define your

abbreviation at the bottom of the field data sheet. For example, unknown shorebird is UNSB; unknown brown bird is UNBR; unknown warbler is UNWA; and unknown waterfowl is UNWF. For a flyover of a flock of unknown species, use a term that describes the birds' general characteristics and include the approximate flock size in parenthesis; do not fill in the habitat column. For example, a flock of black, medium-sized birds could be coded as UNBB / FO (25).

Bird Density: For each observation record the actual or estimated number of individuals observed per species and per behavior. Totals can be tallied in the office and entered onto the Bird Survey-Field Data Sheet.

Bird Behavior: Bird behavior must be identified by what is known. When a species is observed, the behavior that is immediately exhibited is recorded. Only behaviors that have discreet descriptive terms should be used. The following terms are recommended: breeding pair (BP); foraging (F); flyover (FO); loafing (L), which is defined as sleeping, roosting, or floating with head tucked under wing; and nesting (N). If other behaviors that have a specific descriptive word are observed then it can be used and should later be added to the protocol. Descriptive words or phrases such as "migrating" or "living on site" are unknown behaviors.

Bird Species Habitat Use: When a species is observed, the habitat is also recorded. The following broad habitat categories are used:

- aquatic bed (AB), defined as rooted-floating, floating-leaved, or submergent vegetation.
- marsh (MA), defined as emergent (e.g. cattail, bulrush) vegetation with surface water.
- wet meadow (WM), defined as grasses, sedges, or rushes with little to no surface water.
- scrub-shrub (SS), defined as shrub covered wetland.
- forested (FO), defined as tree covered wetland.
- open water (OW), defined as unvegetated surface water.
- upland (UP), defined as the upland buffer.

Other categories can be used and defined on the data sheet and should later be added to the protocol.

Other Fields

Bird Visit: Each bird survey (i.e. spring, fall, and mid-season) should be completed on separate Bird Survey-Field Data Sheets.

Time: Record the start time and end time on the Bird Survey-Field Data Sheet.

Date: Record the date of the bird survey.

Weather: Record the weather conditions (i.e. temperature, wind, condition).

Notes: Note if a particular individual bird is using a constructed nest box and note the condition of constructed nest box(es). Also record any comments about the site, wildlife, wetland conditions, etc.

GPS MAPPING AND AERIAL PHOTO REFERENCING PROCEDURE

From 2001 through 2006, PBS&J mapped the vegetation community boundaries, photograph points, and other sampling locations in the field using the resource-grade Trimble GEO III GPS (Global Positioning System) unit. The data were collected with a minimum of three positions per feature using Course/Acquisition code. The collected data were then transferred to a personal computer (PC) and differentially corrected to the nearest operating Community Base Station. The corrected data were then exported to ACAD drawings in Montana State Plain Coordinates NAD 83 international feet. The Trimble GEO III GPS unit was also used for some sites in 2007.

The collected and processed Trimble Geo III GPS positions had a 68% accuracy of 7 feet except in isolated areas where accuracy fell to 12 feet. This is within the 1 to 5 meter range listed as the expected accuracy of the mapping grade Trimble GPS.

In 2007 and 2008 sites were mapped using the resource-grade Magellan MobileMapper Office GPS unit. The Magellan GPS unit has a comparable accuracy level to the Trimble Geo III unit.

Each year, MDT photographs each mitigation site from the air. These aerial photographs are not geo-referenced, but serve as a visual aid to map wetland development and vegetation communities, and to show approximate locations for various monitoring activities (i.e. photograph points, transects, or macroinvertebrate sampling). Reference points that are observable on the aerial photo (i.e. road, stream channel, or fence) were also marked with the GPS unit in order to better position the aerial photograph. This positioning did not remove any of the distortion inherent to all photos. All mapped features and community boundaries were reviewed by the wetland biologist, to increase the figure's accuracy.

Any relationship of features located to easement or property lines are not to be construed from these figures. These relationships can only be determined with a survey by a licensed surveyor.

Appendix F

2009 MACROINVERTEBRATE SAMPLING PROTOCOL AND DATA

MDT Wetland Mitigation Monitoring
Alkali Lake
Pondera County, Montana

AQUATIC INVERTEBRATE SAMPLING PROTOCOL

Equipment List

- D-frame sampling net with 1 mm mesh.
- 1-liter, wide-mouth, plastic sample jars provided by Rhithron Associates, Inc. (Quart sized, wide-mouthed canning jars can be substituted.)
- 95% ethanol (alternatively isopropyl alcohol).
- Pre-printed sample labels (printed on rite-in-the-rain paper); two labels per sample.
- Pencil.
- Clear packaging tape.
- 3-5 gallon plastic pail.
- Large tea strainer or framed screen.
- Cooler with ice for storing sample.

Site Selection

Select a site that is accessible with hip waders or rubber boots. If the substrate is too soft, place a wide board down to walk on. Choose a site that is representative of the overall condition of the wetland. Annual sampling should occur at the same site within the wetland.

Sampling Procedure

Wetland invertebrates (macroinvertebrates) inhabit the substrate, the water column, the stems and leaves of aquatic vegetation, and the water surface. At the given location, each habitat type is sampled and combined into a single 1-liter sample jar. Pre-cautions are made to minimize disturbing the sample site in order to maximize the number of animals collected.

Fill the pail with approximately 1 gallon of wetland water. Ideally, sample the water column from near-shore outward to a depth of 3 feet. Sample the water column using a long sweep of the net, keeping the net at about half the depth of the water. Sample the water surface with a long sweep of the net. Aquatic vegetation is sampled by pulling the net beneath the water surface, for at least a meter in distance. The substrate is sampled by pulling the net along the bottom, bumping it against the substrate several times as you pull. Be sure to place some muck, mud, and/or vegetation into the jar. After sampling a habitat, rinse the net in the bucket and look for insects, crustaceans, and other aquatic invertebrates. It is not necessary to sample habitats in any specific order, but all habitats, if present, are to be sampled. Habitats can be sampled more than once.

Fill about 1 cup of ethanol into the sample jar. Sieve the contents of the bucket through the straining device and pour or carefully scrape the contents of the strainer into the sample jar. Top off the jar with enough ethanol to cover all the material and leave as little headroom as possible. Alternatively, sampled materials can be lifted out of the net and put directly into the jar. Be sure to include some muck, mud, and/or vegetation into the jar. Each macroinvertebrate sampling site should have only one sampling jar.

Using pencil, complete two labels with the required information: project name, project number, date, collector's name, and habitats sampled. Do not complete the label with ink as it will dissolve in ethanol. For wetlands with at least two macroinvertebrate sampling sites, number the site consecutively followed by the total number of sites (e.g. Sample 2 of 3 sites). Place one label into the jar and seal the jar. Dry the jar off, if necessary, and tape the second label to the outside of the jar.

Photograph each macroinvertebrate sampling site.

Sample Handling/Delivery

In the field, keep sample jars cool by placing in a cooler with a small amount of ice.
Deliver samples to the PBS&J office in Missoula, where they will be inventoried and delivered to Rhithron Associates, Inc.

MDT Mitigated Wetland Monitoring Project: Aquatic Invertebrate Monitoring
Summary 2001 – 2009

Prepared for Post, Buckley, Schuh, and Jernigan (PBS&J)
Prepared by W.Bollman, Rhithron Associates, Inc.

INTRODUCTION

This report summarizes data generated from eight years of mitigated wetland monitoring from sites throughout the State of Montana. A total of 229 invertebrate samples have been collected over the study period. Table 1 lists the currently monitored sites at which aquatic invertebrates were collected in 2009, and summarizes the sampling history of each.

METHODS

Sampling and Sample Processing

Aquatic invertebrate samples were collected at mitigated wetland sites in the summer months of 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, and 2009 by personnel of PBS&J. Sampling procedures were based on the protocols developed by the Montana Department of Environmental Quality (MDEQ) for wetland sampling. Sampling consisted of D-frame net sweeps through emergent vegetation (when present), the water column, and over the water surface, and included disturbing and scraping substrates at each sampled site. These sample components were composited and preserved in ethanol at each wetland site. Samples were delivered to Rhithron Associates, Inc. for processing, taxonomic determinations, and data analysis.

Standard sorting protocols were applied to achieve representative subsamples of a minimum of 100 organisms. Caton sub-sampling devices (Caton 1991), divided into 30 grids, each approximately 5 cm by 6 cm, were used. Grid contents were examined under stereoscopic microscopes using 10x-30x magnification. All aquatic invertebrates from each selected grid were sorted from the substrate, and placed in 95% ethanol for subsequent identification. Grid selection, examination, and sorting continued until at least 100 organisms were sorted. A large/rare search was conducted to collect any taxa not found in the subsampling procedure.

Organisms were individually examined using 10x – 80x stereoscopic dissecting scopes (Leica S8E and S6E) and identified to the lowest practical taxonomic levels using appropriate published taxonomic references. Identification, counts, life stages, and information about the condition of specimens were recorded on bench sheets. To obtain accuracy in richness measures, organisms that could not be identified to the target level specified in MDEQ protocols were designated as “not unique” if other specimens from the same group could be taken to target levels. Organisms designated as “unique” were those that could be definitively distinguished from other organisms in the sample. Identified organisms were preserved in 95% ethanol in labeled vials, and archived at the Rhithron laboratory. Midges were morphotyped using 10x – 80x stereoscopic dissecting microscopes (Leica S8E and S6E) and representative specimens were slide mounted and examined at 200x – 1000x magnification using an Olympus BX 51 compound microscope. Slide mounted organisms were also archived at the Rhithron laboratory.

Assessment

The method employed to assess these wetlands is based on an index incorporating a battery of 12 bioassessment metrics or attributes (Table 1) tested and recommended by Stribling et al. (1995) in a report to the Montana Department of Health and Environmental Science. In that study, it was determined that some of the metrics were of limited use in some geographic regions, and for some wetland types. Despite that finding, all 12 metrics are used in this evaluation of mitigated wetlands, since detailed geographic information and wetland classifications were unavailable for this report. Scoring criteria for the 12 metrics were developed specifically for this project, since mitigated wetlands were not included in original criteria development.

Scoring criteria for wetland metrics were developed by generally following the tactic used by Stribling et al. (1995). Boxplots were generated using a statistical software package (Statistica™), and distributions, median values, ranges, and quartiles for each metric were examined. For the wetland sites, “good” scores were generally

those that fell above the 75th percentile (for those metrics that decrease in value in response to stress) or below the 25th percentile (for metrics that respond to stress by an increase in value) of all scores. Additional scoring ranges were established by bisecting the range below the 75th percentile for decreasing scores (or above the 25th percentile for increasing scores) into "sub-optimal" and "poor" assessment categories. A score of 5, 3, or 1 was assigned to good, sub-optimal, and poor metric performance, respectively. In this way, metric values were translated into normalized metric scores, and scores for all metrics were summed to produce a total bioassessment score, which is expressed as a percentage of the maximum possible score (60). Total bioassessment scores were classified according to a similar process, using the ranges and distributions of total scores for all sites studied between 2001 and 2007. Data from a total of 167 sites were used to develop criteria.

Six sites in this study supported aquatic fauna characteristic of lotic habitats rather than lentic wetland habitats; these sites were excluded from mitigated wetland scoring criteria development, and were evaluated with a metric battery specific to flowing water habitats. In 2008, the lotic sites were Camp Creek (2 sites), Cloud Ranch stream, Jack Creek – McKee Spring, and Jocko Spring Creek (2 sites). Invertebrate assemblages at these sites were generally characteristic of montane or foothill stream conditions and were assessed using the tested metric battery developed for montane streams of Western Montana (MVFP index: Bollman 1998).

The purpose of constructing an index from biological attributes or metrics is to provide a means of integrating information to facilitate the determination of whether management action is needed. However, the nature of the action needed is not determined solely by the index score or impairment classification, but by consideration of an analysis of the component metrics, the taxonomic composition of the assemblages, and other issues. The diagnostic functions of the metrics and taxonomic data need more study since our understanding of the interrelationships of natural environmental factors and anthropogenic disturbances is tentative. Thus, the bioassessment index used in this report may not be universally applicable to all wetland types, and in particular, to constructed wetlands. Scores and impairment classifications derived from the index may not be valid indications of impairment or non-impairment. In addition, the further interpretive remarks accompanying the raw taxonomic and metric data in this summary are offered cautiously. Year-to-year comparisons depend on an assumption that specific sites were revisited in each year, and that equivalent sampling methods were utilized at each site revisit.

Bioassessment metrics - wetlands

An index based on the performance of 12 metrics was constructed, as described above. Table 2 lists those metrics, describes their calculation and the expected response of each to increased degradation or impairment of the wetland.

In addition to the summed scores of each metric and the associated impairment classification described above, each individual metric informs the bioassessment to some degree. The four richness metrics (Total taxa, POET, Chironomidae taxa, and Crustacea taxa + Mollusca taxa) can be interpreted to express habitat complexity as well as water quality. Complex, diverse habitats consist of variable substrates, emergent vegetation, variable water depths and other factors, and are potential features of long-established stable wetlands with minimal human disturbance. In the study conducted by Stribling et al. (1995), all four richness metrics were found to be significantly associated with water quality parameters including conductance, salinity, and total dissolved solids.

Four composition metrics (%Chironomidae, %Orthocladiinae of Chironomidae, %Crustacea + %Mollusca, and %Amphipoda) measure the relative contributions of certain taxonomic groups that may have significant responses to habitat and/or water quality impacts. For example, amphipods have been demonstrated to increase in abundance in alkaline conditions. Short-lived, relatively mobile taxa such as chironomids dominate ephemeral environments; many are hemoglobin-bearers capable of tolerating de-oxygenated conditions.

Two tolerance metrics (Hilsenhoff Biotic Index [HBI] and %Dominant Taxon) were included in the bioassessment battery. The HBI indicates the overall invertebrate assemblage tolerance to nutrient enrichment, warm water, and/or low dissolved oxygen conditions. The percent abundance of the dominant taxon has been demonstrated to be strongly associated with pH, conductance, salinity, total organic carbon, and total dissolved solids.

Two trophic measures (%Collector-gatherers and %Filterers) may be helpful in expressing functional integrity of the invertebrate assemblage, which can be impacted by poor water quality or habitat degradation. High proportions of filtering organisms suggest nutrient and/or organic enrichment, while abundant collectors suggest more positive functional conditions and well-developed wetland morphology. These organisms graze periphyton growing on stable surfaces such as macrophytes.

Summary metric values and scores for the 2009 samples are given in Tables 4a-4c and 5. Thermal preference of invertebrate assemblages was calculated using Brandt 2001.

Bioassessment metrics – lotic habitats

For sites supporting rheophilic invertebrate assemblages, bioassessment was based on a metric battery and scoring criteria developed for montane regions of Montana (MVFP index: Bollman 1998). The six metrics constituting the bioassessment index used for MVFP sites in this study were selected because, both individually and as an integrated metric battery, they are robust at distinguishing impaired sites from relatively unimpaired sites (Bollman 1998). They have been demonstrated to be more variable with anthropogenic disturbance than with natural environmental gradients (Bollman 1998). Each of the six metrics and their expected responses to various stressors are described below.

1. Ephemeroptera (mayfly) taxa richness. The number of mayfly taxa declines as water quality diminishes. Impairments to water quality which have been demonstrated to adversely affect the ability of mayflies to flourish include elevated water temperatures, heavy metal contamination, increased turbidity, low or high pH, elevated specific conductance and toxic chemicals. Few mayfly species are able to tolerate certain disturbances to instream habitat, such as excessive sediment deposition.

2. Plecoptera (stonefly) taxa richness. Stoneflies are particularly susceptible to impairments that affect a stream on a reach-level scale, such as loss of riparian canopy, streambank instability, channelization, and alteration of morphological features such as pool frequency and function, riffle development and sinuosity. Just as all benthic organisms, they are also susceptible to smaller scale habitat loss, such as by sediment deposition, loss of interstitial spaces between substrate particles, or unstable substrate.

3. Trichoptera (caddisfly) taxa richness. Caddisfly taxa richness has been shown to decline when sediment deposition affects habitat. In addition, the presence of certain case-building caddisflies can indicate good retention of woody debris and lack of scouring flow conditions.

4. Number of sensitive taxa. Sensitive taxa are generally the first to disappear as anthropogenic disturbances increase. The list of sensitive taxa used here includes organisms sensitive to a wide range of disturbances, including warmer water temperatures, organic or nutrient pollution, toxic pollution, sediment deposition, substrate instability and others. Unimpaired streams of western Montana typically support at least four sensitive taxa (Bollman 1998).

5. Percent filter feeders. Filter-feeding organisms are a diverse group; they capture small particles of organic matter, or organically enriched sediment material, from the water column by means of a variety of adaptations, such as silken nets or hairy appendages. In forested montane streams, filterers are expected to occur in insignificant numbers. Their abundance increases when canopy cover is lost and when water temperatures increase and the accompanying growth of filamentous algae occurs. Some filtering organisms, specifically the Arctopsychid caddisflies (*Arctopsyche* spp. and *Parapsyche* spp.) build silken nets with large mesh sizes that capture small organisms such as chironomids and early-instar mayflies. Here they are considered predators, and, in this study, their abundance does not contribute to the percent filter feeders metric.

6. Percent tolerant taxa. Tolerant taxa are ubiquitous in stream sites, but when disturbance increases, their abundance increases proportionately. The list of taxa used here includes organisms tolerant of a wide range of disturbances, including warmer water temperatures, organic or nutrient pollution, toxic pollution, sediment deposition, substrate instability and others.

Table 1. Montana Department of Transportation Mitigated Wetlands Monitoring Project sites: sampling history. Only sites sampled in 2009 are included. An asterisk indicates lotic sites.

Site identifier	2002	2003	2004	2005	2006	2007	2008	2009
Camp Creek MS-1*	+	+	+	+	+	+	+	+
Camp Creek MS-2*					+	+	+	+
Cloud Ranch Pond			+	+	+	+	+	+
Cloud Ranch Stream (Big Timber)*			+			+	+	+
Jack Creek – McKee Spring Creek*					+	+	+	+
Jack Creek – pond			+	+	+	+	+	+
Rock Creek Ranch				+	+	+	+	+
Wagner Marsh				+	+	+	+	+
Alkali Lake 1					+	+	+	+
West Fork of Charley Creek						+	+	+
Little Muddy Creek						+	+	+
Selkirk Ranch						+	+	+
Jocko Spring Creek MS1							+	+
Jocko Spring Creek MS2							+	+
Sportsman's Campground Site #1							+	+
Sportsman's Campground Site #2							+	+
Sportsman's Campground Site #3							+	+
Lonepine #1							+	+
Lonepine #2							+	+

Table 2. Aquatic invertebrate metrics employed for wetland (lentic) invertebrate assemblages in the MDT mitigated wetlands study, 2001 – 2009.

Metric	Metric calculation	Expected response to degradation or impairment
Total taxa	Count of unique taxa identified to lowest recommended taxonomic level.	Decrease
POET	Count of unique Plecoptera, Trichoptera, Ephemeroptera, and Odonata taxa identified to lowest recommended taxonomic level.	Decrease
Chironomidae taxa	Count of unique midge taxa identified to lowest recommended taxonomic level.	Decrease
Crustacea taxa + Mollusca taxa	Count of unique Crustacea taxa and Mollusca taxa identified to lowest recommended taxonomic level.	Decrease
% Chironomidae	Percent abundance of midges in the subsample.	Increase
Orthocladiinae / Chironomidae	Number of individual midges in the sub-family Orthocladiinae / total number of midges in the subsample.	Decrease
%Amphipoda	Percent abundance of amphipods in the subsample.	Increase
%Crustacea + %Mollusca	Percent abundance of crustaceans in the subsample plus percent abundance of molluscs in the subsample.	Increase
HBI	Relative abundance of each taxon multiplied by that taxon's modified Hilsenhoff Biotic Index (tolerance) value. These numbers are summed over all taxa in the subsample.	Increase
%Dominant taxon	Percent abundance of the most abundant taxon in the subsample.	Increase
%Collector-Gatherers	Percent abundance of organisms in the collector-gatherer functional group.	Decrease
%Filterers	Percent abundance of organisms in the filterer functional group.	Increase

RESULTS

(Note: Individual site discussions were removed from this report by PBS&J and are included in the macroinvertebrate sections of individual monitoring reports. Summary tables for lentic (4a – 4c) and lotic (5) sites and project specific taxa listing(s) and metrics report(s) are provided on the following pages.)

Table 4a. Metric values and scores for wetland (lentic) sites in the MDT mitigated wetland study – 2009 sampling.

METRIC	Cloud Ranch Pond	Jack Creek Pond	Rock Creek Ranch	Wagner Marsh	Alkali Lake	West Fork of Charley Creek	Little Muddy Creek
Total taxa	15	11	20	18	17	7	18
POET	2	0	2	3	1	0	1
Chironomidae taxa	6	3	3	5	10	2	6
Crustacea + Mollusca	0	5	6	7	1	1	6
% Chironomidae	14.47%	66.67%	43.75%	16.07%	61.00%	2.73%	42.40%
Orthocladiinae/Chir	45.45%	20.00%	57.14%	22.22%	52.46%	0.00%	86.79%
%Amphipoda	0.00%	3.33%	0.00%	1.79%	0.00%	91.82%	4.80%
%Crustacea + %Mollusca	0.00%	23.33%	32.14%	34.82%	1.00%	91.82%	34.40%
HBI	6.026666	9	7.045045	7.981652	6	7.90909	7.448
%Dominant taxon	40.79%	53.33%	23.21%	23.21%	30.00%	91.82%	36.00%
%Collector-Gatherers	21.05%	73.33%	61.61%	43.75%	51.00%	91.82%	37.60%
%Filterers	0.00%	0.00%	7.14%	4.46%	0.00%	0.00%	4.80%
Total taxa	3	1	3	3	3	1	3
POET	1	1	1	3	1	1	1
Chironomidae taxa	3	3	3	3	5	1	3
Crustacea + Mollusca	1	3	5	5	1	1	5
% Chironomidae	5	1	1	5	1	5	1
Orthocladiinae/Chir	5	3	5	3	5	1	5
%Amphipoda	5	5	5	5	5	1	3
%Crustacea + %Mollusca	5	5	5	3	5	1	3
HBI	5	1	3	1	5	1	3
%Dominant taxon	3	1	5	5	5	1	3
%Collector-Gatherers	1	3	3	1	3	5	1
%Filterers	3	3	1	3	3	3	3
Total score	**40**	**30**	**40**	**40**	**42**	**22**	**34**
Percent of maximum score	**66.67%**	**50.00%**	**66.67%**	**66.67%**	**70.00%**	**36.67%**	**56.67%**
Impairment classification	**optimal**	**sub-optimal**	**optimal**	**optimal**	**optimal**	**poor**	**sub-optimal**

Table 4b. Metric values and scores for wetland (lentic) sites in the MDT mitigated wetland study – 2009 sampling.

METRIC	Selkirk Ranch	Sportsman's Campground Site #1	Sportsman's Campground Site #2	Sportsman's Campground Site #3	Lonepine #1	Lonepine #2
Total taxa	17	19	11	23	22	19
POET	1	1	0	2	2	3
Chironomidae taxa	6	10	8	11	11	8
Crustacea + Mollusca	6	4	2	4	4	2
% Chironomidae	27.27%	38.46%	90.00%	41.82%	67.83%	25.86%
Orthocladiinae/Chir	43.33%	37.50%	3.33%	23.91%	7.69%	16.67%
%Amphipoda	5.45%	25.96%	2.00%	4.55%	0.00%	0.00%
%Crustacea + %Mollusca	62.73%	51.92%	5.00%	50.00%	6.96%	18.10%
HBI	8.245455	6.942309	6.9	7.345455	7.196427	7.191304
%Dominant taxon	30.00%	24.04%	45.00%	27.27%	51.30%	15.52%
%Collector-Gatherers	57.27%	50.00%	91.00%	83.64%	86.09%	63.79%
%Filterers	3.64%	25.96%	18.00%	29.09%	1.74%	6.03%
Total taxa	3	3	1	5	5	3
POET	1	1	1	1	1	3
Chironomidae taxa	3	5	5	5	5	5
Crustacea + Mollusca	5	3	1	3	3	1
% Chironomidae	3	3	1	1	1	3
Orthocladiinae/Chir	3	3	1	3	1	1
%Amphipoda	3	1	5	3	5	5
%Crustacea + %Mollusca	3	3	5	3	5	5
HBI	1	3	3	3	3	3
%Dominant taxon	5	5	3	5	1	5
%Collector-Gatherers	3	3	5	5	5	3
%Filterers	3	1	1	1	3	1
Total score	**36**	**34**	**32**	**38**	**38**	**38**
Percent of maximum score	**60.00%**	**56.67%**	**53.33%**	**63.33%**	**63.33%**	**63.33%**
Impairment classification	**sub-optimal**	**sub-optimal**	**sub-optimal**	**sub-optimal**	**sub-optimal**	**sub-optimal**

Table 5. Metric values and scores for stream (lotic) sites in the MDT mitigated wetland study – 2009 sampling.

METRIC	Camp Creek MS-1	Camp Creek MS-2	Cloud Ranch Stream	Jack Creek McKee	Jocko Spring Creek MS-1	Jocko Spring Creek MS-2
E Richness	2	4	1	1	2	1
P Richness	1	0	0	0	0	0
T Richness	2	4	4	1	3	2
Pollution Sensitive Richness	1	1	0	0	1	0
Filterer Percent	11.88%	22.02%	18.18%	25.23%	27.36%	10.91%
Pollution Tolerant Percent	13.86%	12.84%	15.15%	8.41%	12.26%	32.73%
E Richness	1	2	0	0	1	0
P Richness	1	0	0	0	0	0
T Richness	1	2	2	0	2	1
Pollution Sensitive Richness	1	1	0	0	1	0
Filterer Percent	1	1	1	0	0	1
Pollution Tolerant Percent	1	1	1	2	1	1
Total score	**6**	**7**	**4**	**2**	**5**	**3**
Percent of maximum score	**33.33%**	**38.89%**	**22.22%**	**11.11%**	**27.78%**	**16.67%**
Impairment classification	**moderate**	**moderate**	**moderate**	**severe**	**moderate**	**severe**

LITERATURE CITED

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Brandt, D. 2001. Temperature Preferences and Tolerances for 137 Common Idaho Macroinvertebrate Taxa. Report to the Idaho Department of Environmental Quality, Coeur d' Alene, Idaho.

Caton, L. W. 1991. Improving subsampling methods for the EPA's "Rapid Bioassessment" benthic protocols. Bulletin of the North American Benthological Society. 8(3): 317-319.

Stribling, J.B., J. Lathrop-Davis, M.T. Barbour, J.S. White, and E.W. Leppo. 1995. Evaluation of environmental indicators for the wetlands of Montana: the multimetric approach using benthic macroinvertebrates. Report to the Montana Department of Health and Environmental Science. Helena, Montana.

Taxa Listing

Project ID: MDT09PBSJ
RAI No.: MDT09PBSJ017

RAI No.: MDT09PBSJ017 **Sta. Name:** Alkali Lake
Client ID:
Date Coll.: 8/24/2009 **No. Jars:** 1 **STORET ID:**

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Non-Insect							
Enchytraeidae							
Enchytraeus sp.	1	1.00%	Yes	Unknown		4	CG
Planorbidae							
Gyraulus sp.	1	1.00%	Yes	Unknown		8	SC
Odonata							
Coenagrionidae							
Coenagrionidae	1	1.00%	Yes	Larva	Damaged	7	PR
Heteroptera							
Corixidae							
Corixidae	1	1.00%	Yes	Larva		10	PH
Coleoptera							
Dytiscidae							
Dytiscidae	2	2.00%	Yes	Larva		5	PR
Hydrophilidae							
Berosus sp.	1	1.00%	Yes	Larva		5	PR
Diptera							
Ceratopogonidae							
Ceratopogonidae	2	2.00%	No	Pupa		6	PR
Ceratopogoninae	30	30.00%	Yes	Larva		6	PR
Chironomidae							
Chironomidae							
Ablabesmyia sp.	1	1.00%	Yes	Larva		8	CG
Acricotopus sp.	1	1.00%	Yes	Larva		10	CG
Corynoneura sp.	11	11.00%	Yes	Larva		7	CG
Cricotopus (Isocladius) sp.	2	2.00%	Yes	Larva		7	SH
Micropsectra sp.	15	15.00%	Yes	Larva		4	CG
Paramerina sp.	9	9.00%	Yes	Larva		6	PR
Parametriocnemus sp.	1	1.00%	Yes	Larva		5	CG
Paratanytarsus sp.	4	4.00%	Yes	Larva		6	CG
Psectrocladius sp.	5	5.00%	Yes	Larva		8	CG
Pseudosmittia sp.	12	12.00%	Yes	Larva		6	CG
Sample Count	**100**						

Metrics Report

Project ID: MDT09PBSJ
RAI No.: MDT09PBSJ017
Sta. Name: Alkali Lake
Client ID:
STORET ID:
Coll. Date: 8/24/2009

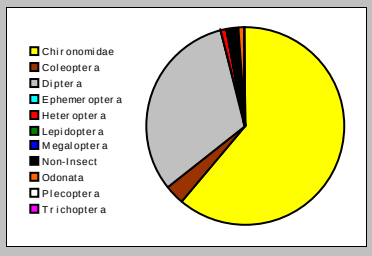
Abundance Measures

Sample Count: 100
Sample Abundance: 107.14 93.33% of sample used

Coll. Procedure:
Sample Notes:

Taxonomic Composition

Category	R	A	PRA
Non-Insect	2	2	2.00%
Odonata	1	1	1.00%
Ephemeroptera			
Plecoptera			
Heteroptera	1	1	1.00%
Megaloptera			
Trichoptera			
Lepidoptera			
Coleoptera	2	3	3.00%
Diptera	1	32	32.00%
Chironomidae	10	61	61.00%

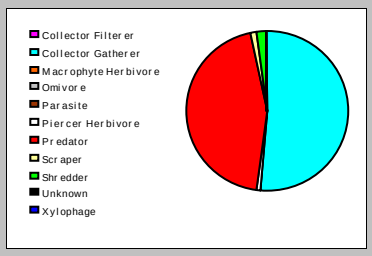


Dominant Taxa

Category	A	PRA
Ceratopogoninae	30	30.00%
Micropsectra	15	15.00%
Pseudosmittia	12	12.00%
Corynoneura	11	11.00%
Paramerina	9	9.00%
Psectrocladius	5	5.00%
Paratanytarsus	4	4.00%
Dytiscidae	2	2.00%
Cricotopus (Isocladius)	2	2.00%
Ceratopogonidae	2	2.00%
Parametriocnemus	1	1.00%
Enchytraeus	1	1.00%
Corixidae	1	1.00%
Acricotopus	1	1.00%
Ablabesmyia	1	1.00%

Functional Composition

Category	R	A	PRA
Predator	5	45	45.00%
Parasite			
Collector Gatherer	9	51	51.00%
Collector Filterer			
Macrophyte Herbivore			
Piercer Herbivore	1	1	1.00%
Xylophage			
Scraper	1	1	1.00%
Shredder	1	2	2.00%
Omivore			
Unknown			

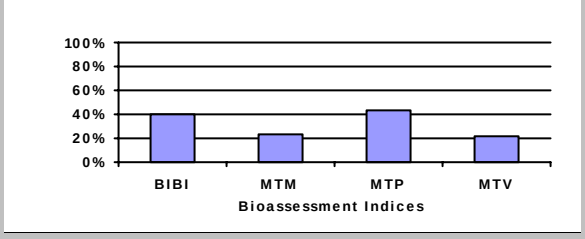


Metric Values and Scores

Metric	Value	BIBI	MTP	MTV	MTM
Composition					
Taxa Richness	17	1	1		0
Non-Insect Percent	2.00%				
E Richness	0	1		0	
P Richness	0	1		0	
T Richness	0	1		0	
EPT Richness	0		0		0
EPT Percent	0.00%		0		0
Oligochaeta+Hirudinea Percent	1.00%				
Baetidae/Ephemeroptera	0.000				
Hydropsychidae/Trichoptera	0.000				
Dominance					
Dominant Taxon Percent	30.00%		2		2
Dominant Taxa (2) Percent	45.00%				
Dominant Taxa (3) Percent	57.00%	3			
Dominant Taxa (10) Percent	92.00%				
Diversity					
Shannon H (loge)	2.187				
Shannon H (log2)	3.155		3		
Margalef D	3.490				
Simpson D	0.150				
Evenness	0.090				
Function					
Predator Richness	5		2		
Predator Percent	45.00%	5			
Filterer Richness	0				
Filterer Percent	0.00%			3	
Collector Percent	51.00%		3		3
Scraper+Shredder Percent	3.00%		1		0
Scraper/Filterer	0.000				
Scraper/Scraper+Filterer	0.000				
Habit					
Burrower Richness	1				
Burrower Percent	30.00%				
Swimmer Richness	2				
Swimmer Percent	2.00%				
Clinger Richness	1	1			
Clinger Percent	2.00%				
Characteristics					
Cold Stenotherm Richness	0				
Cold Stenotherm Percent	0.00%				
Hemoglobin Bearer Richness	3				
Hemoglobin Bearer Percent	11.00%				
Air Breather Richness	2				
Air Breather Percent	3.00%				
Voltinism					
Univoltine Richness	5				
Semivoltine Richness	2	1			
Multivoltine Percent	61.00%		1		
Tolerance					
Sediment Tolerant Richness	1				
Sediment Tolerant Percent	1.00%				
Sediment Sensitive Richness	0				
Sediment Sensitive Percent	0.00%				
Metals Tolerance Index	3.420				
Pollution Sensitive Richness	0	1		0	
Pollution Tolerant Percent	11.00%	5		1	
Hilsenhoff Biotic Index					
Intolerant Percent	0.00%				
Supertolerant Percent	9.00%				
CTQa	103.200				

Bioassessment Indices

BioIndex	Description	Score	Pct	Rating
BIBI	B-IBI (Karr et al.)	20	40.00%	
MTP	Montana DEQ Plains (Bukantis 1998)	13	43.33%	Moderate
MTV	Montana Revised Valleys/Foothills (Bollman 1998)	4	22.22%	Moderate
MTM	Montana DEQ Mountains (Bukantis 1998)	5	23.81%	Moderate

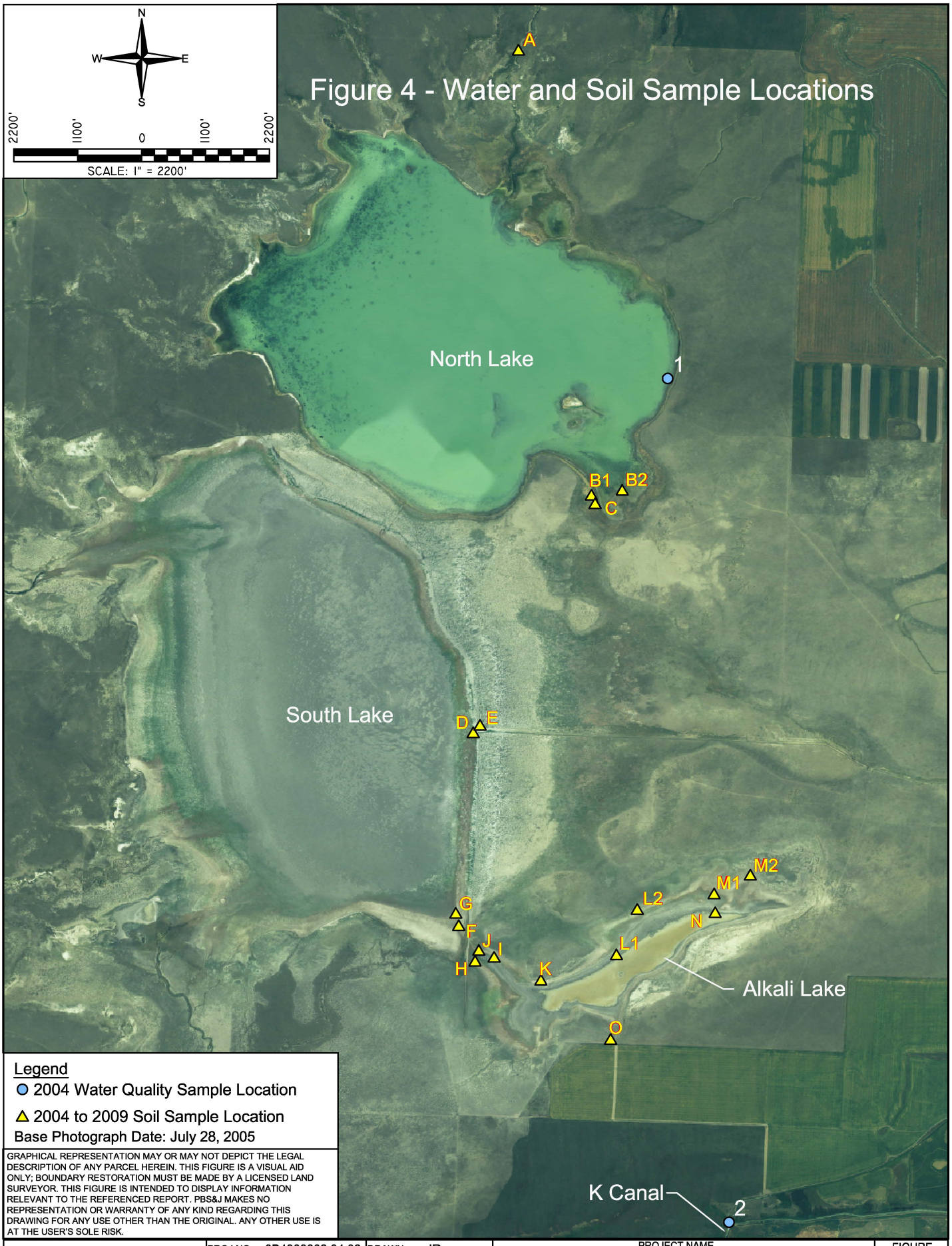


Appendix G

FIGURE 4
2004 - 2009 SOILS METALS DATA

MDT Wetland Mitigation Monitoring
Alkali Lake
Pondera County, Montana

Figure 4 - Water and Soil Sample Locations



Legend

- 2004 Water Quality Sample Location
- 2004 to 2009 Soil Sample Location

Base Photograph Date: July 28, 2005

GRAPHICAL REPRESENTATION MAY OR MAY NOT DEPICT THE LEGAL DESCRIPTION OF ANY PARCEL HEREIN. THIS FIGURE IS A VISUAL AID ONLY; BOUNDARY RESTORATION MUST BE MADE BY A LICENSED LAND SURVEYOR. THIS FIGURE IS INTENDED TO DISPLAY INFORMATION RELEVANT TO THE REFERENCED REPORT. PBS&J MAKES NO REPRESENTATION OR WARRANTY OF ANY KIND REGARDING THIS DRAWING FOR ANY USE OTHER THAN THE ORIGINAL. ANY OTHER USE IS AT THE USER'S SOLE RISK.

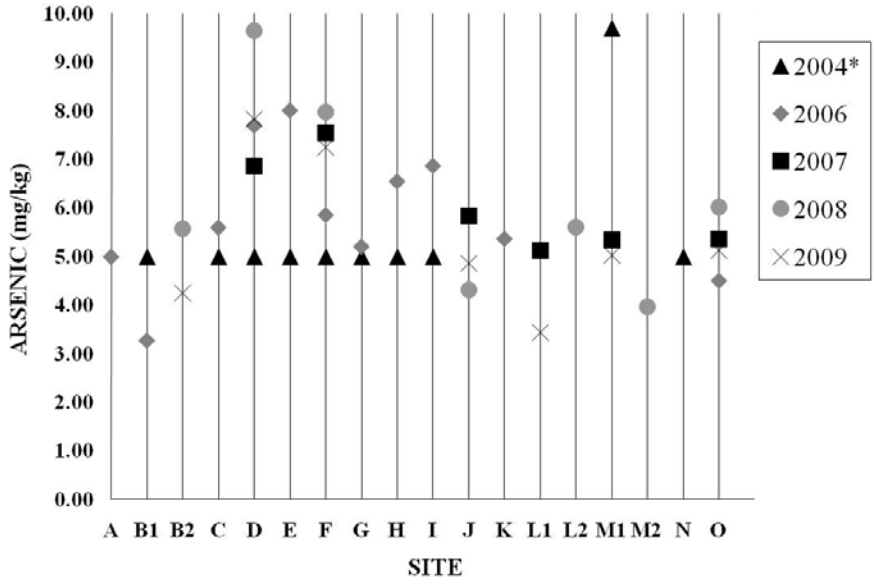
PBSJ
801 N. Last Chance Gulch
Suite 101
Helena, MT 59601

PROJ NO: 0B4308802 04.02	DRAWN: JR	PROJECT NAME: ALKALI LAKE WETLAND MITIGATION SITE	FIGURE 4 OF -
LOCATION: CUT BANK, MT	PROJ MGR: J. BERGLUND		
SCALE: NOTED	CHECKED: AP APPVD: JB	DRAWING TITLE: 2004 - 2009 WATER AND SOIL SAMPLE LOCATIONS	REV -
FILE NAME: BASE2009.dwg	DATE: Nov/04/2009		

Table 12. ***Years sampled for each water (1-2) and soil (A-O) sample location at North Alkali, South Alkali, and Alkali Lakes.***

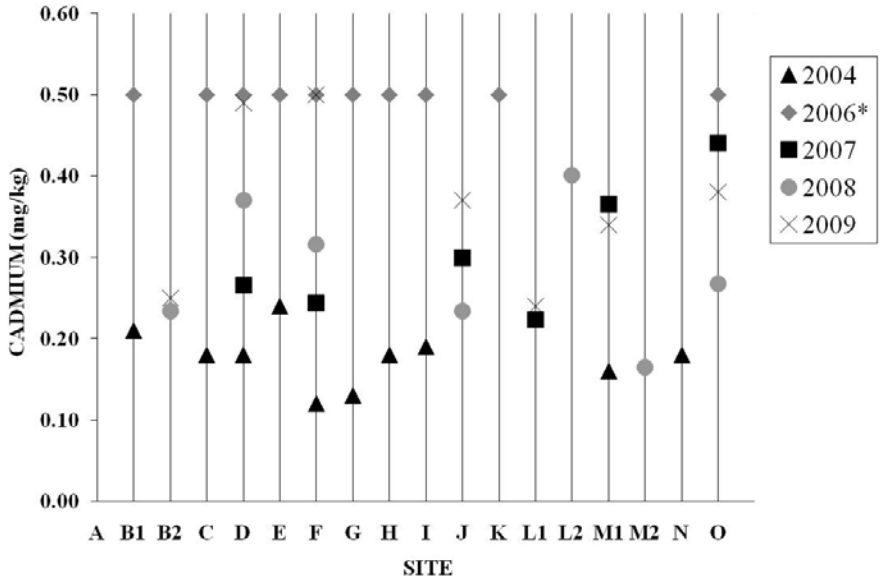
YEAR	SAMPLING SITE																			
	1	2	A	B1	B2	C	D	E	F	G	H	I	J	K	L1	L2	M1	M2	N	O
2004	✓	✓		✓		✓	✓	✓	✓	✓	✓	✓					✓		✓	
2006			✓	✓		✓	✓	✓	✓	✓	✓	✓		✓						✓
2007							✓		✓				✓		✓		✓			✓
2008					✓		✓		✓				✓			✓		✓		✓
2009					✓		✓		✓				✓		✓		✓			✓

Chart 8: ***Arsenic metal levels in soil samples collected in 2004 (baseline) and 2006 to 2009 for North Alkali, South Alkali, and Alkali Lakes.***



***2004 data measured arsenic levels <5.00 mg/kg for Sites A to I, K, and O.**

Chart 9: ***Cadmium metal levels in soil samples collected in 2004 (baseline) and 2006 to 2009 for North Alkali, South Alkali, and Alkali Lakes.***



***2006 data measured cadmium levels <1.00 mg/kg for Site A and <0.50 mg/kg for Sites B1 to I, K, and O.**

Chart 10: ***Nickel metal levels in soil samples collected in 2004 (baseline) and 2006 to 2009 for North Alkali, South Alkali, and Alkali Lakes.***

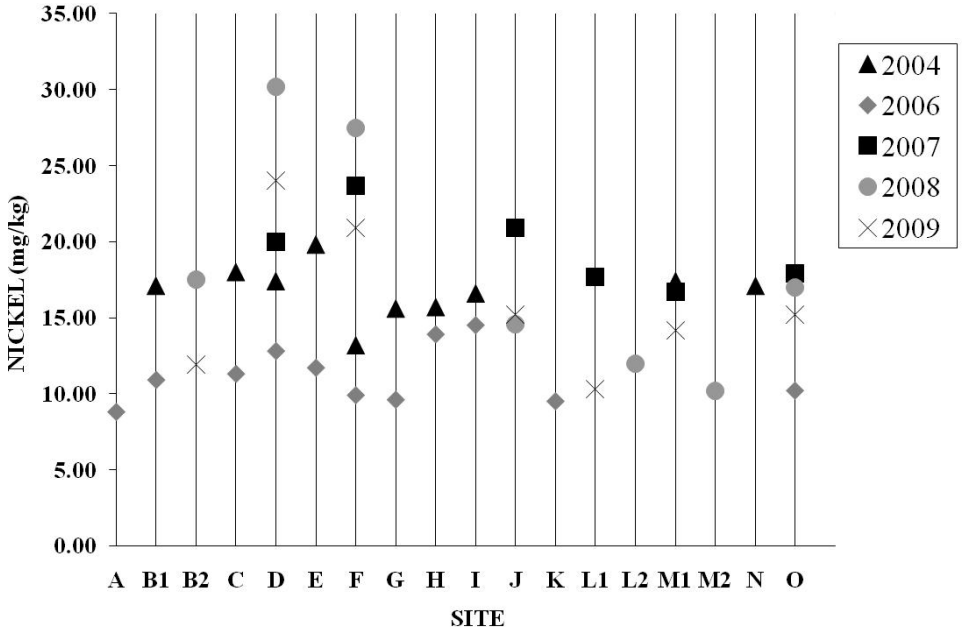
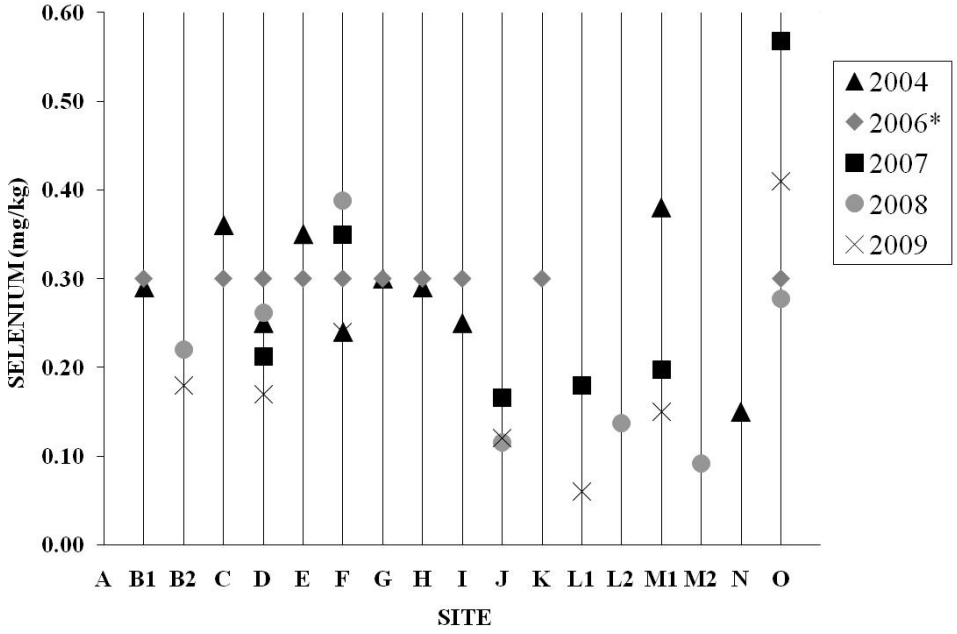


Chart 11: ***Selenium metal levels in soil samples collected in 2004 (baseline) and 2006 to 2009 for North Alkali, South Alkali, and Alkali Lakes.***



***2006 data measured selenium levels <5.00 for Site A and <0.30 for Sites B to I, K, and O.**

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Toll Free 877.472.0711 * 406.442.0711 * FAX 406.442.0712 * helena@energylab.com

LABORATORY ANALYTICAL REPORT

Client: PBS and J
Project: Alkali Wetland Monitoring - OB4308802-04.02.01
Workorder: H09080322

Report Date: 09/15/09
Date Received: 08/26/09

		Analysis		As-T	Cd-T	Ni-T	Se-T
		Units		mg/kg	mg/kg	mg/kg	mg/kg
Sample ID	Client Sample ID	Up	Low	Results	Results	Results	Results
H09080322-001	Soil O- Alkali Lake	0	0	5.12	0.38	15.2	0.41
H09080322-002	Soil M1- Alkali Lake	0	0	5.03	0.34	14.2	0.15
H09080322-003	Soil J- Alkali Lake	0	0	4.85	0.37	15.2	0.12
H09080322-004	Soil F- South Lake	0	0	7.25	0.50	20.9	0.24
H09080322-005	Soil B2- North lake	0	0	4.24	0.25	11.9	0.18
H09080322-006	Soil D- South Lake	0	0	7.83	0.49	24.0	0.17
H09080322-007	Soil LI- Alkali Lake	0	0	3.44	0.24	10.3	0.06

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QA/QC Summary Report

Client: PBS and J
Project: Alkali Wetland Monitoring - OB4308802-04.02.01

Report Date: 09/15/09
Work Order: H09080322

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020									Batch: B_41224	
Sample ID: MB-41224	4	Method Blank				Run: SUB-B135731			09/09/09 19:55	
Arsenic		0.02	mg/kg	0.02						
Cadmium		ND	mg/kg	0.004						
Nickel		ND	mg/kg	0.07						
Selenium		ND	mg/kg	0.05						
Sample ID: LCS3-41224	4	Laboratory Control Sample				Run: SUB-B135731			09/09/09 20:00	
Arsenic		184	mg/kg	5.0	**107**	70	130			
Cadmium		58.1	mg/kg	1.0	**105**	70	130			
Nickel		178	mg/kg	5.0	**108**	70	130			
Selenium		120	mg/kg	5.0	**104**	70	130			
Sample ID: B09082391-001ADIL	4	Serial Dilution				Run: SUB-B135731			09/09/09 20:18	
Arsenic		ND	mg/kg-dry	15		0	0		10	
Cadmium		6.96	mg/kg-dry	3.4		0	0		10	N
Nickel		73.4	mg/kg-dry	56		0	0		10	N
Selenium		ND	mg/kg-dry	41		0	0		10	
Sample ID: B09090153-003AMS3	4	Sample Matrix Spike				Run: SUB-B135731			09/09/09 21:18	
Arsenic		74.4	mg/kg-dry	5.0	**92**	75	125			
Cadmium		28.6	mg/kg-dry	1.0	**104**	75	125			
Nickel		64.1	mg/kg-dry	5.0	**104**	75	125			
Selenium		55.0	mg/kg-dry	5.0	**101**	75	125			
Sample ID: B09090153-003AMSD	4	Sample Matrix Spike Duplicate				Run: SUB-B135731			09/09/09 21:22	
Arsenic		75.5	mg/kg-dry	5.0	**95**	75	125	**1.4**	20	
Cadmium		27.6	mg/kg-dry	1.0	**102**	75	125	**3.4**	20	
Nickel		64.9	mg/kg-dry	5.0	**106**	75	125	**1.3**	20	
Selenium		52.4	mg/kg-dry	5.0	**98**	75	125	**4.8**	20	
Sample ID: MB-41224	4	Method Blank				Run: SUB-B135848			09/11/09 02:45	
Arsenic		0.03	mg/kg	0.02						
Cadmium		ND	mg/kg	0.004						
Nickel		ND	mg/kg	0.07						
Selenium		ND	mg/kg	0.05						
Sample ID: H09080322-001A	4	Serial Dilution				Run: SUB-B135848			09/11/09 02:58	
Arsenic		5.49	mg/kg	5.0		0	0	**7**	10	
Cadmium		0.288	mg/kg	1.0		0	0		10	N
Nickel		16.3	mg/kg	5.0		0	0	**6.8**	10	
Selenium		0.512	mg/kg	5.0		0	0		10	N

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

N - The analyte concentration was not sufficiently high to calculate a RPD for the serial dilution test.

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QA/QC Summary Report

Client: PBS and J
Report Date: 09/15/09
Project: Alkali Wetland Monitoring - OB4308802-04.02.01
Work Order: H09080322

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020									Analytical Run: SUB-B135731	
Sample ID: QCS-090602A,090609		Initial Calibration Verification Standard							09/09/09 10:58	
Cadmium		0.025	mg/L	0.0010	**100**	90	110			
Sample ID: ICSA-ME090423A		Interference Check Sample A							09/09/09 11:03	
Cadmium		0.00072	mg/L	0.0010						
Sample ID: ICSAB-ME090423A,09		Interference Check Sample AB							09/09/09 11:08	
Cadmium		0.010	mg/L	0.0010	**103**	70	130			
Method: SW6020									Analytical Run: SUB-B135848	
Sample ID: QCS-090602A,090401	3	Initial Calibration Verification Standard							09/10/09 22:11	
Arsenic		0.049	mg/L	0.0050	**97**	90	110			
Nickel		0.050	mg/L	0.010	**99**	90	110			
Selenium		0.049	mg/L	0.0050	**99**	90	110			
Sample ID: ICSA-ME090423A	3	Interference Check Sample A							09/10/09 22:18	
Arsenic		9.7E-05	mg/L	0.0050						
Nickel		0.00062	mg/L	0.010						
Selenium		0.00014	mg/L	0.0050						
Sample ID: ICSAB-ME090423A,09	3	Interference Check Sample AB							09/10/09 22:25	
Arsenic		0.010	mg/L	0.0050	**101**	70	130			
Nickel		0.021	mg/L	0.010	**103**	70	130			
Selenium		0.010	mg/L	0.0050	**102**	70	130			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.