MONTANA DEPARTMENT OF TRANSPORTATION
WETLAND MITIGATION MONITORING REPORT: YEAR 2008

Alkali Lake
Pondera County, Montana

Prepared for:

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

Prepared by:

POST, BUCKLEY, SCHUH, AND JERNIGAN
801 North Last Chance Gulch, Suite 101
Helena, MT 59601-3360

December 2008

PBS&J Project No: 0B4308801.04.02

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PBSJ

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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.

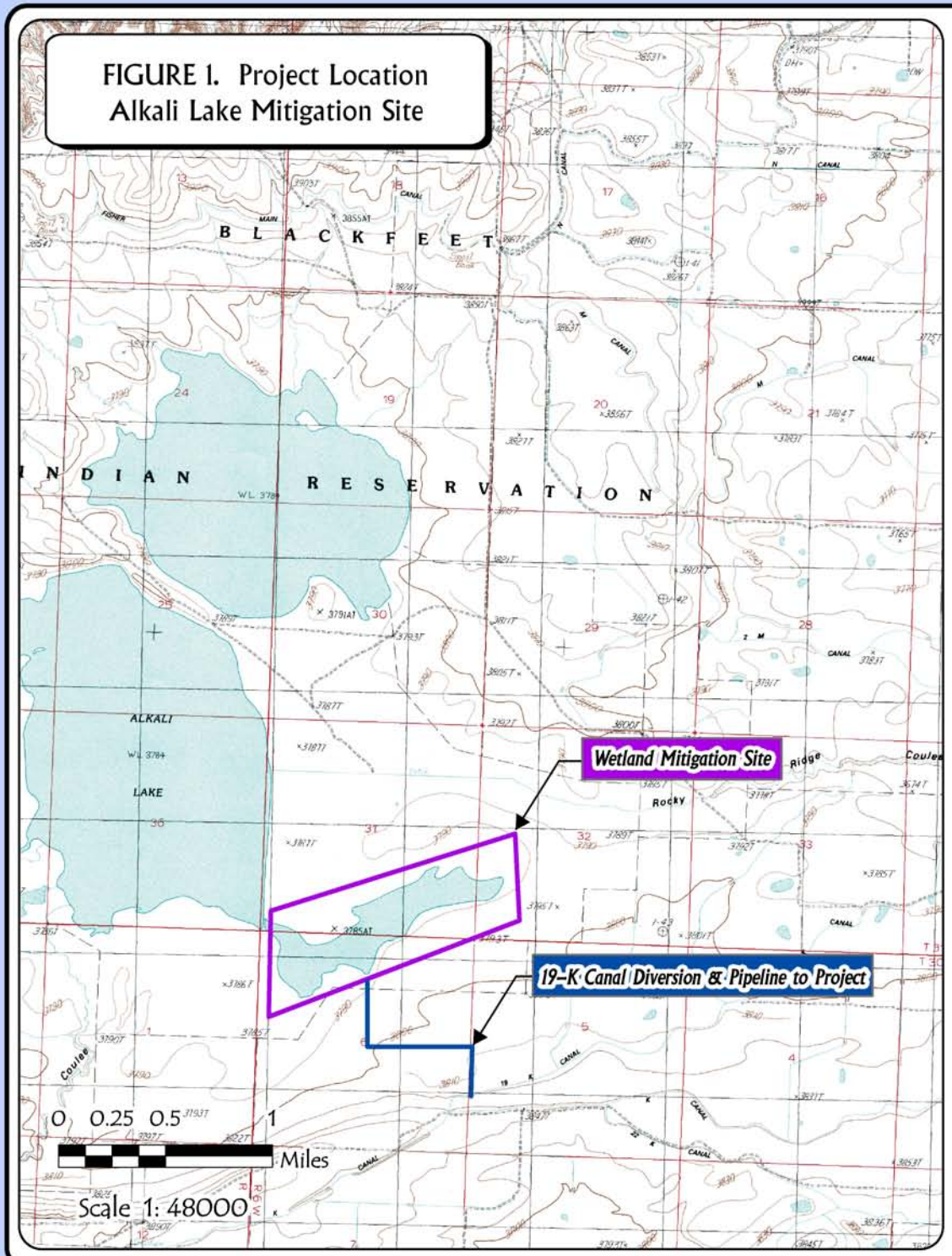
Final approved performance standards (Steinle 2004a and 2004b) are as follows:

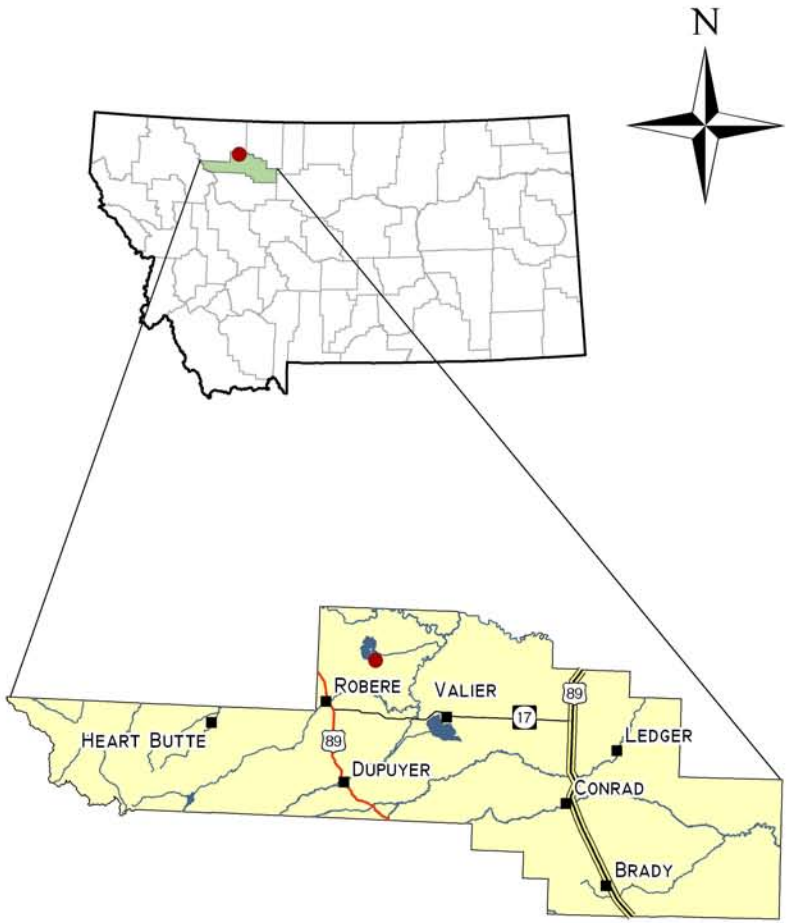
Wetland Hydrology Success will be achieved where wetland hydrology is present as per the technical guidelines in the 1987 COE Wetland Delineation Manual.

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 $\geq$ 50%, and noxious weeds do not exceed 10% cover.

FIGURE 1. Project Location
Alkali Lake Mitigation Site





PROJECT #: B43054.00 0307
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 lacked wetland hydrology. Efforts to increase vegetative diversity in this and other communities 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 16th (spring bird survey), August 14-15th (mid-season survey), and October 28th (fall bird survey) of 2007. 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 GPS unit in 2007. 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 2008. 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.

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 Mammals, Reptiles, and Amphibians

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 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 2008 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 2008 (**Figure 2** in **Appendix A**). Panoramic photographs were taken at each point.

2.11 GPS Data

During the 2008 monitoring season, site features and survey points were collected with a resource grade global positioning system (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 16th irrigation water was flowing into the site. It was estimated that about 70-75% of the lakebed was inundated. Irrigation water was terminated and the site was allowed to draw down for a portion of the summer. On August 14th irrigation water was flowing into the site, but by the end of August 15th irrigation water had been turned off. The site was allowed to draw down again. On October 28th 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 2008, 7.5 inches (in) of precipitation was measured at the Valier Weather

Station (#248501) (Western Regional Climate Center [WRCC] 2008). This represents about 75% of the mean (9.92 in) precipitation recorded between January and July from 1911 to August 2008 (WRCC 2008). This period in 2008 was moderately wet when compared to this period in 2007 (5.7 in) and 2006 (10.1 in) (WRCC 2008).

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* was observed in the northwest corner of the site, but to date this species has not been since observed. Vegetation communities found in 2008 were Type 1 – Upland, Type 3 – *Hordeum* Wetland (formerly named *Puccinellia* Wetland), Type 4 – *Scirpus* Wetland, and Type 6 – Aquatic Wetland. The Type 5 – *Suaeda* Wetland, though expected, was not found in 2008. It was assumed that the site was too inundated for this community to develop in 2008.

Table 2: ***2006 - 2008 vegetation species list for Alkali Lake Wetland Mitigation Site.***

Scientific Name	Indicator Status[1]	Scientific Name	Indicator Status[1]
Agropyron smithii	FACU	*Iva axillaris*	FAC
Alisma gramineum	**OBL**	*Juncus balticus*	OBL
Alopecurus arundinaceus	NI	*Juncus torreyi*	FACW
Aster campestris	**---**	*Koeleria macrantha* [syn. *K. cristata*]	---
Aster falcatus	FACU	*Lactuca serriola*	FAC-
Astragalus (*bisulcatus*)	(---)	*Lepidium* (*ramossissimum*)	(---)
Atriplex gardneri [syn. *A. nuttallii*]	---	***Melilotus* spp.**	---
Atriplex patula	FACW	*Najas guadalupensis*	OBL
Chenopodium glaucum	FAC	*Poa juncifolia*	FACU+
Cirsium arvense [2]	**FACU+**	*Polygonum* (*amphibium*) [syn. *P. coccineum*]	(OBL)
Distichlis spicata	FAC+	*Polygonum ramosissimum*	FAC-
Eleocharis acicularis	OBL	***Potamogeton* spp.**	---
Eleocharis palustris	OBL	*Puccinellia nuttalliana*	OBL
Grindelia squarrosa	FACU	*Rumex crispus*	FACW
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+	*Typha latifolia*	OBL

[1] Specific Epithets in parenthesis are not verified.
[2] Plant is designated as noxious in Montana.
Bolded species were documented within the project area for the first time in 2008.

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,* S*arcobatus vermiculatus, Hordeum jubatum,* and *Suaeda calceoliformis* (**Figure 3** in **Appendix A; Photos 22** and **23** in **Appendix C**).

Vegetation Community Type 3 – *Hordeum* Wetland (**Photos 10-11** in **Appendix C**) expanded in 2008 by occupying what was Type 5 – *Suaeda* Wetland. In 2007 the surface water in the lakebed was allowed to draw down to about two-thirds of the area. Type 5 colonized these drying, but still saturated soils in 2007. In 2008, the lakebed was inundated deeper and for

longer periods with only a short draw-down period. It is hypothesized that the deeper and/or longer periods of inundation favor development of the *Hordeum* Wetland and drown out the *Suaeda calceoliformis* and *Chenopodium glaucum* plants (**Photos 9** and **19** in **Appendix C**). In August 2008 it was noticed that many seedlings (1/4 inch tall) of *S. calceoliformis* and *C. glaucum* had germinated in particular areas of Type 3 – *Hordeum* Wetland (**Photos 18** in **Appendix C**). These areas were saturated, but not inundated and it is assumed that surface soils were exposed for long enough to stimulate seed germination. The Type 3 – *Hordeum* Wetland was dominated by *Hordeum jubatum*, and mixed with *Puccinellia nuttalliana, Eleocharis palustris*, and *Iva axillaris* (**Photos 10-11** in **Appendix C**). The frequency of *Eleocharis palustris* plants increased throughout the site in 2008.

Vegetation Community Type 4 – *Scirpus* Wetland continued to expand in size and occurrence in 2008 (**Photos 14-15** in **Appendix C**). Type 4 – *Scirpus* Wetland polygons either consisted of *Scirpus pungens* or an assemblage of *S. pungens, S. acutus, Eleocharis acicularis*, and *Juncus torreyi*. In addition to the seven mapped polygons, single occurrences of *S. pungens* was found (**Figure 3** in **Appendix A**). The large Type 4 – *Scirpus* polygon near the inlet was inundated and plants were actively growing and flowering; some plants were browsed (**Photo 14** in **Appendix C**). For all other *Scirpus* occurrences, *S. pungens* plants were in poor shape, possibly because they are sought for food and shelter by many bird species (**Photo 15** in **Appendix C**).

Vegetation Community Type 6 – Aquatic Wetland was mapped as a new community (**Figure 3** in **Appendix A**; **Photos 12-13** in **Appendix C**). Type 6 – Aquatic Wetland was comprised of *Eleocharis acicularis* with patchy occurrences of *Potamogeton* spp. and *Najas guadalupensis*. In addition, it was characterized as being inundated and lacking *Hordeum* and *Scirpus* species. *E. acicularis* and *N. guadalupensis* were found in 2007 near the inlet, but were not extensive enough to map as a community. In 2008 this assemblage developed as a community and occupied an inner band to the Type 3 community. This community was absent or very sparse on the extreme northeast and southwest ends of the lakebed.

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 19** in **Appendix C**). Mudflat was not present in 2008; it is characterized by saturated soils with an absence of plant life.

The first noxious weed occurrence was found in 2008. A few basal rosettes of *Cirsium arvense* were found amongst the rocks at the inlet in August and October. Plants were removed each time 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 inlet, *Melilotus* spp. was found for the first time; it had already released its seeds. This sweet clover is not noxious, but can be a nuisance plant.

A green algal bloom was observed for the first time (**Photos 16-17** in **Appendix C**). The bloom was quite extensive along the north, east, and south shores on the north-eastern half of the project site. Algae were also present in the inlet channel. It seemed that the area of algal bloom and Type 6-Aquatic Wetland were mutually exclusive. The growth of green algae increases in

response to higher nutrient levels and/or higher light conditions (MacDonald et. al. 1991). Nutrient inputs (particularly phosphorus and nitrogen) for Alkali Lake would come from irrigation water (directly) and/or cattle (indirectly). High levels of free-floating plants (i.e. green algae) will impair the clarity of water, adversely effect aesthetic qualities, and under high concentrations can deplete oxygen levels in the water (MacDonald et. al. 1991). Cattle use has been greatest along the northeastern fence perimeter of Alkali Lake because soils remain saturated or inundated and grasses cure later.

Three vegetation transects were monitored at Alkali Lake in 2008 (**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 4** and **5** in **Appendix C**). In 2008, Transect 1 was comprised of wetland, represented by three community types, and Transitional Open Water (**Table 2**; **Charts 2** and **3**). Overall wetland habitat increased slightly on Transect 1 (**Chart 3**).

Table 3: ***2006 - 2008 data summary for Transect 1.***

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

Chart 1: ***Transect maps showing habitat types of Transect 1 from start (0 feet) to end (175 feet in 2006 and 412 feet in 2007-2008).***

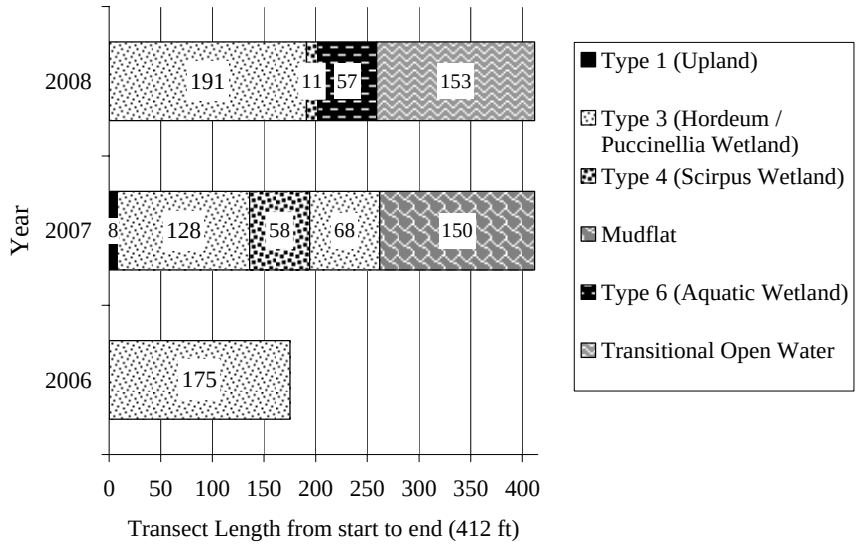
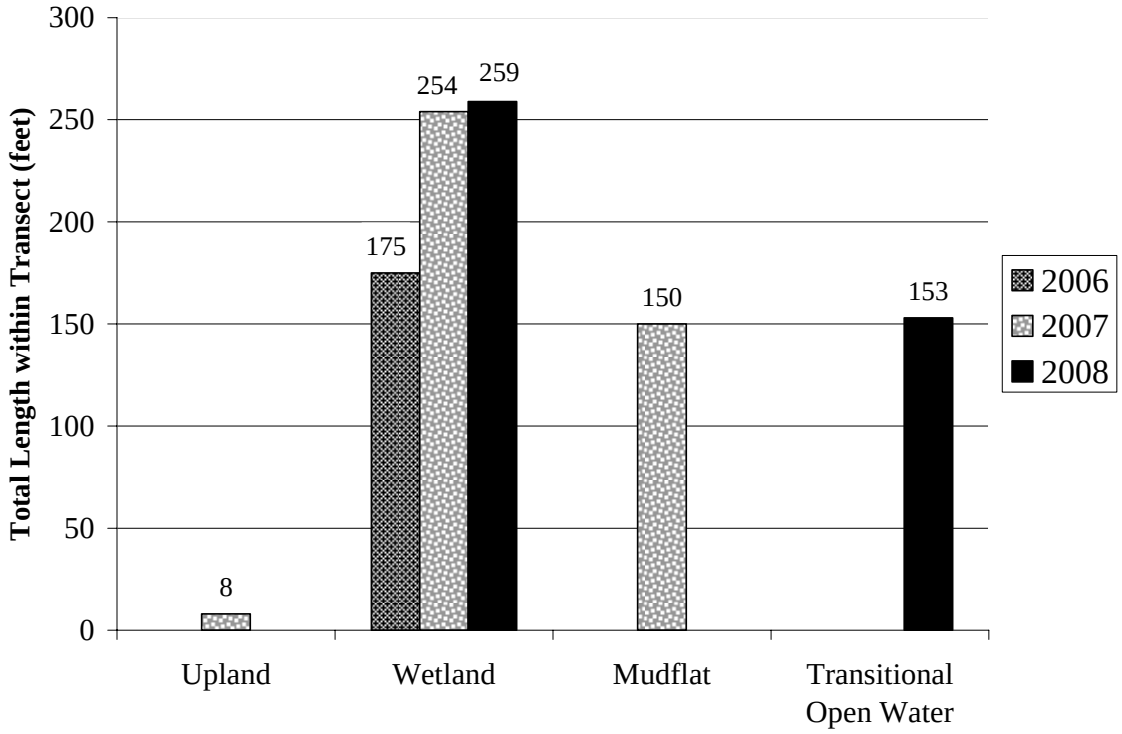


Chart 2: ***Length of habitat types within Transect 1 during 2006 to 2008.***



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 6** and **7** in **Appendix C**). The number of vegetation communities found in 2007 decreased to 2006 levels in 2008; plant diversity declined slightly (**Table 4**). The upland found in 2007 was absent in 2008; as in 2007, two wetland communities were found, but differed in their type along Transect 2 (**Chart 3**). When compared to 2007, Upland decreased, Wetland decreased, and Transitional Open Water increased in 2008 (**Chart 4**).

Table 4: ***2006 - 2008 data summary for Transect 2.***

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

Chart 3: ***Transect maps showing habitat types of Transect 2 from start (0 feet) to end (175 feet in 2006 and 297 feet in 2007-2008).***

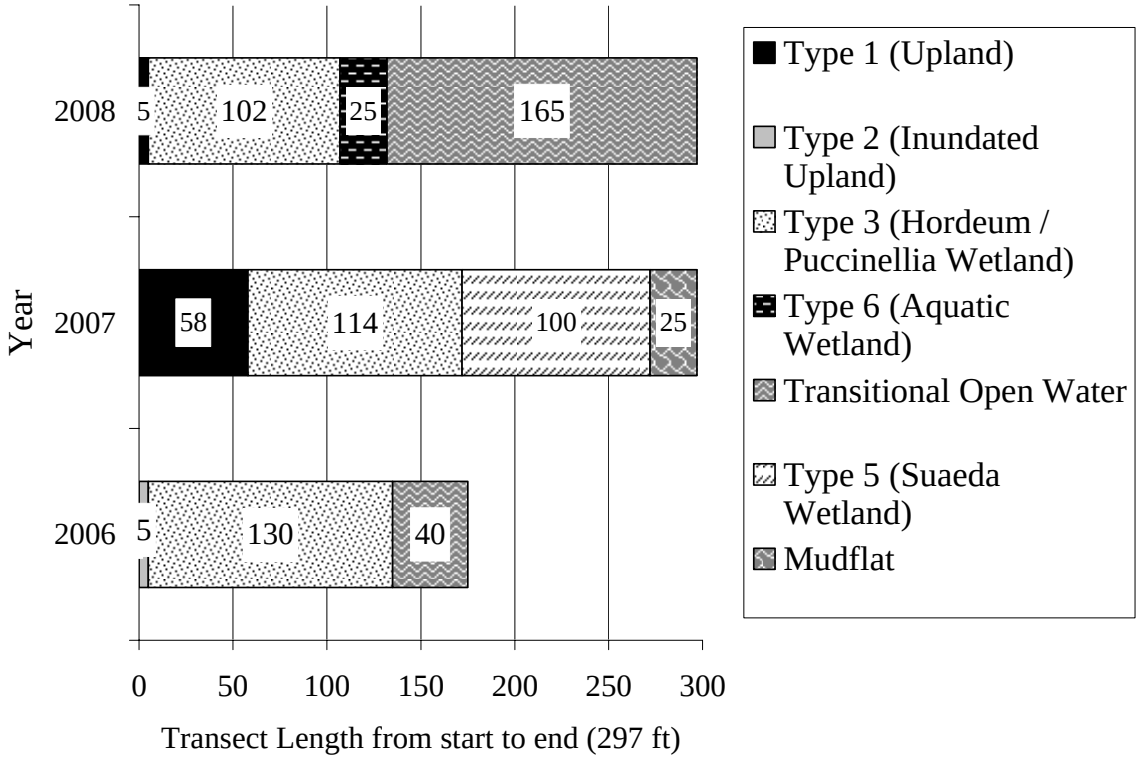
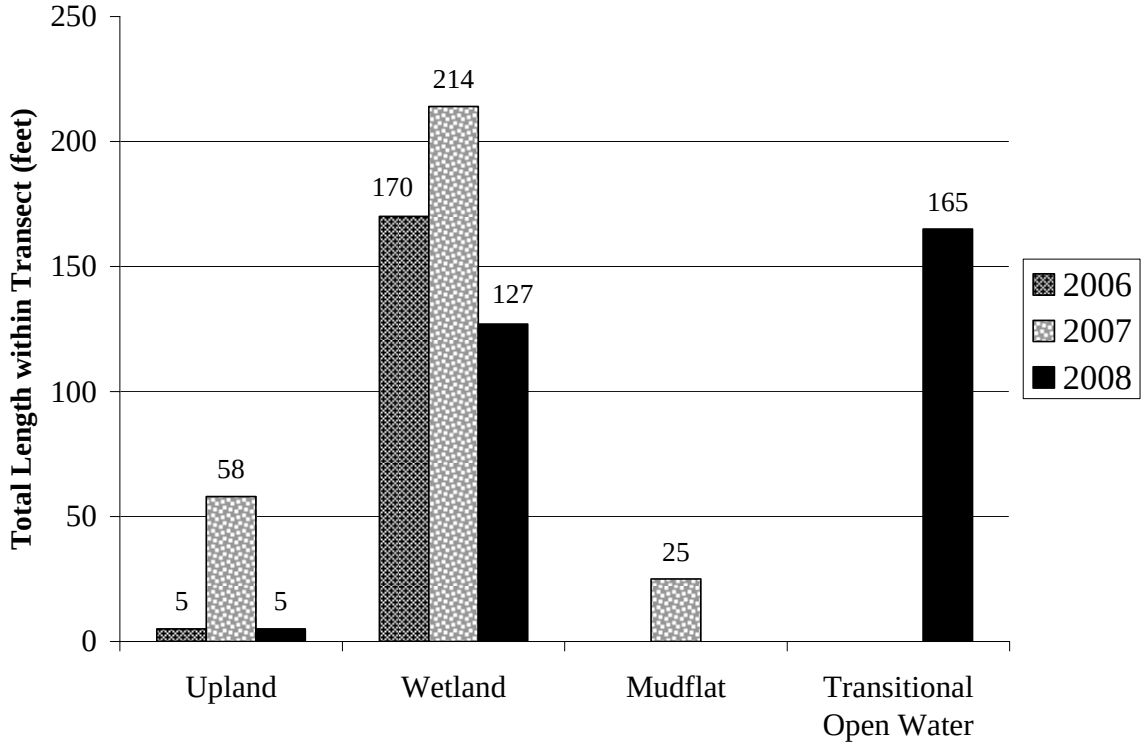


Chart 4: ***Length of habitat types within Transect 2 during 2006 to 2008.***



Data recorded from Transect 3 (**Monitoring Form** in **Appendix B**) were summarized in tabular format (**Table 5**) and graphically illustrated (**Charts 5** and **6**). To serve as a better indicator of habitat changes on the western portion of the mitigation site, Transect 3 was lengthened. Vegetation communities simplified in 2008 and plant species richness decreased slightly (**Table 5**). In 2008 upland habitat transitioned to wetland and some wetland habitat was lost to Transitional Open Water (**Chart 5**). Overall upland habitat has declined and wetland habitat has increased since 2006 along Transect 3 (**Chart 6**).

Table 5: ***2006 - 2008 data summary for Transect 3.***

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

Chart 5: ***Transect maps showing habitat types of Transect 3 from start (0 feet) to end (100 feet in 2006 and 173 feet in 2007-2008).***

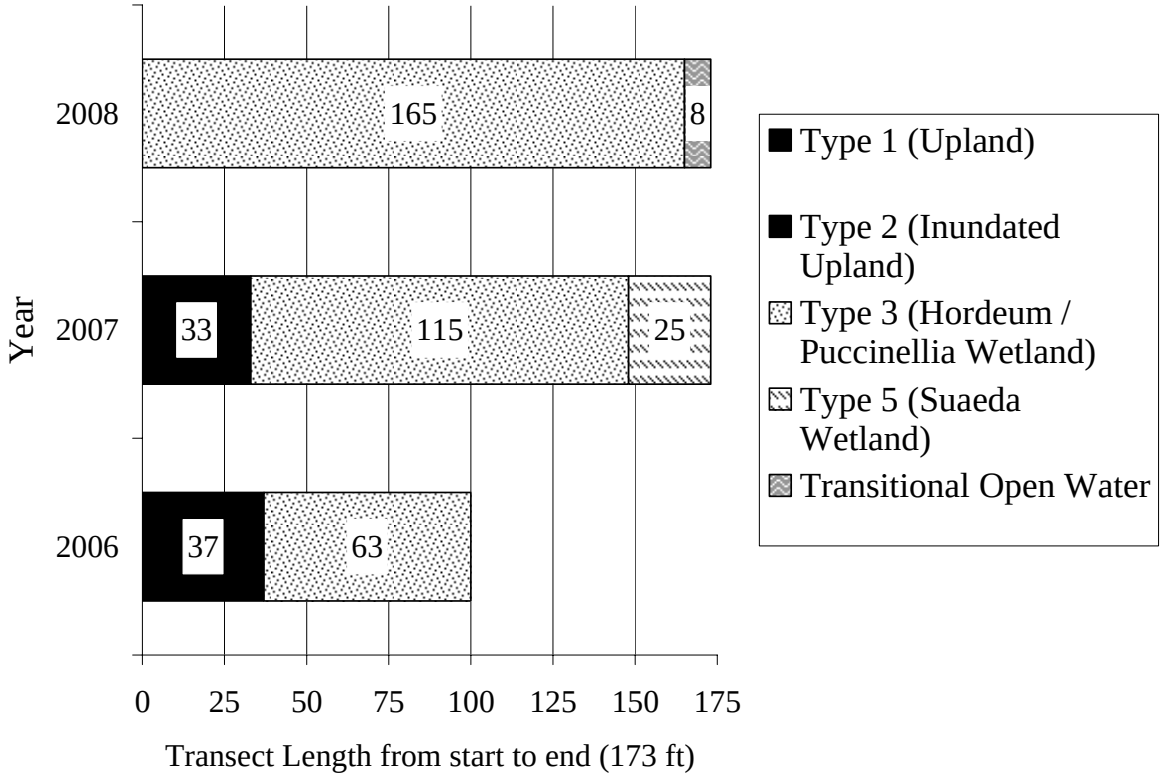
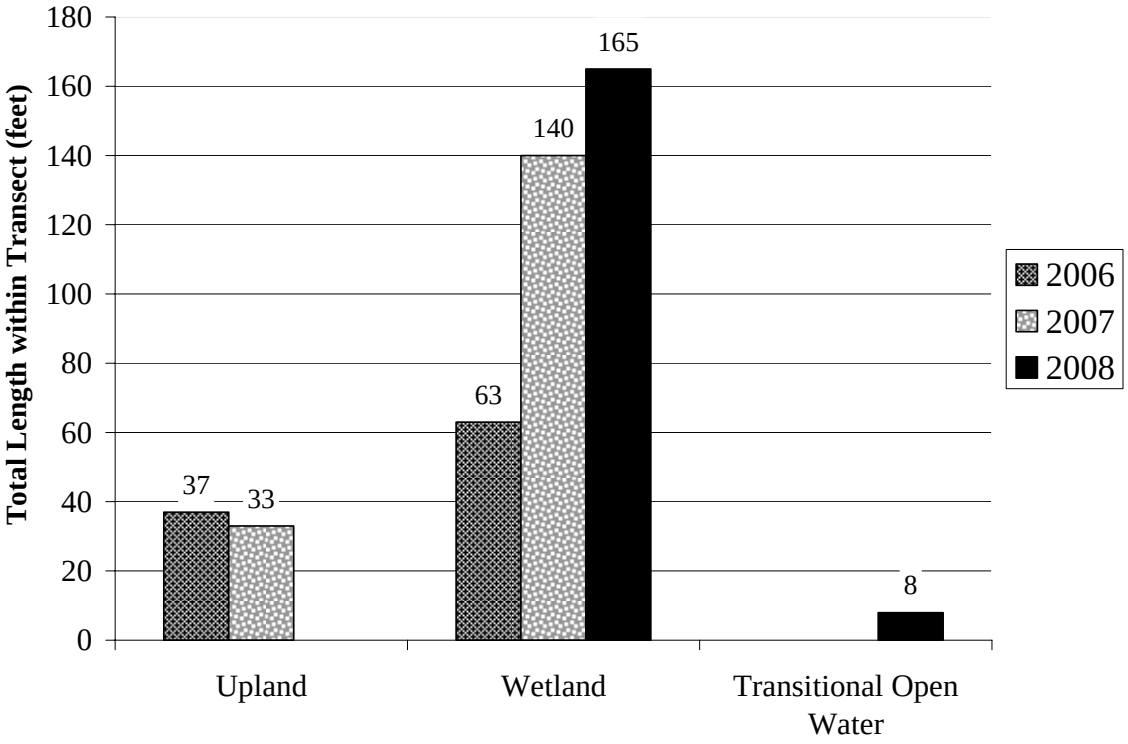


Chart 6: ***Length of habitat types within Transect 3 during 2006 to 2008.***



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 2008, 11 soil pits were dug, revealing dry to saturated clay soils with matrix colors of 2.5Y 4/1 or 2.5Y 5/1 (**COE Forms** in **Appendix B**). Of these 11 soil pits, eight had very fine mottle colors ranging from of 2.5Y 5/6 to 2.5Y 5/4. Since 2004, the number of soil pits with mottles has increased (**COE Forms** in **Appendix B**). For a second year in a row, a very thin layer of 10YR 2/1 soil has been present in vicinity of Transect 1.

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 soils were collected and analyzed for these metals at 10 sites (**Appendix G**). In 2007 soils were collected and analyzed for these metals at six sites (**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 2008 seven soil samples were collected at or near (inundation prevented access to some locations) the 2004 and 2007 sampling locations (**Figure 4** and **Table 12** in **Appendix G**). Arsenic, cadmium, nickel, and selenium levels were measured in each soil sample collected in 2008 (**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: ***2008 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	5.57	0.234	17.5	0.220
South Alkali	D	9.64	0.370	30.2	0.262
South Alkali	F	7.97	0.316	27.5	0.388
Alkali	J	4.31	0.234	14.6	0.116
Alkali	L2	5.60	0.401	12.0	0.137
Alkali	M2	3.96	0.165	10.2	0.092
Alkali	O	6.01	0.268	17.0	0.278

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

Arsenic concentrations in North and South Alkali Lakes were higher in 2008 than in 2004 (**Chart 8** in **Appendix G**). Of the three samples from North and South Alkali Lakes, only one sample (D) fell within the NIWQP range of concern for Arsenic (**Tables 6** and **7**). The 9.64 mg/kg level is on the low range of concern for the NIWQP guideline. Site D receives ephemeral water flow through a man-made ditch that drains agricultural fields and rangeland. It was observed that this ditch was excavated deeper in 2008; it is possible that excavated into the soil released some arsenic. Within the project site (Alkali Lake), arsenic levels were lower in 2008 then in 2004, and all were all below recommended guidelines for protection of aquatic life (**Tables 6** and **7**; **Chart 8** in **Appendix G**). In 2008, the mean (7.73 mg/kg) arsenic level for

three collections outside the project area was higher than the mean (4.97 mg/kg) for four collections within the project area (**Table 7**).

Cadmium concentrations in North and South Alkali Lakes were higher in 2008 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 2008 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 2008, the mean (0.31 mg/kg) cadmium level for three collections outside the project area was slightly higher than the mean (0.27 mg/kg) for four collections within the project area (**Table 7**).

Nickel concentrations in North and South Alkali Lakes were similar or higher in 2008 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 similar to or lower in 2008 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 2008, the mean (25.07 mg/kg) nickel level for three collections outside the project area was higher than the mean (13.45 mg/kg) for four collections within the project area (**Table 7**).

Selenium concentrations in North and South Alkali lakes were similar, higher, and lower in 2008 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 2008 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 2008, the mean (0.29 mg/kg) selenium level for three collections outside the project area was higher than the mean (0.16 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. Vegetation and soils were discussed in previous sections. Following construction in fall 2005, the site was inundated and has been periodically filled throughout 2006, 2007, and 2008 (see Section 3.1 Hydrology).

Wetland habitat increased from about 39 acres in 2006 to about 85 acres in 2007 then decreased to approximately 57 acres in 2008 (**Table 8**). The 2008 decrease in wetland habitat is attributable to an increase in the area of Transitional Open Water. A diversity of wetland habitats was found throughout the site, though habitat types differed slightly from 2007 (**Figure 3** in **Appendix A**). As stated in Section 3.2 Vegetation, Type 5 – *Suaeda* Wetland converted to Type 3 – *Hordeum* Wetland. Type 4 – *Scirpus* Wetland continued to expand in 2008. Type 6 – Aquatic Wetland emerged in 2008 has a community. Mitigation credit is discussed in Section 3.10.

Table 8: ***Aquatic and wetland habitat types and acreages from 2006-2008 at the Alkali Lake Wetland Mitigation Site.***

AQUATIC AND WETLAND HABITATS	ACREAGE		
	2006	2007	2008
Type 3 – *Hordeum*/*Puccinellia* Wetland	38.22	24.35	51.22
Type 3/5 – *Hordeum*/*Suaeda* Wetland	---	37.78	---
Type 4 – *Scirpus* Wetland	0.48	0.33	0.62
Type 5 – *Suaeda* Wetland	---	22.31	---
Type 6 – Aquatic Wetland	---	---	4.92
Mudflat and/or Transitional Open Water	118.69	81.79	130.18

3.5 Wildlife

Direct observations of all wildlife species and their sign (indicating presence) were recorded in 2008 and compiled from 2006-2008 (**Table 8**; **Monitoring Forms** in **Appendix B**). A group of pronghorn were observed for the first time. Deer tracks were observed for the third year in a row. Tracks or scat of coyote, skunk, and fox were also observed. Several ground squirrels and their burrows were observed, as were white-tailed jackrabbits. A domestic calf had entered the site and was found dead along the water's edge (**Photo 21** in **Appendix C**). Juvenile fish were observed in the inlet channel during the fall of 2006, but have not been observed since. No amphibian or reptile species have been observed at the site from 2006 to 2008.

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 were observed. In 2008, about 25 bird species were observed using the site (**Bird Survey Forms** in **Appendix B**). The most abundant species found in 2008 included American Avocet (*Recurvirostra americana*), Marbled Godwit (*Limosa fedoa*), Western Sandpiper (*Calidris mauri*), and Wilson's Phalarope (*Phalaropus tricolor*).

In 2007 and 2008 the Piping Plover (*Charadrius melodus*) has been observed at the mitigation site. In 2008 one Piping Plover was seen foraging at the site. In 2007, two Piping Plovers, presumably a pair, were sighted during the May surveys (**Bird Survey Forms** in **Appendix B**).

In 1985 the Piping Plover was listed as a threatened species and in 2002 critical habitat was designated in Montana. 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 two 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 within the Alkali Lake Wetland Mitigation Site, 2006 - 2008.***

FISH, AMPHIBIAN, REPTILE	
Juvenile fish (unidentified species)	
BIRD	
American Avocet (*Recurvirostra americana*)	**Mallard (*Anas platyrhynchos*)**
American White Pelican (*Pelecanus erythrorhynchos*)	**Marbled Godwit (*Limosa fedoa*)**
American Wigeon (*Anas americana*)	**Northern Harrier (*Circus cyaneus*)**
Brewer's Blackbird (*Euphagus cyanocephalus*)	**Northern Pintail (*Anas acuta*)**
Bufflehead (*Bucephala albeola*)	**Northern Shoveler (*Anas clypeata*)**
Canada Goose (*Branta Canadensis*)	Osprey (*Pandion haliaetus*)
Canvasback (*Aythya valisineria*)	**Piping Plover (*Charadrius melodus*)**
Cinnamon Teal (*Anas cyanoptera*)	Prairie Falcon (*Falco mexicanus*)[1]
Common Goldeneye (*Bucephala clangula*)	**Red-winged Blackbird (*Agelaius phoeniceus*)**
Common Snipe (*Gallinago gallinago*)	**Ring-necked Duck (*Aythya collaris*)**
Common Tern (*Sterna hirundo*)	Ruddy Duck (*Oxyura jamaicensis*)
Franklin's Gull (*Larus pipixcan*)	Sanderling (*Calidris alba*)
Golden Eagle (*Aquila chrysaetos*)	Sandhill Crane (*Grus Canadensis*)
Gadwall (*Anas strepera*)	Short-billed Dowitcher (*Limnodromus griseus*)
Grasshopper Sparrow (*Ammodramus savannarum*)	Snow Bunting (*Plectrophenax nivalis*)
Greater Yellowlegs (*Tringa melanoleuca*)	**Sparrow (unidentified species)**
Green-winged Teal (*Anas crecca*)	Swallow (unidentified species)
Gull (California, *Larus californixus*, and/or Ring-bill, *L. delawarensis*)	**Tundra Swan (*Cygnus columbianus*)**
	Vesper Sparrow (*Pooecetes gramineus*)
Horned Lark (*Eremophila alpestris*)	**Western Meadowlark (*Sturnella neglecta*)**
Killdeer (*Charadrius vociferous*)	**Western Sandpiper (*Calidris mauri*)**
Lesser Yellowlegs (*Tringa flavipes*)	**Willet (*Catoptrophorus semipalmatus*)**
Long-billed Curlew (*Numenius americanus*)	**Wilson's Phalarope (*Phalaropus tricolor*)**
Long-billed Dowitcher (*Limnodromus scolopaceus*)	Yellow-headed Blackbird (*Xanthocephalus xanthocephalus*)
MAMMAL	
American badger (*Taxidea taxus*)	**Raccoon (*Procyon lotor*)**
Black bear (*Ursus americanus*)	**Richardson's Ground Squirrel (*Spermophilus richardsonii*)**
Coyote (*Canis latrans*)	
Fox (unidentified species)	**Striped Skunk (*Mephitis mephitis*)**
Mouse (unidentified species)	Vole (unidentified species)
Porcupine (*Erethizon dorsatum*)	**White-tailed Jack Rabbit (*Lepus townsendii*)**
Pronghorn (*Antilocapra americana*)	**White-tailed Deer (*Odocoileus virginianus*)**

Bolded species were observed in 2008.

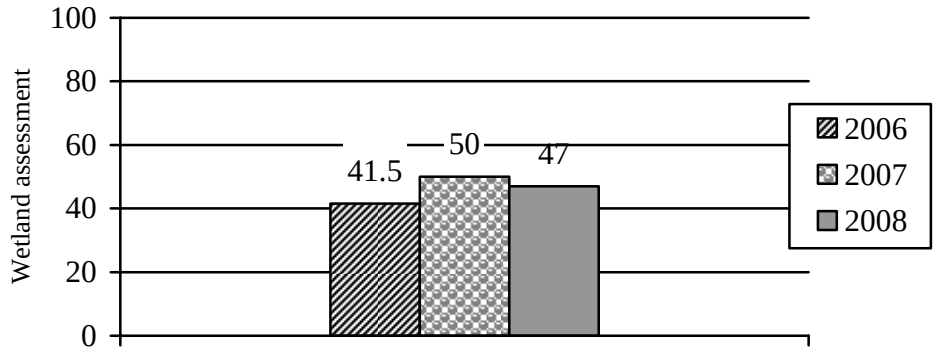
3.6 Macroinvertebrates

Macroinvertebrate diversity and abundance have remained low (**Chart 7**), though composition has changed. Macroinvertebrate sampling occurred at one location (**Figure 2** in **Appendix A; Photo 5** in **Appendix C**). A summary of the 2008 data, provided by Rhithron and Associates, is presented below:

> *Invertebrates were neither abundant nor diverse at this site in 2008. Although taxonomic diversity remained about the same between 2007 and 2008, there was apparently a major functional shift this year. Immature hemipterans (Corixidae) replaced ostracods as the dominant faunal component, with a subsequent shift to herbivory in 2008 compared to 2007. The presence of brine flies (Ephydridae) and hemipterans (Corixidae) may be related to high salinity, which probably contributes to the relative simplicity of the faunal composition here. Thermal preference of the assemblage was calculated to be 20.5ºC. (The 2006 score represents the average of scores from 2 samples collected from Alkali Lake.)*

In 2008, 37 individuals representing 10 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), Ephydridae (brine flies), 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 35% (2008) occurrence (**Appendix F**). Conversely, hemipterans (Family Corixidae, the water boatman) increased from a 17% (2007) to 49% (2008) occurrence (**Appendix F**). As stated by Rhithron and Associates, this represents a functional change in that seed shrimps are 'collector-gatherers' while water boatman are 'piercer herbivores'.
The simple aquatic faunal community is attributable to the natural alkaline conditions of the mitigation site. Likewise aquatic habitats are limited because the site is newly evolving and water levels are managed to allow for periods of 'draw-down'. A detailed report is provided in **Appendix F**. In addition to this data, a leech was collected from a soil pit.

Chart 7: ***Bioassessment scores using the wetland index for 2006 (average of two samples) and 2007-2008 (one sample).***



3.7 Functional Assessment

As the Alkali wetland develops, its environmental functions and values also increase. A functional assessment was completed for the entire Alkali Lake site in 2006 and 2007 using the 1999 MDT Montana Wetland Assessment Method (MWAM). In 2008, conditions were assessed using the 2008 MWAM (**Functional Assessment Form** in **Appendix B**). Although direct comparisons cannot be made, general trends in wetland development can still be determined (**Table 10**). In 2008, the Alkali Lake Wetland Mitigation Site continued to rate as a Category II wetland (**Table 10**). However, the site scored lower in 2008 as a result of revised MWAM application. Despite a gain in total wetland/aquatic habitat, the functional units decreased slightly in 2008. The site continued to rate as exceptional or high for General Wildlife Habitat and Short and Long Term Surface Water Storage (**Table 10**).

Table 10: ***Summary of 2006 to 2008 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]
Listed/Proposed T&E Species Habitat	Low (0.3)	Mod (0.8)	Mod (0.8)
MTNHP Species Habitat	Mod (0.6)	Mod (0.6)	Mod (0.5)
General Wildlife Habitat	High (0.9)	Exc (1.0)	Exc (1.0)
General Fish/Aquatic Habitat	N/A	N/A	N/A
Flood Attenuation	N/A	N/A	N/A
Short and Long Term Surface Water Storage	High (0.9)	High (0.9)	High (0.9)
Sediment/Nutrient/Toxicant Removal	Mod (0.7)	Mod (0.7)	Mod (0.7)
Sediment/Shoreline Stabilization	Low (0.2)	Low (0.3)	Low (0.2)
Production Export/Food Chain Support	Mod (0.6)	Mod (0.7)	Mod (0.7)
Groundwater Discharge/Recharge	Low (0.1)	Low (0.1)	Low (0.1)
Uniqueness	Mod (0.5)	Mod (0.5)	Mod (0.5)
Recreation/Education Potential	Mod (0.7)	Mod (0.7)	Low (0.05)
Actual Points/Possible Points	**5.5 / 10**	**6.3 / 10.0**	**5.55 / 9.0**
% of Possible Score Achieved	**55%**	**63%**	**62%**
Overall Category	**II**	**II**	**II**
Total Acreage of Assessed Wetlands and Other Aquatic Habitats within Site Boundaries (ac)	**157.31**	**166.43**	**186.94**
Functional Units (acreage x actual points)	**865.2**	**1048.50**	**1037.52**

[1] Used the 1999 MWAM.
[2] Used the 2008 MWAM. The complete functional assessment form is in **Appendix B**.

3.8 Photographs

The 2008 aerial photograph was taken on July 7th 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 (**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, irrigation water flooded the site in the spring and fall, but allowed for a draw-down period 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, but limited waterfowl/shorebird use of the site to the early spring and late fall time periods.

3.10 Current Credit Summary

In 2008, approximately 57 acres of emergent wetlands were delineated at the mitigation site. These acres satisfied soils, hydrology, and vegetation performance standards listed in **Section 1.0**. This represents a two-thirds increase in wetland habitat since 2006 (**Table 8**). All together, about 187 acres of aquatic habitat were mapped in 2008. The upland buffer also satisfied applicable performance standards as listed in **Section 1.0**. The 2008 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: ***2008 Tribal and Corps of Engineers credits at the Alkali Lake Wetland Mitigation Site.***

Proposed Feature	2008 Delineated Acres	Tribal Credit Ratio and 2008 Calculated Credit	Tribal Credit Target	Corps Credit Ratio and 2008 Calculated Credit[a]	Corps Credit Target
Primary emergent wetland restoration	56.76	1:2.5 credit ratio 22.70 credit acres	29.77 credit acres	1:1 credit ratio 56.76 credit acres	74.42 credit acres
Shallow open water restoration	130.18	1:2.5 credit ratio 52.07 credit acres	40.56 credit acres	1:1 credit ratio (to a max. matching wetland acres) 56.76 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	186.94 (aquatic only)	**86.05 credit acres**	81.61 credit acres	**119.16 credit acres[a]**	154.48 credit acres

[a] Maximum credits as of 2008. Final credits are subject to compliance with the performance standards at the end of the monitoring period.

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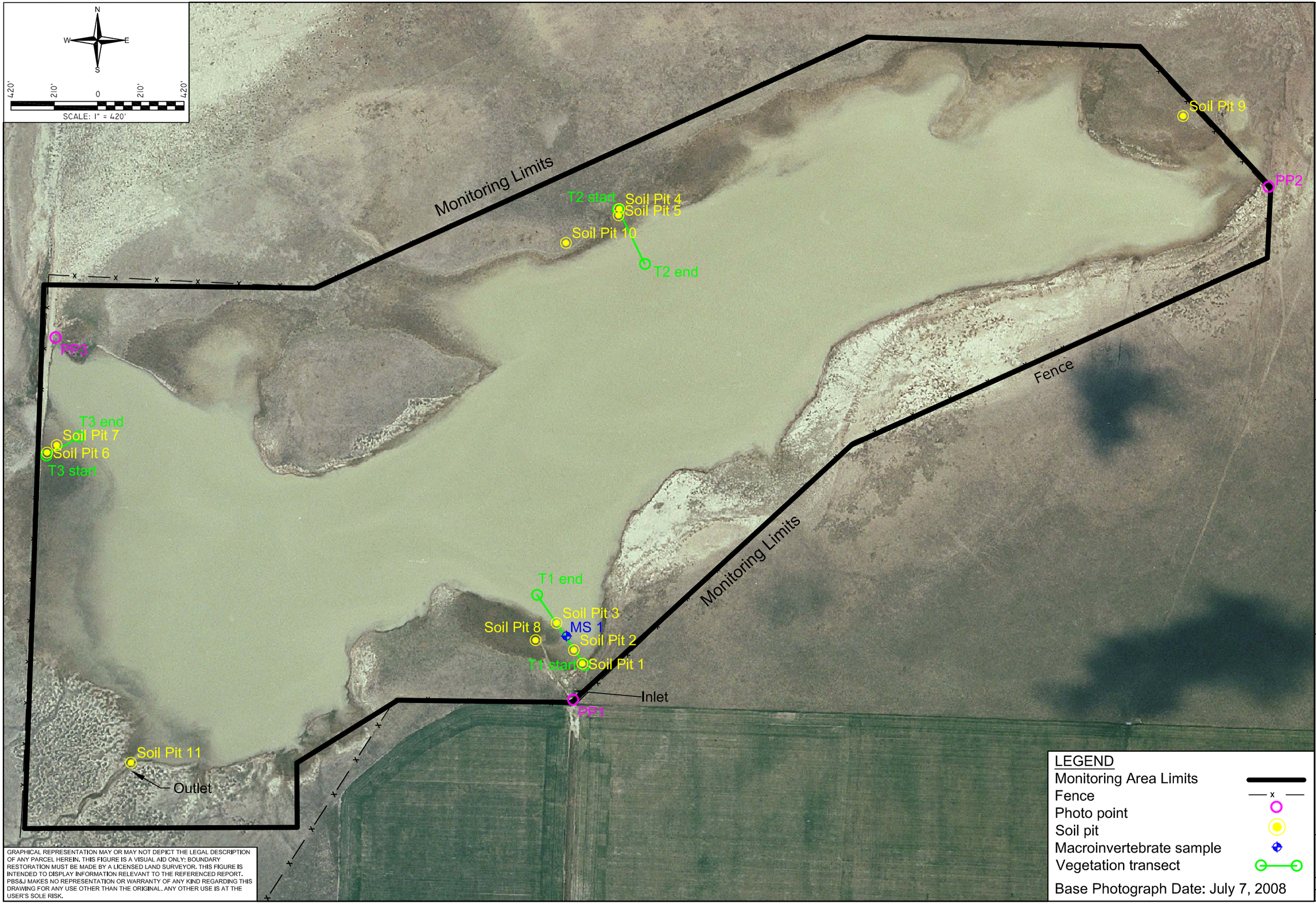
Appendix A

FIGURES 2 & 3

MDT Wetland Mitigation Monitoring
Alkali Lake
Pondera County, Montana



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ALKALI LAKE WETLAND MITIGATION SITE

2008 MONITORING ACTIVITY LOCATIONS

DRAWN: JR
PROJ MGR: J. BERGLUND
CHECKED: AP
APPVD: JB
PLOTTED: Nov/24/2008

PROJ NO: 0B4308801 04.02
LOCATION: CUT BANK, MT
SCALE: NOTED
FILE NAME: BASE2008.dwg

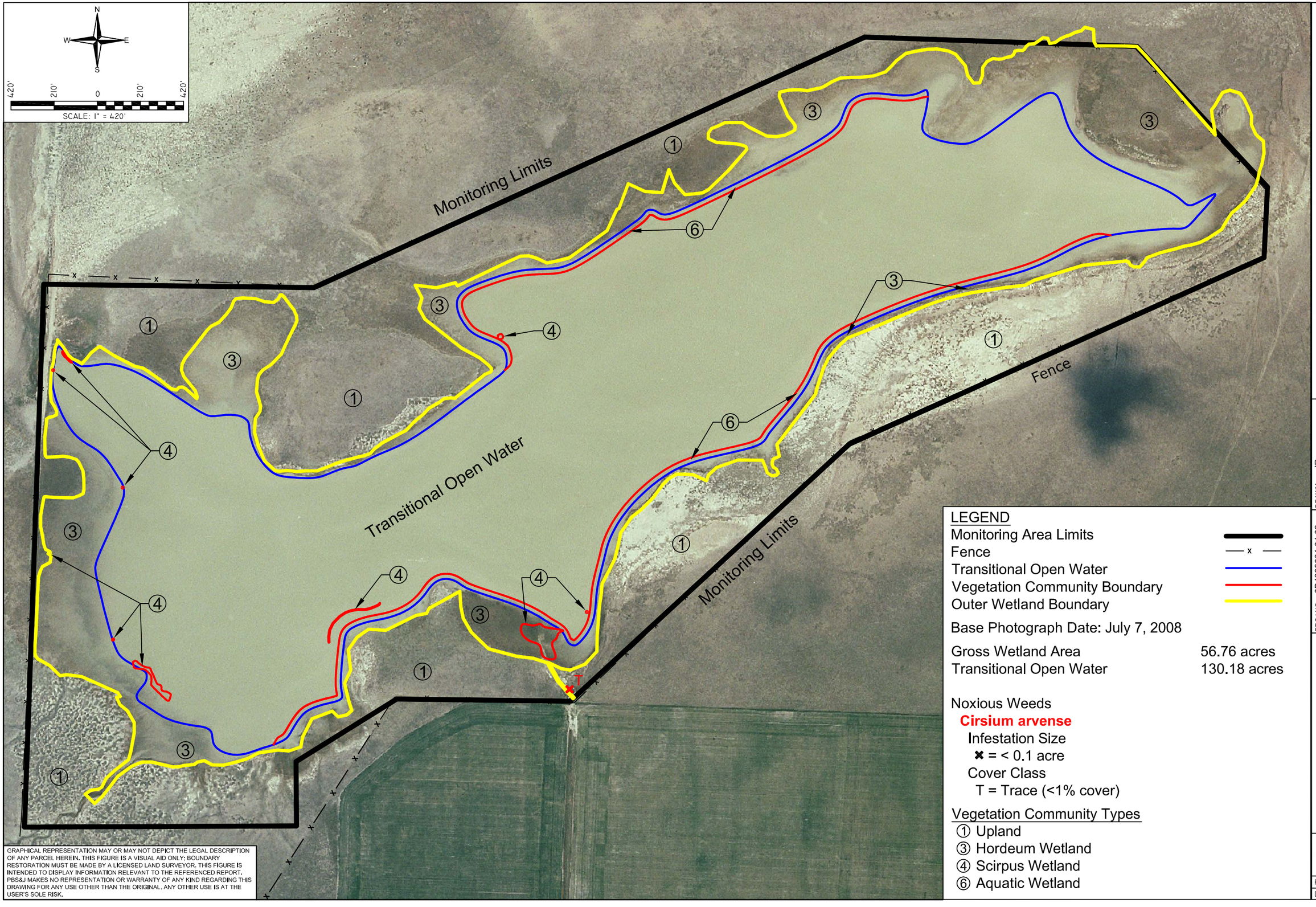
801 N. Last Chance Gulch
Suite 101
Helena, MT 59601
PBSJ

FIGURE
2

REV -
DATE 11/24/2008

ALKALI LAKE WETLAND MITIGATION SITE

2008 MAPPED SITE FEATURES



LEGEND

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

Base Photograph Date: July 7, 2008

Gross Wetland Area	56.76 acres
Transitional Open Water	130.18 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
⑥ Aquatic Wetland

DRAWN: JR
PROJ MGR: J. BERGLUND
CHECKED: AP
APPVD: JB
PLOTTED: Dec/03/2008

PROJ NO: 0B4308801 04.02
LOCATION: CUT BANK, MT
SCALE: NOTED
FILE NAME: BASE2008.dwg

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

FIGURE
3

REV -

DATE 11/24/2008

Appendix B

2008 WETLAND MITIGATION SITE MONITORING FORM
2008 BIRD SURVEY FORM
2008 COE WETLAND DELINEATION FORMS
2008 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: **0B4308801-04.02**
Assessment Date: **August 14-15, 2008** 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 with cloud cover; 10 mph winds, high 70's** Time of Day: **9:00-5:00**
Initial Evaluation Date: **August 22, 2006** Monitoring Year: **3** # 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: **66%**
Depth at emergent vegetation-open water boundary: **1 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 16th, irrigation water was flowing into the site; it appeared that the water had recently been turned on. The lakebed was about 70% inundated. By mid-August the site had drawn down as evidenced by drift lines and cracked soils. On August 14th irrigation water was flowing into the site and by late day on August 15th the irrigation water had been turned off. The lakebed was about 80% inundated on August 15th. On October 28th irrigation water was still turned off. The lakebed had drawn down a bit and was about 65-70% inundated.

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 and 2008.**

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

Dominant Species	% Cover	Dominant Species	% Cover
Agropyron smithii	2 = 6-10%		
Puccinellia nuttalliana	3 = 11-20%	Polygonum ramossissimum	+ = < 1%
Hordeum jubatum	5 = > 50%	Atriplex patula	+ = < 1%
Astragalus (bisulcatus)		Hordeum brachyantherum	+ = < 1%
Iva axillaris	4 = 21-50%	Alopecurus arundinaceus	+ = < 1%
Suaeda calceoliformis	+ = < 1%	Chenopodium glaucum	+ = < 1%

Comments / Problems: **Same community as in 2006 (Type 3-Puccinellia Wetland). Community flourished in 2007 and 2008.**

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	1 = 1-5%	Najas guadalupensis	+ = < 1%
Typha latifolia (not observed in 2007-2008)			
Puccinellia nuttalliana	2 = 6-10%		
Hordeum jubatum	4 = 21-50%		
Juncus torreyi	+ = < 1%		

Comments / Problems: **Since 2006 this community has increased in area.**

VEGETATION COMMUNITIES (continued)

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

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

Comments / Problems: **Wetland community developed and flourished in 2007. In 2008 it was absent and became 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%		
Algae			

Comments / Problems: **Community is characterized by a consistent presence of Eleocharis acicularis and inundated soils. Algae are present in inlet channel and as a bloom in the northeastern portion of site.**

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		
Alisma gramineum	3		
Alopecurus arundinaceus	3		
Aster campestris	1		
Aster falcatus	1		
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 spp.	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		
Sarcobatus vermiculatus	1		
Scirpus acutus	4		
Scirpus pungens	3, 4, 5		
Suaeda calceoliformis [syn. S. depressa]	1-5		
Typha latifolia	4		

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

Mammal and Herptile Species	Number Observed	Indirect Indication of Use			
		Tracks	Scat	Burrows	Other
coyote		☐	☒	☐	
Richardson's ground squirrel	several	☐	☐	☒	
domestic calf	1	☐	☐	☐	dead
white-tailed jackrabbit	2	☐	☐	☐	
skunk		☒	☐	☐	
fox		☒	☐	☒	
pronghorn	4	☐	☐	☐	1 male; 3 female
mouse-partially eaten with remains left on rock	2	☐	☐	☐	

Additional Activities Checklist:
Yes Macroinvertebrate Sampling (if required)

Comments / Problems: August/September: Many types of aquatic insects observed in water; blue dragonflies observed. Collected one leach in a soil sample.

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 14, 2008** 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 - 15 feet	
Plant Species	**Cover**
Hordeum jubatum	4 = 21-50%
Iva axillaris	3 = 11-20%
Agropyron smithii	+ = < 1%
Puccinellia nuttalliana	2 = 6-10%
Bare Ground (40%)	
Total Vegetative Cover:	50%

Vegetation Type B: **Type 3 - Hordeum Wetland (inundated)**	
Length of transect in this type: 15 - 191 feet	
Plant Species	**Cover**
Hordeum jubatum	4 = 21-50%
Puccinellia nuttalliana (not seen in 2008)	
Eleocharis acicularis	+ = < 1%
Alisma gramineum	+ = < 1%
Polygonum ramisossimum (not seen in 2008)	
Chenopodium glaucum (not seen in 2008)	
Suaeda calceoliformis (not seen in 2008)	
Bare Ground (50%)	
Total Vegetative Cover:	50%

Vegetation Type C: **Type 4 - Scirpus Wetland**	
Length of transect in this type: 191-202 feet	
Plant Species	**Cover**
Scirpus pungens (browsed)	+ = < 1%
Hordeum jubatum	4 = 21-50%
Total Vegetative Cover:	40%

Vegetation Type D: **Type 6 - Aquatic Wetland**	
Length of transect in this type: 202 - 259 feet	
Plant Species	**Cover**
Hordeum jubatum (live)	+ = < 1%
Eleocharis acicularis	4 = 21-50%
Indundated Bare Ground (60%)	
Dead clumps of Hordeum jubatum are also prevalent.	
Total Vegetative Cover:	40%

MDT WETLAND MONITORING – VEGETATION TRANSECT

Site: **Alkali Lake** Date: **August 14, 2008** 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: **Transitional Open Water**	
Length of transect in this type: 259 - 412 feet	
Plant Species	**Cover**
No live plants.	
Total Vegetative Cover:	0%

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

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

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 14, 2008** 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	4 = 21-50%
Astragalus (bisulcatus)	+ = < 1%
Iva axillaris	3 = 11-20%
Atriplex patula	2 = 6-10%
Hordeum jubatum	3 = 11-20%
Puccinellia nuttalliana	3 = 11-20%
Total Vegetative Cover:	70%

Vegetation Type F: **Type 3 - Hordeum Wetland**	
Length of transect in this type: 5 - 107 feet	
Plant Species	**Cover**
Agropyron smithii	1 = 1-5%
Hordeum jubatum	4 = 21-50%
Iva axillaris	3 = 11-20%
Polygonum ramosissimum (not seen in 2008)	
Atriplex patula (not seen in 2008)	
Puccinellia nuttalliana	1 = 1-5%
Bare ground = 40%	
Total Vegetative Cover:	60%

Vegetation Type G: **Type 6 - Aquatic Wetland**	
Length of transect in this type: 107 - 132 feet	
Plant Species	**Cover**
Eleocharis acicularis	4 = 21-50%
Bare ground = 60%	
Total Vegetative Cover:	40%

Vegetation Type H: **Transitional Open Water**	
Length of transect in this type: 132 - 297 feet	
Plant Species	**Cover**
No Vegetation	
Total Vegetative Cover:	%

MDT WETLAND MONITORING – VEGETATION TRANSECT

Site: **Alkali Lake** Date: **August 14, 2008** 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 - 165 feet	
Plant Species	**Cover**
Agropyron smithii	1 = 1-5%
Hordeum jubatum	4 = 21-50%
Iva axillaris	2 = 6-10%
Hordeum brachyantherum	+ = < 1%
Polygonum ramosissimum	1 = 1-5%
Puccinellia nuttalliana (not seen in 2008)	
Suaeda calceoliformis (dead stalks seen in 2008)	
Scirpus pungens	+ = < 1%
Atriplex patula	1 = 1-5%
Bare Ground = 50%	
Total Vegetative Cover:	50%

Vegetation Type J: **Transitional Open Water**	
Length of transect in this type: 165 - 173 feet	
Plant Species	**Cover**
No live vegetation.	
Total Vegetative Cover:	0%

Vegetation Type K: **Open Water**	
Length of transect in this type: feet	
Plant Species	**Cover**
Total Vegetative Cover:	50%

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 was seen in 2007 was absent in 2008. Suaeda wetland appears to require a long period of draw-down. The higher water levels in 2008 appear to favor the creation of Hordeum and Scirpus wetlands. Hordeum wetland was extensive and healthy. Scirpus wetland patches are increasing in frequency. The majority of Scirpus plants are not flowering and are in poor shape, presumeably because they are being targeted by wildlife species.**

BIRD SURVEY – FIELD DATA SHEET

Site: **Alkali Lake** Date: **5/16/08**
Survey Time: **9:00 am** to **12:00 pm**

Bird Species	#	Behavior	Habitat	Bird Species	#	Behavior	Habitat
American Avocet	40	F, BD	OW, MA, MF, US	Tern (vocal heard)	1-2	F	UP, OW
American Wigeon	2	F	OW	Vesper Sparrow	6	F	UP
California Gull	2	F	OW	Western Meadowlark	4	F, BD	UP
Canada Goose	2 pair	F	OW, MF, MA	Western Sandpiper	30	F	MA, MF, US
Green-winged Teal	2 pair	F	OW	Willet	12	F, BD	MA, MF, US
Horned Lark	12	F	UP, MA	Wilson's Phalarope	24	F	OW, MA, MF
Killdeer	10	F, N	MA, MF, US				
Long-billed Curlew	5	F	MA, MF, US				
Mallard	4 pairs	F	OW				
Marbled Godwit	20	F, BD	MA, MF, US				
Northern Harrier	1	F	UP				
Northern Pintail	2	F, FO	OW				
Northern Shoveler	2	F	OW				
Piping Plover	1	F	MF, US				
Red-winged Blackbird	4	F	MA				
Ring-necked Duck	6	F, FO	OW				
Sandhill Crane	1	F	UP				
Savannah Sparrow	2	F	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: **Sunny, light breeze, 65 degrees in morning, 80 degrees by noon hour.**

Notes: **Official Spring Bird Survey conducted by Larry Urban (MDT) and Jeff Berglund (PBS&J). Lakebed was inundated approximately 70-75%. Irrigation water was flowing into site and appeared to be recently turned on.**
Also saw pronghorn and the signs of ground squirrel, coyote, skunk, and fox.

BIRD SURVEY – FIELD DATA SHEET

Site: **Alkali Lake** Date: **8/14-15/08**
Survey Time: **8:00 am** to **5:00 pm**

Bird Species	#	Behavior	Habitat	Bird Species	#	Behavior	Habitat
Canada Geese	<50	F, L, FO	MA, OW				
Long-billed Curlew	<15	F, FO	MA, OW, UP				
California/Ring-billed Gull	<50	F, L	MA, OW				
Killdeer	<5	F	MA, UP				
Greater Yellowlegs	3	F	MA, OW				
Sandpiper	<30	F	MA, OW				
Willett	<30	F	MA, OW				
Sparrow	<20	F, L, FO	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: **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: **10/28/08**
Survey Time: **12:15 pm** to **1:40 pm**

Bird Species	#	Behavior	Habitat	Bird Species	#	Behavior	Habitat
Tundra Swans (mature & immature)	43	L	OW, MA, US				
Sparrows (unidentified)	13	L	MA, US				
Canada Geese	10	FO	entire site				

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 60's to low 70's; wind 0-3 mph.**

Notes: **Official Fall Bird Survey conducted by Andrea Pipp. Lakebed was 65-70% inundated. Irrigation water was not flowing. Inlet channel with aquatic insects and algae. Flying insects were common. Plants have all cured out in upland and in wetland. Pulled three Cirsium arvense plants (not flowering) from rocks at inlet.**

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

Project/Site: Alkali - 2008	**Project No:**	**Date:** 14-Aug-2008	
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)		Betw. 0-8 feet on Transect 1.

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:

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
- YES FAC-Neutral Test
- YES Other(Explain in Remarks)

Remarks:
Dry from 0-6 inches; Moist from 6-11 inches; Nearly saturated from 11-12 inches, but not quite saturated. Assumed it was saturated earlier in growing season and for long enough duration. Surface soil cracks are abundant and 2 inches deep. Few oxidized root channels present from 6-12 inches.

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

Project/Site: Alkali - 2008	**Project No:**	**Date:** 14-Aug-2008	
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
0-6	A	2.5Y5/1	2.5Y5/4	Few	Faint	Clay
6-12	B	2.5Y4/1	2.5Y4/4	Many	Faint	Clay, Oxidized rhizospheres

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:

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

Project/Site:	Alkali - 2008	**Project No:**	**Date:** 14-Aug-2008
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? (If needed, explain on the reverse side)	Yes (No)	**Field Location:** On Transect 1.

VEGETATION (USFWS Region No. 9)

Dominant Plant Species(Latin/Common)	Stratum	Indicator	Plant Species(Latin/Common)	Stratum	Indicator
Hordeum jubatum	Herb	FAC+	*Scirpus pungens*	Herb	OBL
Barley,Fox-Tail			Bulrush,Three-Square		
Eleocharis palustris	Herb	OBL			
Spikerush,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:** 5/3 = 1.67

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: = 2.0 *(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:
Pit dug where soil was inundated. Nearby surface soil is dry, but cracked to 3 inches deep.

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

Project/Site:	Alkali - 2008	**Project No:**	**Date:** 14-Aug-2008
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
0-0.5	Oi	10YR2/1	N/A	N/A	N/A	Organic
0.5-12	A/B	2.5Y5/1	2.5Y5/4	Few	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:

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

Project/Site: Alkali - 2008	**Project No:**	**Date:** 14-Aug-2008	
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)	On T-1 in Aquatic Plant wetland.

VEGETATION (USFWS Region No. 9)

Dominant Plant Species(Latin/Common)	Stratum	Indicator	Plant Species(Latin/Common)	Stratum	Indicator
Eleocharis acicularis	Herb	OBL			
Spikerush,Least					

Percent of Dominant Species that are OBL, FACW or FAC: 1/1 = 100.00%
(excluding FAC-) 1/1 = 100.00%

FAC Neutral: 1/1 = 100.00%
Numeric Index: 1/1 = 1.00

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:	= 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
- 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:
Also dominant was a species of Potamogeton.

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

Project/Site: Alkali - 2008	**Project No:**	**Date:** 14-Aug-2008	
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
0-12	A/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 - 2008	**Project No:**	**Date:** 14-Aug-2008	
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)	Between 0-5 feet on Transect 2.

VEGETATION (USFWS Region No. 9)

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

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:
Present, but not dominant were Hordeum jubatum and Puccinellia nuttalliana.

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
- NO 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:
Soils dry from 0-9 inches and slightly moist from 9-12 inches. Soil surface cracked to 1 inch deep.

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

Project/Site: . Alkali - 2008	**Project No:**	**Date:** 14-Aug-2008	
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	Many	Faint	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:
Site is upland.

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

Project/Site: Alkali - 2008	**Project No:**	**Date:** 14-Aug-2008	
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)		On Transect 2.

VEGETATION (USFWS Region No. 9)

Dominant Plant Species(Latin/Common)	Stratum	Indicator	Plant Species(Latin/Common)	Stratum	Indicator
Hordeum jubatum	Herb	FAC+	*Iva axillaris*	Herb	FAC
Barley,Fox-Tail			Sumpweed,Small-Flower		

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

FAC Neutral: 0/0 = 0.00%
Numeric Index: 6/2 = 3.00

Remarks:
Hordeum brachyantherum possibly present. In vicinity of plot there are some small patches of 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:	> 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
- YES Other(Explain in Remarks)

Remarks:
From 11-12 inches, soil was pliable, but not saturated. Surface soil cracks were 5 inches deep. From 7-12 inches oxidized rhizospheres were present. It is assumed that the soil was saturated earlier in the growing season and for long enough duration.

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

Project/Site: Alkali - 2008	**Project No:**	**Date:** 14-Aug-2008	
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
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/Contrast		Texture, Concretions, Structure, etc
0-7	A	2.5Y5/1	N/A	N/A	N/A	Clay
7-12	B	2.5Y5/1	2.5YR5/6	Many	Faint	Clay, Oxidized rhizospheres

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 - 2008	**Project No:**	**Date:** 14-Aug-2008
Applicant/Owner:	-Montana Department of Transportation-		**County:** Pondera
Investigators:	Andrea Pipp		**State:** Montana
			Plot ID: Soil Pit 6

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:** First segment of Transect 3.

VEGETATION (USFWS Region No. 9)

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

Percent of Dominant Species that are OBL, FACW or FAC: (excluding FAC-) 2/3 = 66.67%	**FAC Neutral:** 0/1 = 0.00% **Numeric Index:** 10/3 = 3.33

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:	= 11 *(in.)*

Wetland Hydrology Indicators

Primary Indicators
- NO Inundated
- YES 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:
Soils dry from 0-4 inches; pliable from 5-11 inches; and saturated at 11 inches. Surface soils cracked from 0-4 inches.

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

Project/Site:	Alkali - 2008	**Project No:**	**Date:** 14-Aug-2008
Applicant/Owner:	-Montana Department of Transportation-		**County:** Pondera
Investigators:	Andrea Pipp		**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 **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	2.5Y5/1	2.5Y5/6	Few Faint	Clay, Oxidized rhizospheres

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:

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

Project/Site:	Alkali - 2008	**Project No:**	**Date:** 14-Aug-2008
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? (If needed, explain on the reverse side)	Yes (No)	**Field Location:** Middle section of Transect 3.

VEGETATION (USFWS Region No. 9)

Dominant Plant Species(Latin/Common)	Stratum	Indicator	Plant Species(Latin/Common)	Stratum	Indicator
Hordeum jubatum	Herb	FAC+			
Barley,Fox-Tail					

Percent of Dominant Species that are OBL, FACW or FAC: (excluding FAC-) 1/1 = 100.00%

FAC Neutral: 0/0 = 0.00%

Numeric Index: 3/1 = 3.00

Remarks:
Suaeda species is absent, though 2007 stalks are still present. Polygonum ramosissimum present, but not dominant.

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:	= 2.5 *(in.)*

Wetland Hydrology Indicators

Primary Indicators
- NO 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
- NO FAC-Neutral Test
- NO Other(Explain in Remarks)

Remarks:
Dry from 0-2.5 inches. Surface soil cracks are 0-4 inches deep.

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

Project/Site:	Alkali - 2008	**Project No:**	**Date:** 14-Aug-2008
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
0-12	A/B	2.5Y5/1	2.5Y5/6	Common 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:

WetForm™

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

Project/Site: Alkali - 2008	**Project No:**	**Date:** 15-Aug-2008	
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?	Yes (No)	**Field Location:**
(If needed, explain on the reverse side)		In Inlet Channel.

VEGETATION (USFWS Region No. 9)

Dominant Plant Species(Latin/Common)	Stratum	Indicator	Plant Species(Latin/Common)	Stratum	Indicator
Scirpus acutus	Herb	OBL	*Hordeum jubatum*	Herb	FAC+
Bulrush,Hard-Stem			Barley,Fox-Tail		
Scirpus pungens	Herb	OBL			
Bulrush,Three-Square					

Percent of Dominant Species that are OBL, FACW or FAC:	**FAC Neutral:** 2/2 = 100.00%
(excluding FAC-) 3/3 = 100.00%	**Numeric Index:** 5/3 = 1.67

Remarks:
Many Scirpus are browsed.

HYDROLOGY

NO Recorded Data(Describe in Remarks):	**Wetland Hydrology Indicators**
N/A Stream, Lake or Tide Gauge	**Primary Indicators**
N/A Aerial Photographs	YES Inundated
N/A Other	YES Saturated in Upper 12 Inches
YES No Recorded Data	NO Water Marks
	NO Drift Lines
Field Observations	NO Sediment Deposits
	NO Drainage Patterns in Wetlands
Depth of Surface Water: = 3.0 *(in.)*	**Secondary Indicators**
	NO Oxidized Root Channels in Upper 12 Inches
Depth to Free Water in Pit: N/A *(in.)*	NO Water-Stained Leaves
	NO Local Soil Survey Data
Depth to Saturated Soil: N/A *(in.)*	YES FAC-Neutral Test
	NO Other(Explain in Remarks)

Remarks:

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

Project/Site: Alkali - 2008	**Project No:**	**Date:** 15-Aug-2008	
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
0-5	A	2.5Y5/1	N/A	N/A	N/A	Clay
5-12+	A/B	2.5Y5/1	2.5Y5/4	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 - 2008	**Project No:**	**Date:** 15-Aug-2008	
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?	Yes (No)	**Field Location:**
(If needed, explain on the reverse side)		Northeast area of site.

VEGETATION (USFWS Region No. 9)

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

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 few was Iva axillaris.

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:	N/A *(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
- 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:
Soil very dry from 0-8 inches; pliable at 8 inches. Tall hummicks were observed on the other side of the fence, indicating that that soils around Pit 9 must have been flooded with water. Surface soil cracks are from 0-2 inches deep. Soils meet NRCS Hydric Soils Criteria #3, "Soils that are frequently ponded for long duration or very long duration during the growing season."

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

Project/Site: Alkali - 2008	**Project No:**	**Date:** 15-Aug-2008	
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
0-8	A	2.5Y5/1	N/A	N/A	N/A	Clay
8-12+	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 - 2008	**Project No:**	**Date:** 15-Aug-2008
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)	West of T-2 in AGRSMI patch.

VEGETATION (USFWS Region No. 9)

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

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:
Bare ground accounts for 33% of area.

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
- NO 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 dry from 0-12 inches. Surface soil occasionally cracked to 2 inches deep.

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

Project/Site: Alkali - 2008	**Project No:**	**Date:** 15-Aug-2008
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
0-12	A	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)	Is the Sampling Point within the Wetland? Yes (No)
Wetland Hydrology Present?	Yes (No)	
Hydric Soils Present?	(Yes) No	

Remarks:
Site is upland.

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

Project/Site:	Alkali - 2008	**Project No:**	**Date:** 15-Aug-2008
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?	Yes (No)	**Field Location:**
(If needed, explain on the reverse side)		In outlet.

VEGETATION (USFWS Region No. 9)

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

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):	**Wetland Hydrology Indicators**
N/A Stream, Lake or Tide Gauge	**Primary Indicators**
N/A Aerial Photographs	NO Inundated
N/A Other	NO Saturated in Upper 12 Inches
YES No Recorded Data	NO Water Marks
	NO Drift Lines
Field Observations	NO Sediment Deposits
Depth of Surface Water: N/A *(in.)*	YES Drainage Patterns in Wetlands
Depth to Free Water in Pit: N/A *(in.)*	**Secondary Indicators**
Depth to Saturated Soil: > 13 *(in.)*	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 dry from 0-1 inch; moist from 1-4 inches; and pliable from 4-12 inches. Surface soils cracked from 0-4 inches. Assumed that soils were saturated earlier in growing season and for long enough duration.

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

Project/Site:	Alkali - 2008	**Project No:**	**Date:** 15-Aug-2008
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
0-12	A/B	2.5Y4/1	2.5Y5/6	Common 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:

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 14-15, 2008 **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)
56.76 (measured, e.g. GPS)

9. Assessment Area (AA) Size (acre): _____ (visually estimated)
(see manual for determining AA) 186.94 (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	50
Depressional	Unconsolidated Bottom	Impounded	Seasonal / Intermittent	50

Comments: _____

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.

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), and May 16, 2008 (1 bird); nesting was not documented. Nesting by Piping Plovers was documented along the North 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
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 sited at Alkali Lake in 2006-2007. Trumpeter Swan was observed at Alkali Lake in 2006.

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 used the site in Fall 2005 and Spring through Fall of 2006 through 2008.

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**

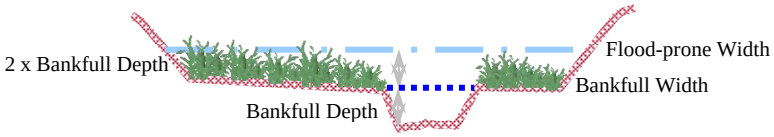
iii. Final Score and Rating: _ **Comments:** _____

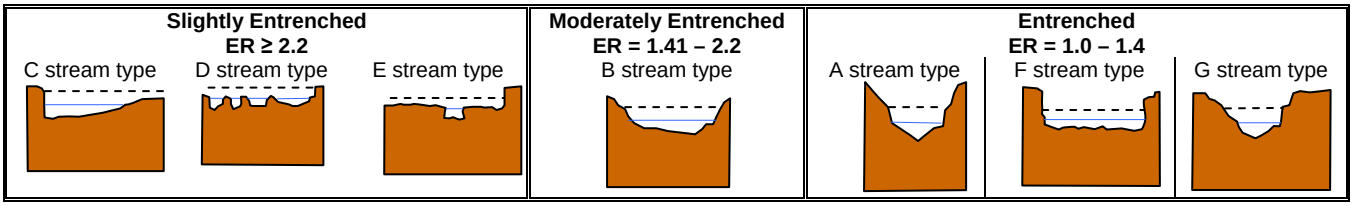
14E. FLOOD ATTENUATION ☒ **NA** (proceed to 14F)

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: Duration of surface water depends upon irrigation water. A portion of the site has retained permanent surface water since 2006; however, surface water management allows for water to draw-down and environmental conditions may prevent surface water from being permanent.

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 which probably would rates as a 3-4. 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	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
S/I	---	.6M	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
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** = 0.70 ☐ **NO**

iv. Final Score and Rating: .7M **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. 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 that could serve as an area for educational/scientific study, bird hunting, and birdwatching.

15. GENERAL SITE NOTES: _____

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	mod 0.70	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	**5.55**	**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

2008 REPRESENTATIVE PHOTOGRAPHS

MDT Wetland Mitigation Monitoring
Alkali Lake
Pondera County, Montana

2008 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 4: Photo Point 3 taken from the northwest corner of Alkali Lake. View is southeast.

Photo 4: View is northwest (311˚) from Transect 1 start.

Photo 5: View is southeast (131˚) from Transect 1 end. Photo's center marks macroinvertebrate sampling site.

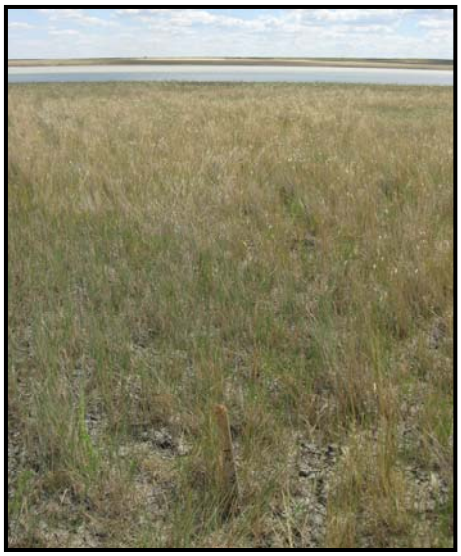


Photo 6: View is southeast (297˚) from Transect 2 start.

Photo 7: View is northwest (316˚) from Transect 2 end.

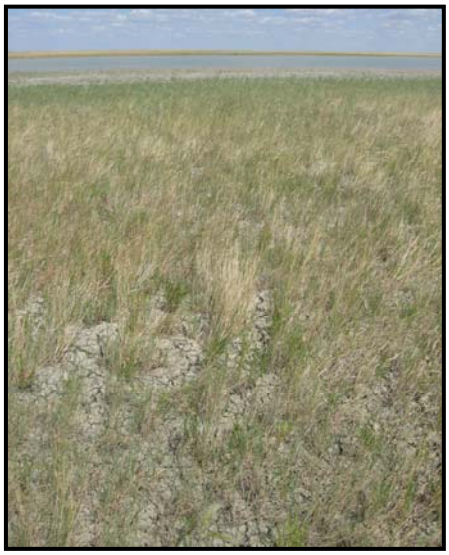


Photo 8: View is northeast from Transect 3 end.

Photo 9: View is southwest from Transect 3 end. Dead (2007) stalks of *Suaeda* in foreground.

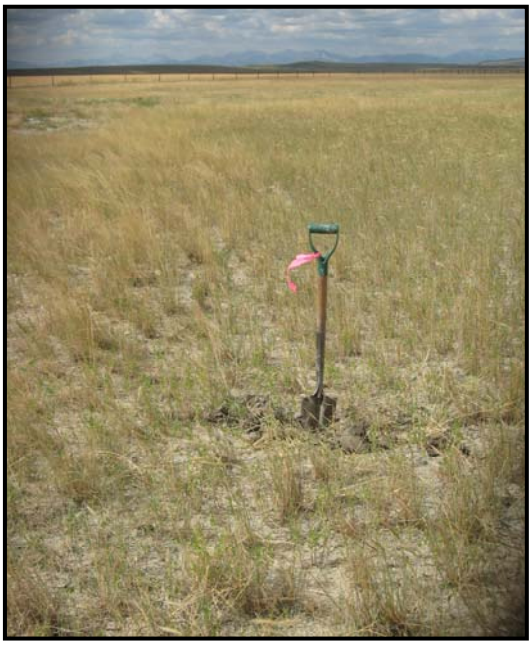


Photo 10: View is southwest of Type 3-*Hordeum* Wetland at Soil Pit 1. Upland (*Agropyron*) on photo left.

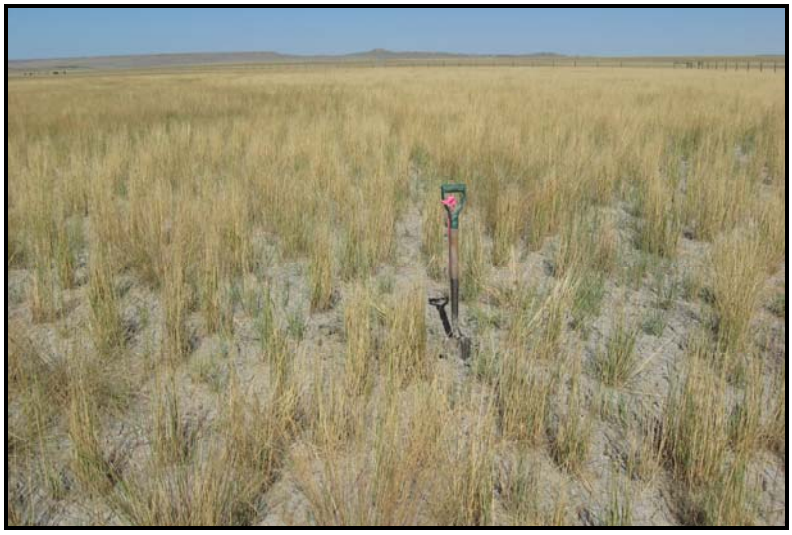


Photo 11: View is north at Type 3-*Hordeum* Wetland with *Puccinellia nuttalliana* at Soil Pit 9.

Photo 12: Type 6-Aquatic Wetland (primarily *Eleocharis acicularis*) on Transect 1.

Photo 13: Type 6-Aquatic Wetland within northeast side of site.

Photo 14: View is northwest at Soil Pit 8 within the large Type 4-*Scirpus* Wetland near inlet.

Photo 15: View is southwest at a typical Type 4-*Scirpus* Wetland. *Scirpus* stalks are alive, but battered.

Photo 16: View is south at a green algal bloom. This is a new phenomenon at Alkali Lake.

Photo 17: View is northeast at a green algal bloom. Algal bloom was found primarily on the northeast half of Alkali Lake.

Photo 18: *Chenopodium* and *Suaeda* seedlings germinating within Type 3-*Hordeum* Wetland.

Photo 19: Dead (2007) stalks of *Suaeda* within Open Water. One green stem of *Scirpus* is present in photo.

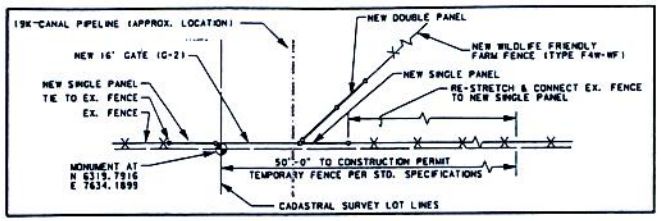
Photo 20: View is southwest at the outlet and Soil Pit 11. *Eleocharis palustris* dominates.

Photo 21: View is north at a dead calf.

Appendix D

PROJECT PLAN SHEET

MDT Wetland Mitigation Monitoring
Alkali Lake
Pondera County, Montana



DETAIL 'A'
(NO SCALE)

REMOVE EXISTING FENCE PER ROW AGREEMENT. EXACT LOCATION AND QUANTITY TO BE DETERMINED IN THE FIELD.

N = 9622.8243
E = 8953.2500

1322.5ft

N = 9627.6560
E = 10275.7398

832.52ft

N = 8967.7063
E = 10934.5693

16' GATE (G-2) BETWEEN (D) & (D)

N = 8959.6745
E = 7632.3853

1477.99ft

340.6ft

N = 8620.8070
E = 10934.6756

730.64ft

N = 8305.0272
E = 10276.0162

1479.5ft

16' GATE (G-2) BETWEEN (D) & (S)

N = 8300.2611
E = 5000.5074

N = 8300.4514
E = 6316.6097

1316.1ft

1471.68ft

656.53ft

N = 7643.7118
E = 4990.8440

N = 7641.1853
E = 8953.8039

ALLOT 1303

ALLOT 1303

REMOVE EX. FENCE AS NECESSARY WITHIN THE WEST BOUNDARIES OF ALLOTMENTS 1303 & 1913

FENCE ON THE INSIDE OF THE LEGAL BOUNDARIES (AREA TO ENGLOSE) - PLACE WIRE ON THE OUTSIDE PERIMETER

1867.48ft

1983.2ft

24" CATTLE GUARD BETWEEN (S) & (S)

N = 6321.7979
E = 10277.6411

DO NOT DISTURB AREA

TEMPORARY FENCE

16' GATE (G-2) BETWEEN (S) & (S)

N = 6319.7916
E = 7634.1886

REMOVE EX. FENCE AS NECESSARY WITHIN THE WEST BOUNDARIES OF ALLOTMENTS 1303 & 1913

ALLOT 1911

ALLOT 1913

289.3ft

EXISTING FENCE - DO NOT DISTURB

659.69ft

329.8ft

1317.24ft

TIE TO EXISTING FENCE
N = 5989.3576
E = 6606.1775

N = 5989.3566
E = 6316.9620

16' GATE (G-2) BETWEEN (D) & (S)

N = 5660.5135
E = 4999.5486

POINT OF BEGINNING
N = 5659.4700
E = 6316.7899

ALLOT 42

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.

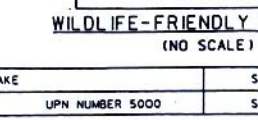
GATE COORDINATES ARE APPROXIMATE. SET GATES AND FENCING WITHIN THE LEGAL BOUNDARIES AS DISCUSSED ABOVE AND IN ACCORDANCE WITH GATE AND FARM FENCE STANDARD DETAILED DRAWINGS.

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)

SCALE 1 in = 600 ft (HALF SIZE PLANS)
0 600' 1200'

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

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

2008 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 – 2008

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. Over all years of sampling, a total of 210 invertebrate samples have been collected. Table 1 lists the currently monitored sites at which aquatic invertebrates were collected in 2008, and summarizes the sampling history of each.

METHODS

Sample processing

Aquatic invertebrate samples were collected at mitigated wetland sites in the summer months of 2001, 2002, 2003, 2004, 2005, 2006, 2007, and 2008 by personnel of PBS&J (Table 1). 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 2) 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. 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 in all years. Data from a total of 167 samples 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 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 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 2008 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 is 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 those sites sampled in 2008 are included. An asterisk indicates lotic sites.

Site Identifier	2001	2002	2003	2004	2005	2006	2007	2008
Roundup	+	+	+	+	+	+	+	+
Hoskins Landing MS-1		+	+	+	+	+	+	+
Peterson Ranch Pond 2		+		+	+	+	+	+
Peterson Ranch Pond 4		+	+	+	+	+	+	+
Perry Ranch		+			+			+
Camp Creek MS-1*		+	+	+	+	+	+	+
Camp Creek MS-2*						+	+	+
Cloud Ranch Pond				+	+		+	+
Cloud Ranch Stream*				+			+	+
Jack Creek – Pond				+	+	+	+	+
Jack Creek – McKee*							+	+
Norem				+	+	+	+	+
Rock Creek Ranch					+	+	+	+
Wagner Marsh					+	+	+	+
Alkali Lake 1						+	+	+
West Fork of Charley Creek							+	+
Woodson Pond MI 1							+	+
Woodson Stream MI 2*							+	+
Little Muddy Creek							+	+
Selkirk Ranch							+	+
DH Ranch							+	+
Jocko Spring Creek MS-1								+
Jocko Spring Creek MS-2								+
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 – 2008.

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 – 2008 sampling.

METRIC	Roundup	Hoskins Landing MS 1	Peterson Ranch Pond 2	Peterson Ranch Pond 4	Perry Ranch	Cloud Ranch Pond	Jack Creek Pond	Norem
Total taxa	9	18	13	25	11	27	21	14
POET	0	2	1	3	0	5	2	0
Chironomidae taxa	4	5	3	6	5	14	7	6
Crustacea + Mollusca	3	6	3	5	2	4	6	2
% Chironomidae	80.37%	17.00%	3.70%	13.21%	88.79%	49.53%	42.86%	34.69%
Orthocladiinae/Chir	0.63	0.18	1.50	0.21	0.82	0.66	0.40	0.53
% Amphipoda	0.00%	8.00%	0.00%	0.00%	0.00%	6.54%	15.24%	0.00%
% Crustacea + % Mollusca	15.89%	48.00%	86.11%	43.40%	6.54%	10.28%	30.48%	26.53%
HBI	8.01	7.62	7.85	7.40	7.37	5.94	8.17	7.61
% Dominant taxon	50.47%	27.00%	84.26%	25.47%	62.62%	13.08%	19.05%	26.53%
% Collector-Gatherers	31.78%	54.00%	87.96%	20.75%	20.56%	56.07%	65.71%	44.90%
% Filterers	2.80%	10.00%	0.00%	1.89%	0.00%	3.74%	1.90%	0.00%
Total taxa	1	3	1	5	1	5	5	1
POET	1	1	1	3	1	5	1	1
Chironomidae taxa	3	3	3	3	3	5	5	3
Crustacea + Mollusca	1	5	1	3	1	3	5	1
% Chironomidae	1	5	5	5	1	1	1	3
Orthocladiinae/Chir	5	1	5	3	5	5	3	5
% Amphipoda	5	3	5	5	5	3	3	5
% Crustacea + % Mollusca	5	3	1	3	5	5	5	5
HBI	1	1	1	3	3	5	1	1
% Dominant taxon	1	5	1	5	1	5	5	5
% Collector-Gatherers	1	3	5	1	1	3	3	1
% Filterers	3	1	3	3	3	3	3	3
Total Score	**28**	**34**	**32**	**42**	**30**	**48**	**40**	**34**
Percent of Maximum Score	**46.67%**	**56.67%**	**53.33%**	**70.00%**	**50.00%**	**80.00%**	**66.67%**	**56.67%**
Impairment Classification	**poor**	**sub-optimal**	**sub-optimal**	**good**	**poor**	**good**	**sub-optimal**	**sub-optimal**

Table 4b. Metric values and scores for wetland (lentic) sites in the MDT mitigated wetland study – 2008 sampling.

METRIC	Rock Creek Ranch	Wagner Marsh	Alkali Lake	West Fork of Charley Creek	Woodson Pond	Woodson Stream	Little Muddy Creek	Selkirk Ranch
Total taxa	23	11	10	9	13	7	14	17
POET	1	4	0	0	1	3	1	1
Chironomidae taxa	5	2	2	1	7	0	2	8
Crustacea + Mollusca	5	2	3	3	2	2	3	5
% Chironomidae	28.97%	2.83%	5.41%	0.91%	60.00%	0.00%	55.00%	23.38%
Orthocladiinae/Chir	0.97	0.00	0.00	0.00	0.52	0	0.64	0.33
% Amphipoda	0.00%	0.00%	0.00%	67.27%	0.00%	7.69%	0.00%	5.19%
% Crustacea + % Mollusca	28.97%	39.62%	32.43%	70.91%	25.45%	15.38%	17.00%	48.05%
HBI	6.91	7.45	8.57	8.19	8.14	4.62	6.97	7.76
% Dominant taxon	22.43%	48.11%	48.65%	67.27%	25.45%	30.77%	35.00%	32.47%
% Collector-Gatherers	30.84%	52.83%	21.62%	68.18%	86.36%	23.08%	29.00%	16.88%
% Filterers	1.87%	0.00%	0.00%	0.00%	0.00%	30.77%	0.00%	32.47%
Total taxa	5	1	1	1	1	1	1	3
POET	1	5	1	1	1	3	1	1
Chironomidae taxa	3	1	1	1	5	1	1	5
Crustacea + Mollusca	3	1	1	1	1	1	1	3
% Chironomidae	3	5	5	5	1	5	1	3
Orthocladiinae/Chir	5	1	1	1	5	Not Scored	5	3
% Amphipoda	5	5	5	1	5	3	5	3
% Crustacea + % Mollusca	5	3	5	1	5	5	5	3
HBI	3	3	1	1	1	5	3	1
% Dominant taxon	5	3	3	1	5	5	3	5
% Collector-Gatherers	1	3	1	3	5	1	1	1
% Filterers	3	3	3	3	3	1	3	1
Total Score	**42**	**34**	**28**	**20**	**38**	**31**	**30**	**32**
Percent of Maximum Score	**70.00%**	**56.67%**	**46.67%**	**33.33%**	**63.33%**	**56.36%**	**50.00%**	**53.33%**
Impairment Classification	**good**	**sub-optimal**	**poor**	**poor**	**sub-optimal**	**sub-optimal**	**poor**	**sub-optimal**

Table 4c. Metric values and scores for wetland (lentic) sites in the MDT mitigated wetland study – 2008 sampling.

METRIC	DH Ranch	Sportsman's Campground Site # 1	Sportsman's Campground Site # 2	Sportsman's Campground Site # 3	Lonepine # 1	Lonepine # 2
Total taxa	15	16	9	12	18	4
POET	1	1	0	0	2	0
Chironomidae taxa	6	6	3	7	12	3
Crustacea + Mollusca	2	5	3	4	1	1
% Chironomidae	52.29%	10.91%	41.18%	69.09%	81.82%	57.14%
Orthocladiinae/Chir	0.09	0.17	0.00	0.25	0.13	0.00
% Amphipoda	0.00%	24.55%	5.88%	27.27%	0.00%	0.00%
% Crustacea + % Mollusca	30.28%	83.64%	23.53%	29.09%	7.27%	42.86%
HBI	7.33	7.55	8.76	7.55	7.60	8.14
% Dominant taxon	33.03%	56.36%	29.41%	25.45%	25.45%	42.86%
% Collector-Gatherers	49.54%	20.91%	11.76%	57.27%	55.45%	28.57%
% Filterers	0.92%	63.64%	11.76%	25.45%	22.73%	42.86%
Total taxa	3	3	1	1	3	1
POET	1	1	1	1	1	1
Chironomidae taxa	3	3	3	5	5	3
Crustacea + Mollusca	1	3	1	3	1	1
% Chironomidae	1	5	3	1	1	1
Orthocladiinae/Chir	1	1	1	3	1	1
% Amphipoda	5	1	3	1	5	5
% Crustacea + % Mollusca	5	1	5	5	5	3
HBI	3	3	1	3	3	1
% Dominant taxon	5	1	5	5	5	3
% Collector-Gatherers	3	1	1	3	3	1
% Filterers	3	1	1	1	1	1
Total Score	**34**	**24**	**26**	**32**	**34**	**22**
Percent of Maximum Score	**56.67%**	**40.00%**	**43.33%**	**53.33%**	**56.67%**	**36.67%**
Impairment Classification	**sub-optimal**	**poor**	**poor**	**sub-optimal**	**sub-optimal**	**poor**

Table 5. Metric values and scores for stream (lotic) sites in the MDT mitigated wetland study – 2008 sampling.

METRIC	Camp Creek MS-1	Camp Creek MS-2	Cloud Ranch Stream	Jack Creek – McKee Spring	Jocko Spring Creek MS-1	Jocko Spring Creek MS-2
E Richness	7	5	4	1	0	1
P Richness	2	2	0	0	0	1
T Richness	4	6	5	3	2	5
Pollution Sensitive Richness	0	1	0	0	0	0
Filterer Percent	29.00%	37.00%	5.00%	40.00%	15.00%	11.00%
Pollution Tolerant Percent	5.00%	3.00%	28.00%	1.00%	62.00%	15.00%
E Richness	3	2	2	0	0	0
P Richness	2	2	0	0	0	1
T Richness	2	3	3	2	1	3
Pollution Sensitive Richness	0	1	0	0	0	0
Filterer Percent	1	0	3	0	1	1
Pollution Tolerant Percent	3	3	0	3	0	1
Total score	**11**	**11**	**8**	**5**	**2**	**6**
Percent of maximum score	**61%**	**61%**	**44%**	**28%**	**11%**	**33%**
Impairment classification	**slight**	**slight**	**moderate**	**moderate**	**severe**	**moderate**

LITERATURE CITED

Bollman, W. 1998. Montana Valleys and Foothill Prairies Ecoregion. Master's Thesis. (M.S.) University of Montana, Missoula, Montana.

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: MDT08PBSJ
RAI No.: MDT08PBSJ006

RAI No.: MDT08PBSJ006 **Sta. Name:** Alkali WL Mit.
Client ID:
Date Coll.: 8/14/2008 **No. Jars:** 1 **STORET ID:**

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Non-Insect							
Nematoda	1	2.70%	Yes	Unknown		5	PA
Ostracoda	6	16.22%	Yes	Unknown		8	CG
Lymnaeidae							
Lymnaeidae	1	2.70%	Yes	Immature		6	SC
Physidae							
Physidae	5	13.51%	Yes	Unknown		8	SC
Heteroptera							
Corixidae							
Corixidae	18	48.65%	Yes	Larva		10	PH
Coleoptera							
Hydrophilidae							
Berosus sp.	2	5.41%	Yes	Larva		5	PR
Diptera							
Ceratopogonidae							
Ceratopogoninae	1	2.70%	Yes	Larva		6	PR
Ephydridae							
Ephydridae	1	2.70%	Yes	Larva		6	CG
Chironomidae							
Chironomidae							
Cryptotendipes sp.	1	2.70%	Yes	Larva		6	CG
Tanypus sp.	1	2.70%	Yes	Larva		10	PR
Sample Count	**37**						

Metrics Report

Project ID: MDT08PBSJ
RAI No.: MDT08PBSJ006
Sta. Name: Alkali WL Mit.
Client ID:
STORET ID:
Coll. Date: 8/14/2008

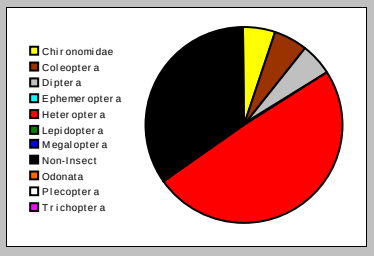
Abundance Measures

Sample Count: 37
Sample Abundance: 37.00 100.00% of sample used

Coll. Procedure:
Sample Notes:

Taxonomic Composition

Category	R	A	PRA
Non-Insect	4	13	35.14%
Odonata			
Ephemeroptera			
Plecoptera			
Heteroptera	1	18	48.65%
Megaloptera			
Trichoptera			
Lepidoptera			
Coleoptera	1	2	5.41%
Diptera	2	2	5.41%
Chironomidae	2	2	5.41%

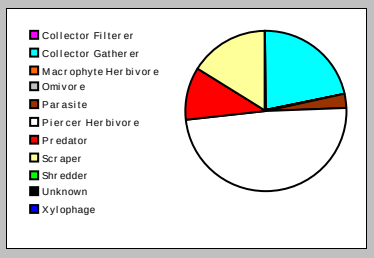


Dominant Taxa

Category	A	PRA
Corixidae	18	48.65%
Ostracoda	6	16.22%
Physidae	5	13.51%
Berosus	2	5.41%
Tanypus	1	2.70%
Nematoda	1	2.70%
Lymnaeidae	1	2.70%
Ephydridae	1	2.70%
Cryptotendipes	1	2.70%
Ceratopogoninae	1	2.70%

Functional Composition

Category	R	A	PRA
Predator	3	4	10.81%
Parasite	1	1	2.70%
Collector Gatherer	3	8	21.62%
Collector Filterer			
Macrophyte Herbivore			
Piercer Herbivore	1	18	48.65%
Xylophage			
Scraper	2	6	16.22%
Shredder			
Omivore			
Unknown			

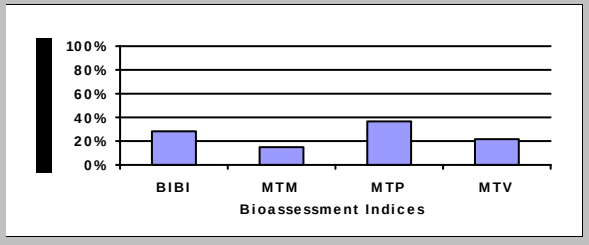


Metric Values and Scores

Metric	Value	BIBI	MTP	MTV	MTM
Composition					
Taxa Richness	10	1	0		0
Non-Insect Percent	35.14%				
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					
Baetidae/Ephemeroptera	0.000				
Hydropsychidae/Trichoptera	0.000				
Dominance					
Dominant Taxon Percent	48.65%		1		0
Dominant Taxa (2) Percent	64.86%				
Dominant Taxa (3) Percent	78.38%	1			
Dominant Taxa (10) Percent	100.00%				
Diversity					
Shannon H (loge)	1.659				
Shannon H (log2)	2.394		1		
Margalef D	2.492				
Simpson D	0.269				
Evenness	0.121				
Function					
Predator Richness	3		1		
Predator Percent	10.81%	3			
Filterer Richness	0				
Filterer Percent	0.00%			3	
Collector Percent	21.62%		3		3
Scraper+Shredder Percent	16.22%		2		0
Scraper/Filterer	0.000				
Scraper/Scraper+Filterer	0.000				
Habit					
Burrower Richness	1				
Burrower Percent	2.70%				
Swimmer Richness	2				
Swimmer Percent	54.05%				
Clinger Richness	0	1			
Clinger Percent	0.00%				
Characteristics					
Cold Stenotherm Richness	0				
Cold Stenotherm Percent	0.00%				
Hemoglobin Bearer Richness	2				
Hemoglobin Bearer Percent	5.41%				
Air Breather Richness	1				
Air Breather Percent	5.41%				
Voltinism					
Univoltine Richness	5				
Semivoltine Richness	1	1			
Multivoltine Percent	24.32%		3		
Tolerance					
Sediment Tolerant Richness	1				
Sediment Tolerant Percent	2.70%				
Sediment Sensitive Richness	0				
Sediment Sensitive Percent	0.00%				
Metals Tolerance Index	4.500				
Pollution Sensitive Richness	0	1		0	
Pollution Tolerant Percent	27.03%	3		1	
Hilsenhoff Biotic Index	8.568		0		0
Intolerant Percent	0.00%				
Supertolerant Percent	81.08%				
CTQa	103.500				

Bioassessment Indices

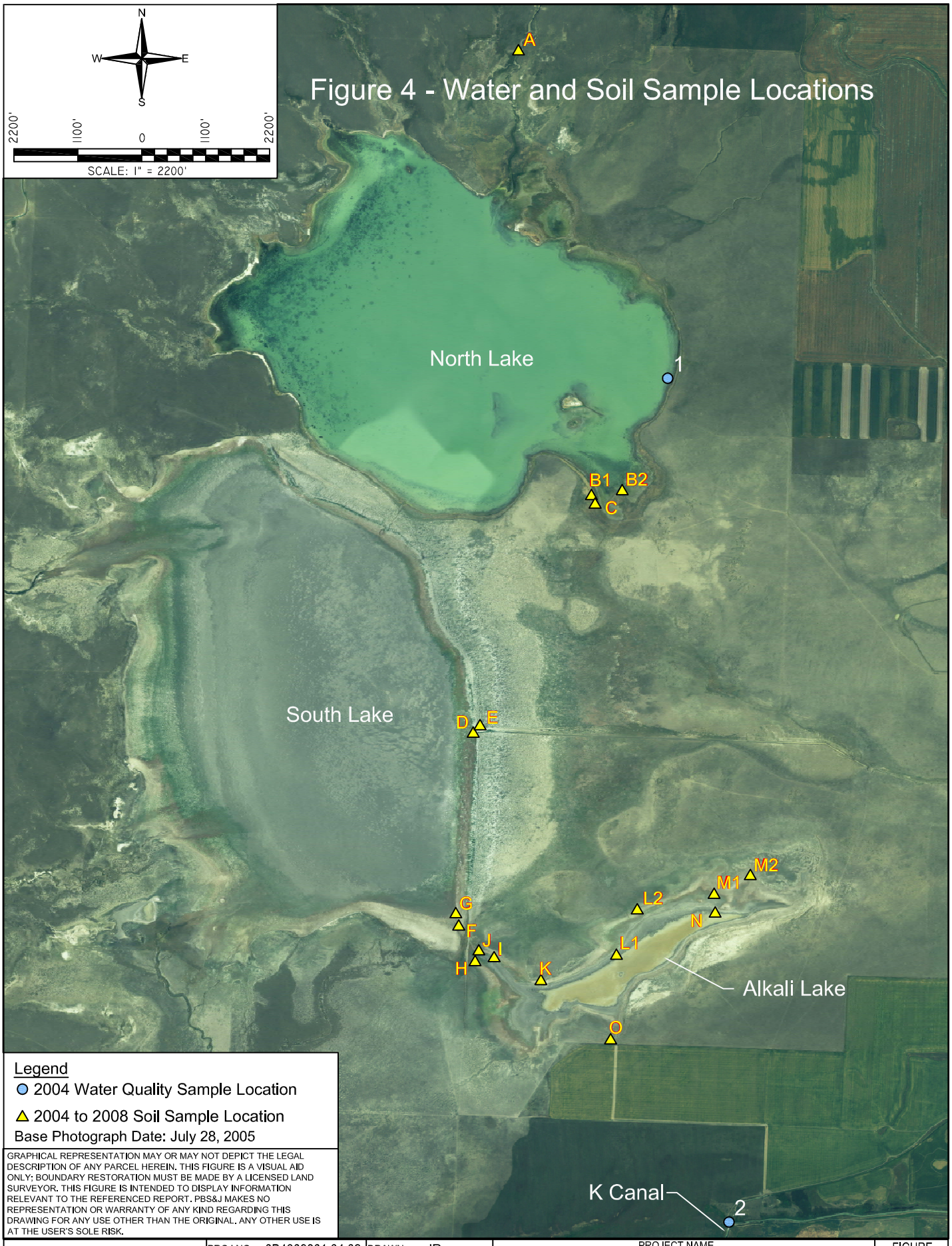
BioIndex	Description	Score	Pct	Rating
BIBI	B-IBI (Karr et al.)	14	28.00%	
MTP	Montana DEQ Plains (Bukantis 1998)	11	36.67%	Moderate
MTV	Montana Revised Valleys/Foothills (Bollman 1998)	4	22.22%	Moderate
MTM	Montana DEQ Mountains (Bukantis 1998)	3	14.29%	Severe



Appendix G

FIGURE 4
2004 - 2008 SOILS METALS DATA

MDT Wetland Mitigation Monitoring
Alkali Lake
Pondera County, Montana



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.

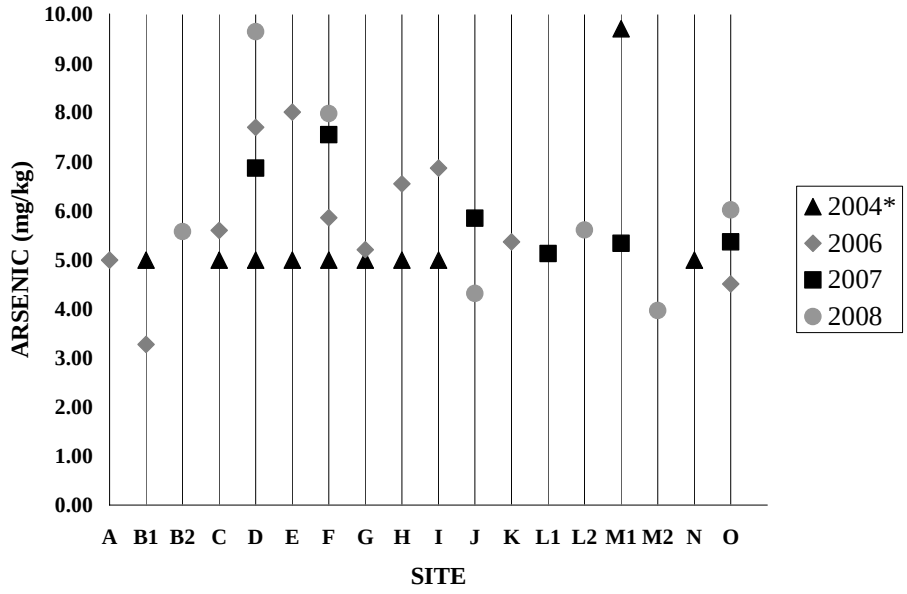
PBSJ
801 N. Last Chance Gulch
Suite 101
Helena, MT 59601

PROJ NO: 0B4308801 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 - 2008 WATER AND SOIL SAMPLE LOCATIONS	REV -
FILE NAME: BASE2008.dwg	DATE: Dec/09/2008		

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

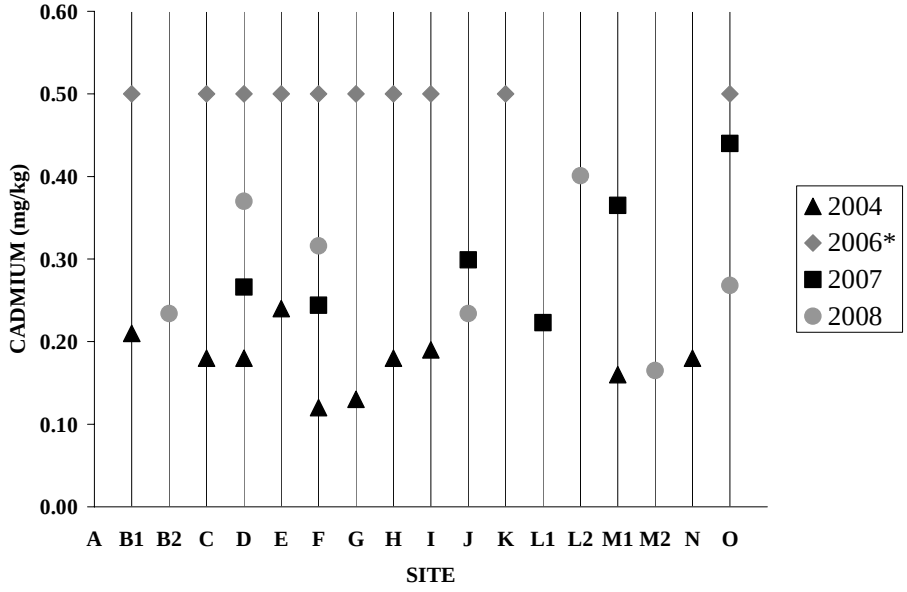
YEAR	SAMPLING SITE																			
	1	2	A	B1	B2	C	D	E	F	G	H	I	J	K	L1	L2	M1	M2	N	O
2004	✓	✓		✓		✓	✓	✓	✓	✓	✓	✓					✓		✓	
2006			✓	✓		✓	✓	✓	✓	✓	✓	✓		✓						✓
2007							✓		✓				✓		✓		✓			✓
2008					✓		✓		✓				✓			✓		✓		✓

Chart 8: ***Arsenic metal levels in soil samples collected in 2004 (baseline) and 2006 to 2008 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 2008 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 2008 for North Alkali, South Alkali, and Alkali lakes.***

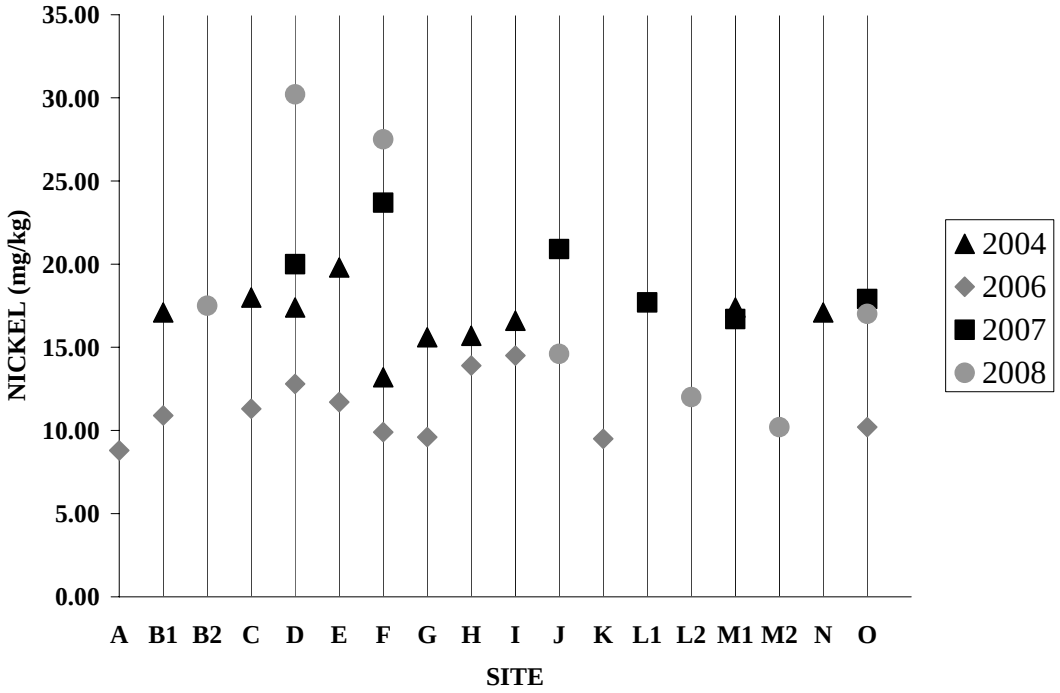
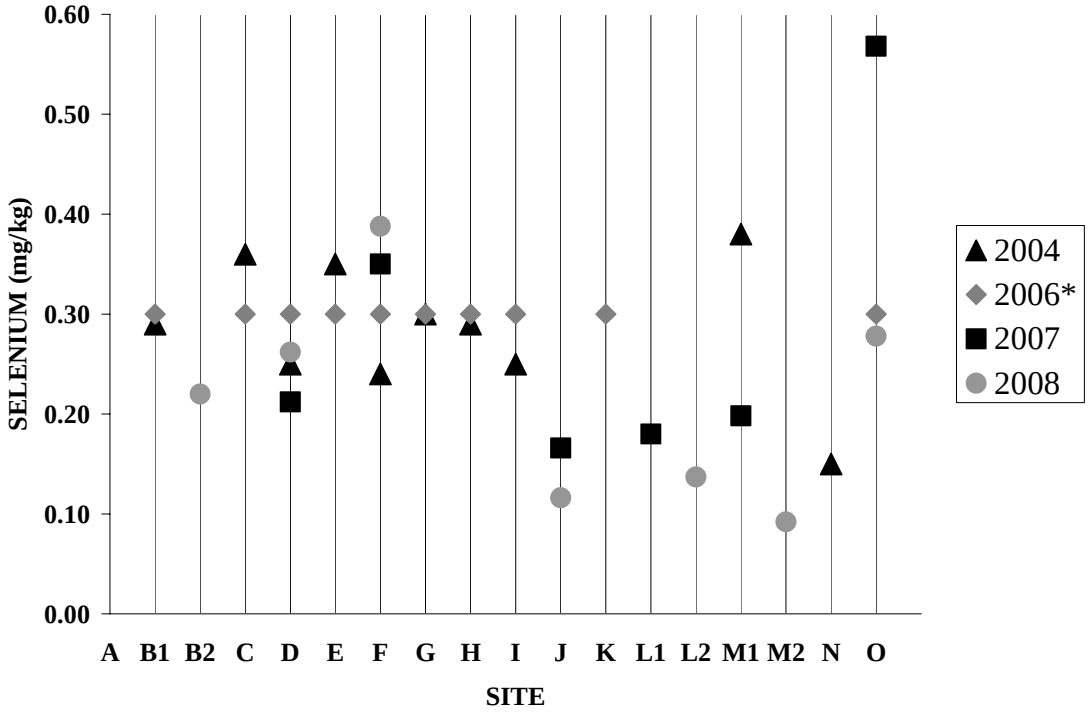


Chart 11: ***Selenium metal levels in soil samples collected in 2004 (baseline) and 2006 to 2008 for North Alkali, South Alkali, and Alkali lakes.***



***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

QA/QC Summary Report

Client: PBS and J
Project: Alkali Wetland Monitoring 0B4308801-04.02.01

Report Date: 09/12/08
Work Order: H08080382

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020									Batch: B_34425
Sample ID: MB-34425	Method Blank				Run: SUB-B116872				09/04/08 04:15
Arsenic	0.05	mg/kg	0.002						
Cadmium	0.07	mg/kg	0.0002						
Nickel	0.02	mg/kg	0.0004						
Selenium	0.002	mg/kg	0.0003						
Sample ID: LCS1-34425	Laboratory Control Sample				Run: SUB-B116872				09/04/08 04:50
Arsenic	86.3	mg/kg	5.0	95	70	130			
Cadmium	69.7	mg/kg	1.0	97	70	130			
Nickel	87.1	mg/kg	5.0	100	70	130			
Selenium	120	mg/kg	5.0	93	70	130			
Sample ID: H08080382-001A	Serial Dilution				Run: SUB-B116872				09/04/08 05:17
Arsenic	4.75	mg/kg	5.0		0	0	0.0	10	
Cadmium	0.241	mg/kg	1.0		0	0	0.0	10	
Nickel	15.6	mg/kg	5.0		0	0	7.0	10	
Selenium	0.145	mg/kg	5.0		0	0	0.0	10	
Sample ID: B08082478-002AMS3	Sample Matrix Spike				Run: SUB-B116872				09/04/08 06:40
Arsenic	61.9	mg/kg-dry	5.0	92	75	125			
Cadmium	26.6	mg/kg-dry	1.0	94	75	125			
Nickel	82.7	mg/kg-dry	5.0	97	75	125			
Selenium	50.2	mg/kg-dry	5.0	88	75	125			
Sample ID: B08082478-002AMSD3	Sample Matrix Spike Duplicate				Run: SUB-B116872				09/04/08 06:46
Arsenic	62.6	mg/kg-dry	5.0	93	75	125	1.2	20	
Cadmium	27.0	mg/kg-dry	1.0	95	75	125	1.2	20	
Nickel	84.7	mg/kg-dry	5.0	100	75	125	2.4	20	
Selenium	49.5	mg/kg-dry	5.0	87	75	125	1.3	20	
Sample ID: MB-34425	Method Blank				Run: SUB-B116932				09/04/08 13:44
Arsenic	0.03	mg/kg	0.002						
Cadmium	0.03	mg/kg	0.0002						
Nickel	0.01	mg/kg	0.0004						
Selenium	0.003	mg/kg	0.0003						
Sample ID: H08080382-002A	Serial Dilution				Run: SUB-B116932				09/04/08 13:58
Arsenic	4.16	mg/kg	5.0		0	0	0.0	10	
Cadmium	0.225	mg/kg	1.0		0	0	0.0	10	
Nickel	10.5	mg/kg	5.0		0	0	2.4	10	
Selenium	0.122	mg/kg	5.0		0	0	0.0	10	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

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QA/QC Summary Report

Client: PBS and J
Project: Alkali Wetland Monitoring 0B4308801-04.02.01

Report Date: 09/12/08
Work Order: H08080382

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020									Analytical Run: SUB-B116872
Sample ID: QCS-ME080514B,080514	Initial Calibration Verification Standard								09/03/08 22:22
Selenium	0.050	mg/L	0.0010	100	90	110			
Arsenic	0.048	mg/L	0.0010	96	90	110			
Cadmium	0.026	mg/L	0.0010	104	90	110			
Nickel	0.051	mg/L	0.0010	102	90	110			
Sample ID: ICSA	Interference Check Sample A								09/03/08 22:43
Selenium	8.8E-05	mg/L	0.0010						
Arsenic	7.9E-05	mg/L	0.0010						
Cadmium	0.00045	mg/L	0.0010						
Nickel	0.00069	mg/L	0.0010						
Sample ID: ICSAB	Interference Check Sample AB								09/03/08 22:50
Selenium	0.0100	mg/L	0.0010	100	70	130			
Arsenic	0.010	mg/L	0.0010	104	70	130			
Cadmium	0.011	mg/L	0.0010	107	70	130			
Nickel	0.022	mg/L	0.0010	109	70	130			
Method: SW6020									Analytical Run: SUB-B116932
Sample ID: QCS-ME080514B,080514	Initial Calibration Verification Standard								09/04/08 12:42
Cadmium	0.026	mg/L	0.0010	104	90	110			
Sample ID: ICSA	Interference Check Sample A								09/04/08 13:02
Cadmium	0.00040	mg/L	0.0010						
Sample ID: ICSAB	Interference Check Sample AB								09/04/08 13:09
Cadmium	0.011	mg/L	0.0010	109	70	130			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

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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 0B4308801-04.02.01
Workorder: H08080382

Report Date: 09/12/08
Date Received: 08/22/08

	Analysis	As-T	Cd-T	Ni-T	Se-T
	Units	mg/kg	mg/kg	mg/kg	mg/kg
Sample ID	Client Sample ID	Results	Results	Results	Results
H08080382-001	Soil H/I-Alkali = 5	4.31	0.234	14.6	0.116
H08080382-002	Soil M/N - Alkali = M2	3.96	0.165	10.2	0.092
H08080382-003	Soil O- Alkali = O	6.01	0.268	17.0	0.278
H08080382-004	Soil P - Alkali = L2	5.60	0.401	12.0	0.137
H08080382-005	Soil B/C - N. Alkali = B2	5.57	0.234	17.5	0.220
H08080382-006	Soil F/G - S. Alkali = F	7.97	0.316	27.5	0.388
H08080382-007	Soil D - S. Alkali = D	9.64	0.370	30.2	0.262