MONTANA DEPARTMENT OF TRANSPORTATION
WETLAND MITIGATION MONITORING REPORT: YEAR 2007

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

December 2007

PBS&J Project No: B43088.00 - 0302

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TABLE OF CONTENTS

TABLES

CHARTS

CHARTS (continued)

FIGURES

APPENDICES

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.

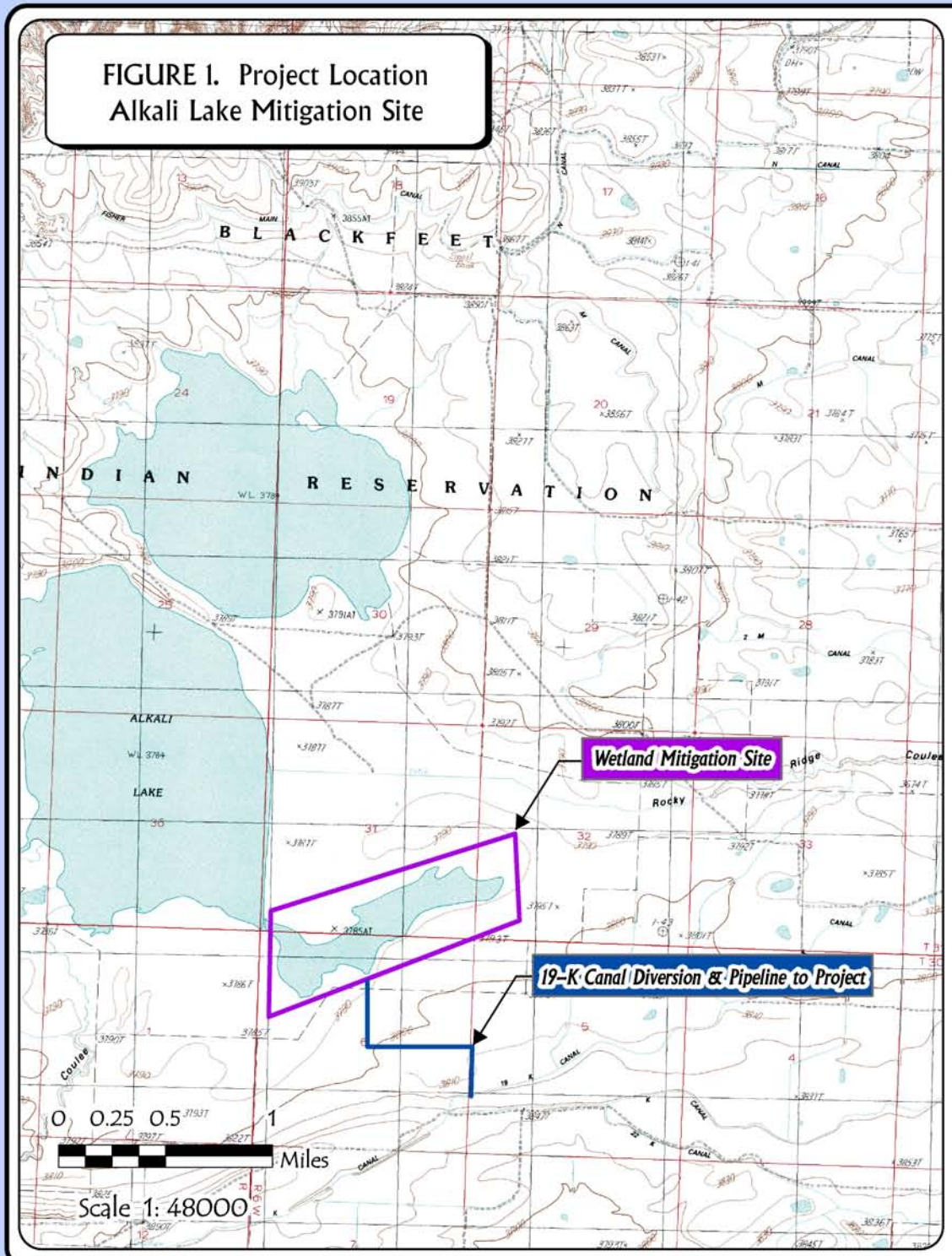
Final approved performance standards (Steinle 2004a and 2004b) are as follows:

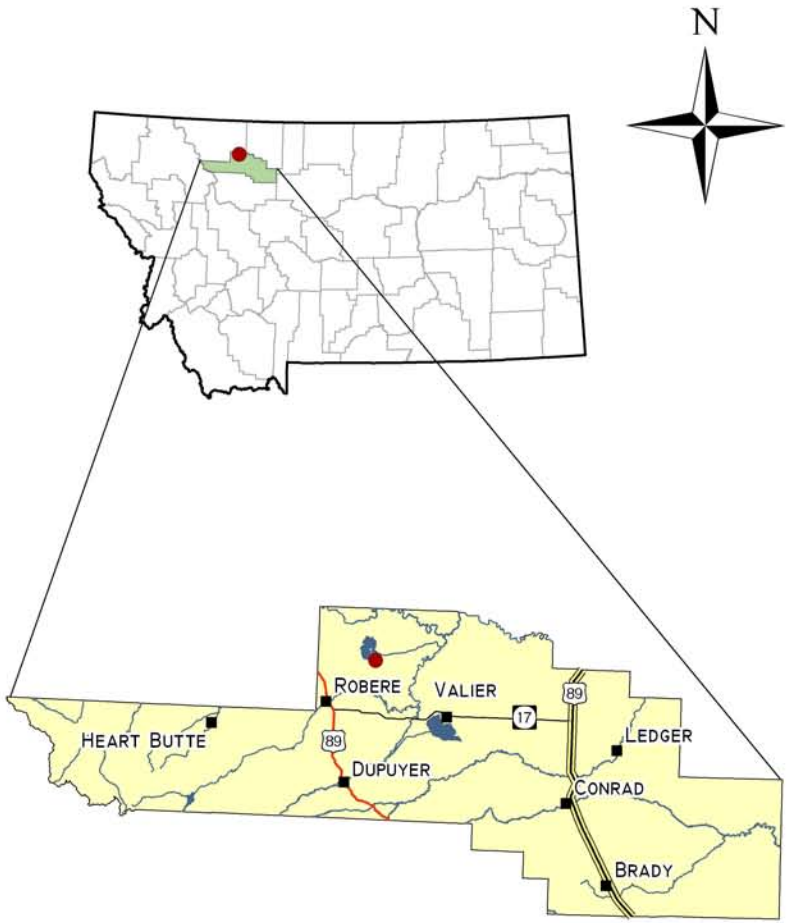
Wetland Hydrology Success will be achieved where wetland hydrology is present as per the technical guidelines in the 1987 COE Wetland Delineation Manual.

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 second full year of monitoring results at the constructed mitigation site. The monitoring area is illustrated on **Figure 2** in **Appendix A**.

2.0 METHODS

2.1 Monitoring Dates and Activities

The site was visited on May 7th (soil sampling), May 15th (spring bird survey), August 20-21st (mid-season survey), September 26th (fall bird survey), and October 29th 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 6 locations within the South Alkali Lake and Alkali Lake (project area) during August and September of 2007. Soil samples could not be collected in North Alkali Lake due to access limitations. The South 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. 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 samples were 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

A functional assessment was completed using the 1999 MDT Montana Wetland Assessment Method. 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 2007 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 2007 (**Figure 2** in **Appendix A**). Panoramic photographs were taken at each point.

2.11 GPS Data

During the 2007 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 include, but are not limited to 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).

The 19-K Canal was dry on May 15th, and therefore, no water was flowing into the site. On May 20th, irrigation water was let into site until it filled (Weatherwax pers. comm.). Surface water was allowed to draw down. By August 20th and 21st it appeared that minor flow was still entering the site from the 19-K Canal. August soil pits revealed that about one-third of the site was still inundated, about half the site was saturated, and the remainder was dry at the 12 inch depth. Water was also added to the site for four days after the irrigation season. On September 26th the site was still filling with irrigation water and was at about 95% of full pool. By October 29th, 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 will also play a role in wetland development. From January to August 2007, 5.1 inches of precipitation was measured at the Valier Weather Station (#248501) (Western Regional Climate Center [WRCC] 2007). This was a very dry year when compared to the January to August 2006 rainfall of 10.08 inches (WRCC 2007). The long-term yearly total precipitation received from August

1911 to August 2007 was 9.98 inches (WRCC 2007). It was assumed that precipitation levels measured at the Valier Weather Station serve as an indicator of precipitation received at the mitigation site.

3.2 Vegetation

Vegetation community types were based on topography, hydrology, and plant composition. Plant species observed within each community type were 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 observed. All vegetation communities found in 2006 were present in 2007: Type 1 – Upland, Type 3 – *Hordeum* Wetland (formerly named *Puccinellia* Wetland), and Type 4 – *Scirpus* Wetland. A new, but anticipated community was found in 2007, Type 5 – *Suaeda* Wetland. Although not delineated as a community, a patch of *Eleocharis palustris* mixed with *Hordeum jubatum* was found growing in the outlet (**Photo 21** in **Appendix C**). No noxious weeds were found within the site.

Table 2: ***2006 - 2007 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
Alopecurus arundinacea	NI	*Juncus balticus*	OBL
Aster falcatus	FACU	*Juncus torreyi*	FACW
Astragalus (*bisulcatus*)	(---)	*Koeleria macrantha* [syn. *K. cristata*]	---
Atriplex gardneri [syn. *A. nuttallii*]	---	*Lepidium* (*ramossissimum*)	(---)
Atriplex patula	FACW	*Najas guadalupensis*	OBL
Chenopodium glaucum	FAC	*Poa juncifolia*	FACU+
Eleocharis acicularis	OBL	*Polygonum* (*amphibium*) [syn. *P. coccineum*]	(OBL)
Eleocharis palustris	OBL	*Polygonum ramosissimum*	FAC-
Chenopodium glaucum	FAC	*Puccinellia nuttalliana*	OBL
Grindelia squarrosa	FACU	*Sarcobatus vermiculatus*	FACU+
Gutierrezia sarothrae	---	*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.

Vegetation Community Type 1 – *Upland* was comprised of a few wetland plants with 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 Types 3 and 5 formed a continuum in wetland development. Where these communities were distinct there was an observed difference in soil hydrology and ground surface salinity. Type 3 – *Hordeum* Wetland occupied areas that were saturated earlier in the growing season, but were nearly dry at 12 inches deep by late August. This community type was dominated by *Hordeum jubatum*, and mixed with *Puccinellia nuttalliana*, *Iva axillaris*, *Polygonum ramossissimum*, *Atriplex patula*, and a few *Suaeda calceoliformis* plants (**Photos 2, 5, 16,** and **17** in **Appendix C**). Type 5 – *Suaeda* Wetland occupied saturated or shallow inundation areas. Where soils were saturated and often visually salty, *Suaeda calceoliformis* and

Chenopodium glaucum flourished (**Photos 4, 8, 14,** and **15** in **Appendix C**). Where soils were inundated less than 6 inches deep, *S. calceoliformis* was growing through the water column. It was apparent that *S. calceoliformis* and *C. glaucum* were actively colonizing the site inward as mudflat became exposed just as *H. jubatum* was greening up in areas where *S. calceoliformis* had seeded and soils were drying.

Vegetation Community Type 4 – *Scirpus* Wetland continued to expand in size and occurrence in 2007 (**Photos 18 - 20** 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, *S. pungens* was also found within each transect belt. The large Type 4 – *Scirpus* polygon near the inlet was inundated and plants were actively growing. For all other *Scirpus* occurrences, *S. pungens* plants were drying during the August visit (**Photo 18** in **Appendix C**).

The remainder of the project site was mapped as Transitional Open Water / Mudflat (**Figure 3** in **Appendix A**). During the mid-season visit, inundation was present from the inlet to the northeast corner (**Photos 1** and **2** in **Appendix C**). Transitional Open Water was mapped where inundation was present, but plants were absent (**Photo 3** in **Appendix C**); it appeared that plants had not yet colonized water that was at least 6 inches deep. Mudflat was very prevalent in 2007 and was marked by saturated soils with no plant cover, but often with a thick ground surface of salts (**Photos 6** and**13** in **Appendix C**). It was apparent that *S. calceoliformis* and *C. glaucum* were colonizing mudflat through the growing season.

Three vegetation transects were monitored at Alkali Lake in 2007 (**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**). Transect 1 was lengthened in 2007 in order to capture the diversity of developing habitats. The start and end of Transect 1 were photographed (**Photos 5** and **6** in **Appendix C**). Along Transect 1 distinct separation between upland, wetland, and mudflat were apparent (**Table 2**; **Chart 2**). The first four feet of Transect 1 was not inundated in 2006, and developed upland characteristics in 2007 (**Chart 1**; **Monitoring Form** in **Appendix B**) (PBS&J 2006). The remainder of Transect 1 was comprised of wetland communities Type 3 – *Hordeum* and Type 4 – *Scirpus* and mudflat (**Chart 1**).

Table 3: ***2006 - 2007 data summary for Transect 1.***

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

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).***

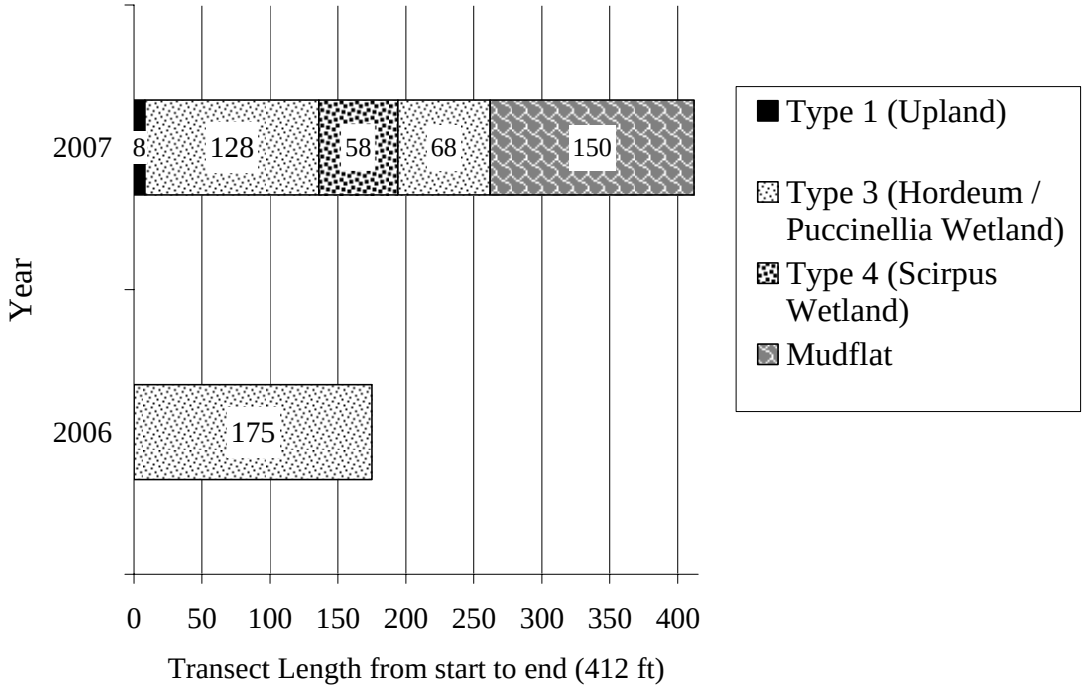
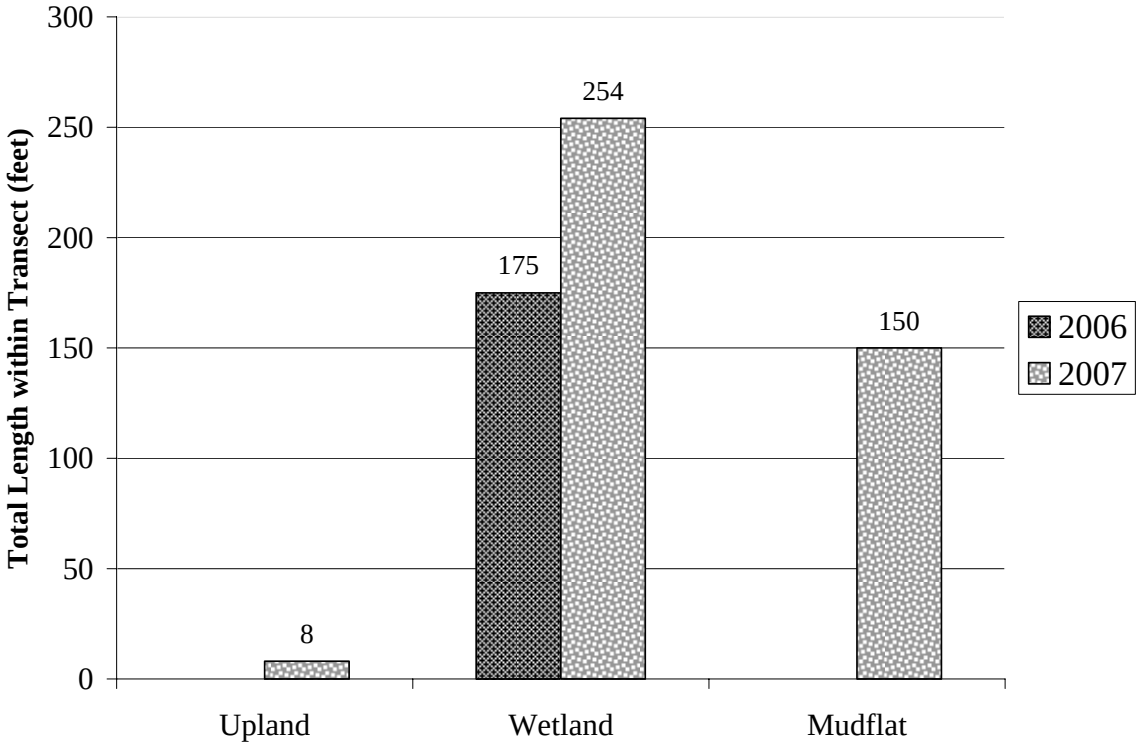


Chart 2: ***Length of habitat types within Transect 1 during 2006 to 2007.***



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 7** and **8** in **Appendix C**). Wetland, Type 3 – *Hordeum* and Type 5 *Suaeda*, and mudflat were present (**Chart 3**). The percentage of Transect 2 occupied by upland increased because of presumed decreased saturation duration (**Table 4; Chart 4**). However, wetland development did increase along the northern portion of the mitigation site in 2007 (**Chart 4**). The longer Transect 2 showed that wetland has developed where it was mapped as Transitional Open Water in 2006 (**Chart 3**) (PBS&J 2006).

Table 4: ***2006 - 2007 data summary for Transect 2.***

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

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).***

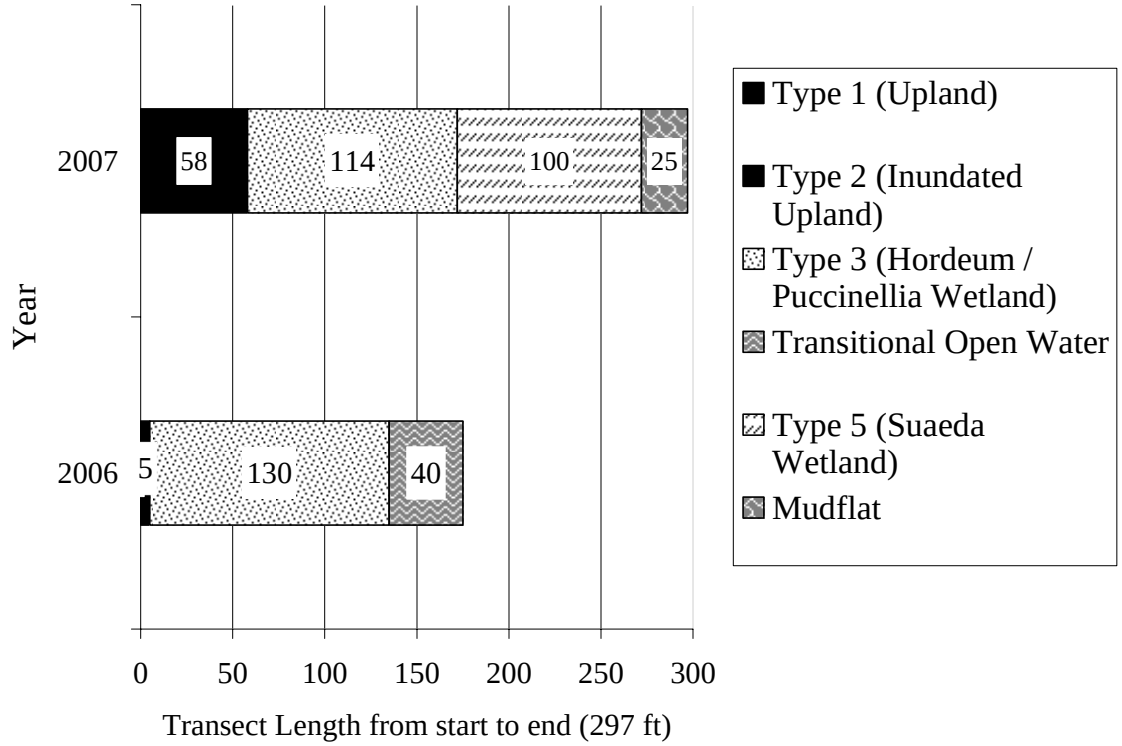
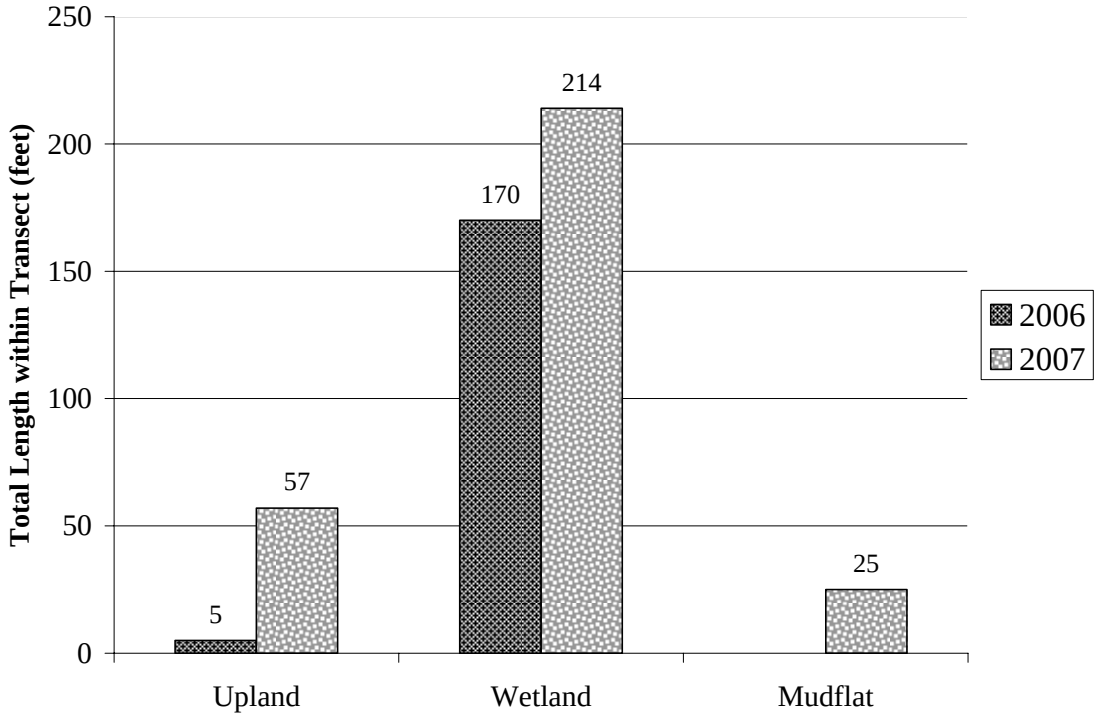


Chart 4: ***Length of habitat types within Transect 2 during 2006 to 2007.***



Data recorded from Transect 3 (**Monitoring Form** in **Appendix B**) were summarized in tabular format (**Table 5**) and graphically illustrated (**Charts 5** and **6**). The start, 2006 end, and 2007 end of Transect 3 were photographed (**Photos 9-11** in **Appendix C**). Transect 3 was entirely inundated in 2006, and in 2007 segregated into Type 1 - Upland, Type 3 – *Hordeum* Wetland and Type 5 – *Suaeda* Wetland (**Chart 5**). To serve as a better indicator of habitat changes on the western portion of the mitigation site, Transect 3 was lengthened. If Transect 3 had not been lengthened, then the 2007 data would have shown that the linear feet for both upland and wetland types remained similar to that in 2006. The linear length of Type 3 – *Hordeum* Wetland remained similar to that of 2006 while the longer Transect 3 was able to capture the new Type 5 - *Suaeda* Wetland (**Charts 5** and **6**). Again, Transitional Open Water mapped in 2006 transitioned to Type 5 – Suaeda wetland in 2007 (**Chart 5**).

Table 5: ***2006 - 2007 data summary for Transect 3.***

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

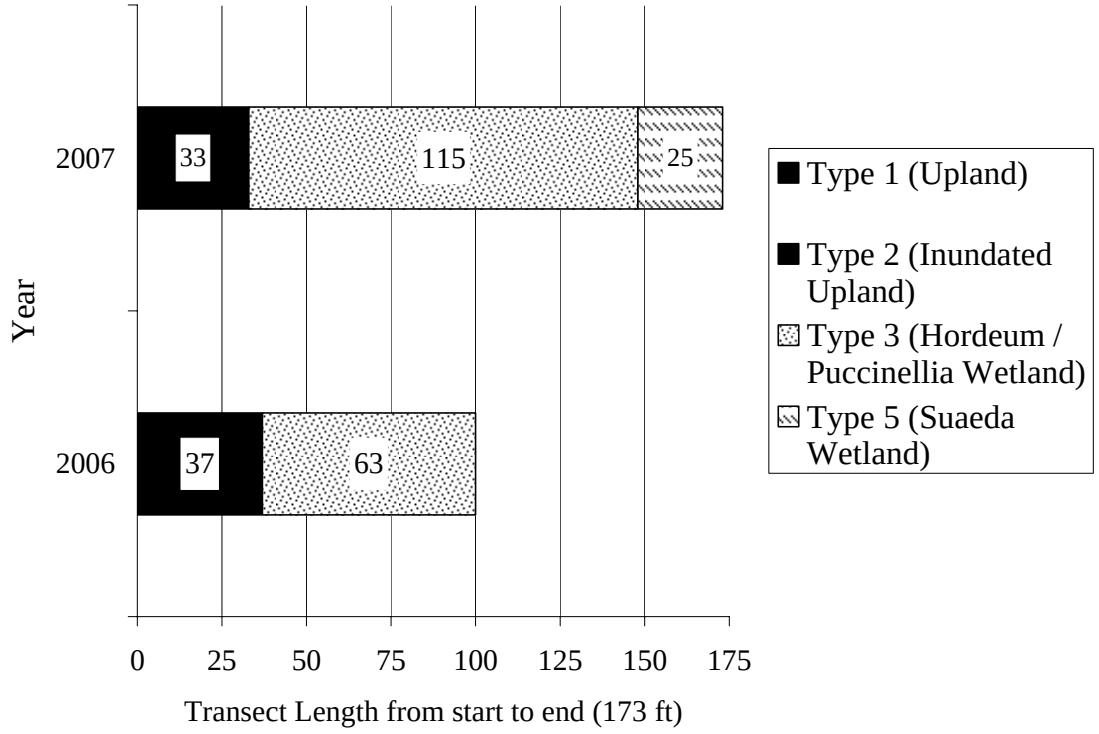
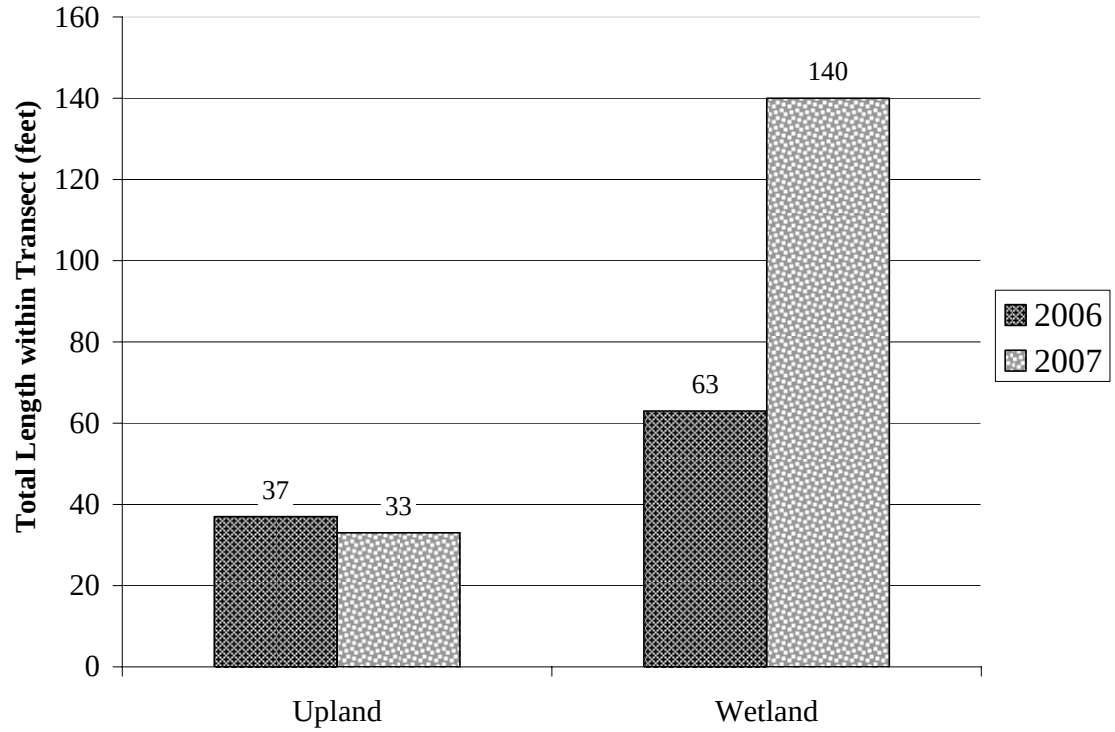


Chart 6: ***Length of habitat types within Transect 3 during 2006 to 2007.***



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 2007, 10 soil pits were dug, revealing dry to saturated clay soils with matrix colors of 2.5Y 4/2 or 2.5Y 5/1 (**COE Forms** in **Appendix B**). Of these 10 pits, seven had very fine mottle colors ranging from of 2.5Y 6/4 to 10YR 5/8. Since 2004, the number of soil pits with mottles has increased (**COE Forms** in **Appendix B**).

In June 2004, baseline soil data was collected from 10 sites and analyzed for arsenic, cadmium, nickel, and selenium. 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 Alkali and South Alkali Lakes differ from that of Alkali Lake and no water flows between the North/South Alkali lakes and the 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 one soil site on the eastern side of Alkali Lake registered 9.7 mg/kg for arsenic, which was on the low end of the concern range using the National Irrigation Water Quality Program guideline. In 2006 soils were collected and analyzed for these metals from 10 sites (PBS&J 2006).

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 2007 six soil samples were collected at or near the 2004 collection sites and also at the project inlet channel (**Tables 7** and **11**; **Figure 4** in **Appendix G**). Fewer soil samples were collected in 2007 than in 2006 or 2004 because: a) the previous data showed that metals levels in vegetated and barren soils collected within 100 feet of each other were very similar, and b) saturated and inundated soil prevented access to the North Alkali Lake sites. The full 2007 soils metals analysis is provided in **Appendix G.**

Table 7: ***2007 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
South Alkali	D	6.86	0.266	20.0	0.212
South Alkali	F	7.54	0.244	23.7	0.35
Alkali	J	5.84	0.299	20.9	0.166
Alkali	L	5.12	0.223	17.7	0.180
Alkali	M	5.33	0.365	16.7	0.198
Alkali	O	5.36	0.440	17.9	0.568

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

A graphical display of the 2004, 2006, and 2007 data is provided for each metal (**Charts 4 - 7** in **Appendix G**). Arsenic levels were higher for most sites in 2007 than in 2004, but were all below those recommended for protection of aquatic life (**Table 6**; **Chart 4** in **Appendix G**). In 2007, the mean (7.20 mg/kg) arsenic level for two collections outside the project area was slightly higher than the mean (5.41 mg/kg) for four collections within the project area (**Table 7**). Cadmium concentrations were higher for all sites in 2007 than in 2004, but were all below those recommended for protection of aquatic life (**Table 6**; **Chart 4** in **Appendix G**). In 2007, the mean (0.26 mg/kg) cadmium level for two collections outside the project area was slightly lower than the mean (0.33 mg/kg) for four collections within the project area (**Table 7**).

Nickel concentrations were higher for most sites in 2007 than in 2004, but all were below those recommended for protection of aquatic life (**Table 6**; **Chart 4** in **Appendix G**). In 2007, the mean (21.85 mg/kg) nickel level for two collections outside the project area was slightly higher than the mean (18.30 mg/kg) for four collections within the project area (**Table 7**). Selenium concentrations were either higher or lower in 2007 than in 2004, but were all below those recommended for protection of aquatic life (**Table 6**; **Chart 4** in **Appendix G**). In 2007, the mean (0.28 mg/kg) selenium level for two collections outside the project area was the same as the mean (0.28 mg/kg) for four collections within the project area (**Table 7**). Overall metals levels have been within the allowable range and no significant difference occurs between Alkali Lake and the North / South Alkali Lakes.

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 and 2007 (see Section 3.1 Hydrology).

Wetland habitat increased from 38.7 acres in 2006 to 84.64 acres in 2007 (**Figure 3** in **Appendix A**). Conversely, Transitional Open Water decreased from 118.61 acres in 2006 to 81.79 acres of Open Water and Mudflat in 2007 (**Figure 3** in **Appendix A**). Both Type 3 – *Hordeum* Wetland and Type 4 – *Scirpus* Wetland continued to expand in 2007 (**Figure 3** in **Appendix A**). A third wetland community, Type 5 – *Suaeda* Wetland, developed in 2007 (**Figure 3** in **Appendix A**). This increase in wetland area is attributable to proper hydrology levels. Inundating the site with water in late fall and/or early spring provides the conditions necessary for Type 4 – *Scirpus* Wetland. Allowing the site to draw down such that soils remain saturated for most of the

growing season provides the conditions necessary for the establishment of Type 3 – *Hordeum* and Type 5 – *Suaeda* Wetlands.

Mitigation credit is discussed in Section 3.10.

3.5 Wildlife

Direct observations of all wildlife species and their sign (indicating presence) were recorded (**Table 8**; **Monitoring Forms** in **Appendix B**). The tracks of a large black bear (*Ursus americanus*) and two cubs were observed around the west/southwest lakebed perimeter in May 2007. Deer tracks were observed for the second year in a row. Two coyotes (*Canis latrans*) were also observed outside, but near the project area in fall of 2007. A variety of small mammals use the site, though their abundance in unknown. Juvenile fish were observed in the inlet channel during the fall of 2006, but were not observed in 2007. No amphibian or reptile species were found within the project area in 2006 or 2007.

Birds are by far the most abundant type of wildlife using the project area. Upon filling of the site in fall 2005, a diversity of waterfowl species were observed. In 2007, about 30 bird species were observed within the site (**Bird Survey Forms** in **Appendix B**). The most abundant species included American Avocet (*Recurvirostra americana*), American White Pelican (*Pelecanus erythrorhynchos*), Horned Larks (*Eremophila alpestris*), Killdeer (*Charadrius vociferous*), Mallard (*Anas platyrhynchos*), Marbled Godwit (*Limosa fedoa*), Northern Pintail (*Anas acuta*), Northern Shoveler (*Anas clypeata*), and Wilson's Phalarope (*Phalaropus tricolor*) (**Table 8**).

Two Piping Plovers (*Charadrius melodus*), presumably a pair, were sighted during the May 2007 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 were documented to be foraging within the project area on two site visits in May 2007; thereby, indicating that the importance of managing water to facilitate use by the Piping Plover.

Table 8: ***Fish and wildlife species observed within the Alkali Lake Wetland Mitigation Site, 2006 - 2007.***

FISH, AMPHIBIANS, REPTILES	
Juvenile fish (unidentified species)	
BIRDS	
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-billed Gull (Larus delawarensis)**
Common Tern (*Sterna hirundo*)	**Ring-necked Duck (*Aythya collaris*)**
Franklin's Gull (*Larus pipixcan*)	**Ruddy Duck (*Oxyura jamaicensis*)**
Golden Eagle (*Aquila chrysaetos*)	Sanderling (*Calidris alba*)
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, 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*)**
MAMMALS	
American Badger (*Taxidea taxus*)	
Black Bear (*Ursus americanus*)	
Common Raccoon (*Procyon lotor*)	
Porcupine (*Erethizon dorsatum*)	
Vole (unidentified species)	
White-tailed Jack Rabbit (*Lepus townsendii*)	
White-tailed Deer (*Odocoileus virginianus*)	

Bolded species were observed in 2007.

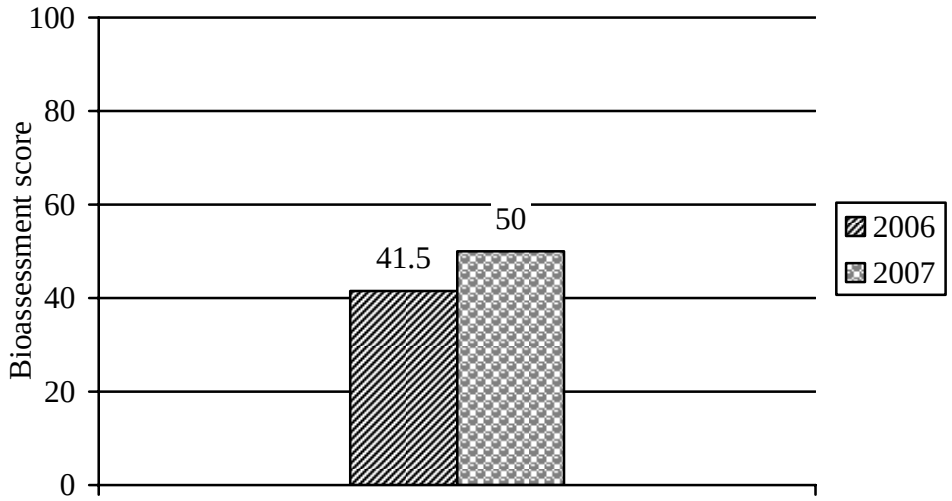
3.6 Macroinvertebrates

In 2006 and 2007, numerous, but patchily distributed macroinvertebrates were present. The area of inundated soil at the mitigation site had far less coverage in 2007. Snails were also very abundant (only) at the inlet. Macroinvertebrate sampling occurred at one location (**Figure 2** in **Appendix A; Photo 12** in **Appendix C**). A summary of the 2007 data provided by Rhithron and Associates is presented below:

> *A very simple fauna was collected at this site in 2007. Although invertebrates were abundant, they were not very diverse. The taxonomic composition of the assemblage suggests that open-water habitats and filamentous algae may have been the major aquatic habitats available for colonization. Poor biotic conditions apparently persist at this site.*

The sample mostly contained species that function as collectors with a few species acting as predators or scaper/shredders (**Appendix F**). The 'poor conditions' suggested by Rhithron are attributable to the natural alkaline conditions of the mitigation site. Likewise 'limited habitats' are a result of the new environment restored/created in 2005. As anticipated, the bioassessment score increased from 2007 (**Chart 7**). A detailed report is provided in **Appendix F**.

Chart 7: ***Bioassessment scores from 2006 (average of two samples) to 2007 (one sample).***



3.7 Functional Assessment

A functional assessment was completed for the entire Alkali Lake site in 2007 (**Functional Assessment Form** in **Appendix B**). In 2007, the Alkali Lake Wetland Mitigation Site continued to rate as a Category II wetland (**Table 9**). However, the site scored higher than in 2006 as it rated moderate to exceptional for the following functions or values: T&E Species Habitat; General Wildlife Habitat; and Short and Long Term Surface Water Storage (**Table 9**).

Table 9: ***Summary of 2006 to 2007 wetland function/value ratings and functional points at the Alkali Lake Wetland Mitigation Site.***

Function and Value Parameters from the 1999 MDT Montana Wetland Assessment Method[1]	2006	2007
Listed/Proposed T&E Species Habitat	Low (0.3)	Mod (0.8)
MTNHP Species Habitat	Mod (0.6)	Mod (0.6)
General Wildlife Habitat	High (0.9)	Exc (1.0)
General Fish/Aquatic Habitat	N/A	N/A
Flood Attenuation	N/A	N/A
Short and Long Term Surface Water Storage	High (0.9)	High (0.9)
Sediment, Nutrient, Toxicant Removal	Mod (0.7)	Mod (0.7)
Sediment/Shoreline Stabilization	Low (0.2)	Low (0.3)
Production Export/Food Chain Support	Mod (0.6)	Mod (0.7)
Groundwater Discharge/Recharge	Low (0.1)	Low (0.1)
Uniqueness	Mod (0.5)	Mod (0.5)
Recreation/Education Potential	Mod (0.7)	Mod (0.7)
Actual Points/Possible Points	**5.5 / 10**	**6.3 / 10.0**
% of Possible Score Achieved	**55%**	**63%**
Overall Category	**II**	**II**
Total Acreage of Assessed Wetlands and Other Aquatic Habitats within Site Boundaries (ac)	**157.31**	**166.43**
Functional Units (acreage x actual points)	**865.2**	**1048.50**

3.8 Photographs

The 2007 aerial photograph was taken on July 5th 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 three photo points (**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. Water management was improved in 2007. It will be important in 2008 to manage water levels throughout the summer to maintain saturated soils without over-inundating the site in order to maximize wetland development and promote nesting habitat for the Piping Plover.

3.10 Current Credit Summary

In 2007, approximately 85 acres of emergent wetlands were delineated at the mitigation site. These acres satisfied soils, hydrology, and vegetation performance standards listed in **Section 1.0**. Further, they represent more than double the acreage found in 2006. Another 82 acres were mapped as Transitional Open Water/Mudflat. All together, about 164 acres of aquatic habitat was mapped in 2007. The upland buffer also satisfied applicable performance standards as listed in **Section 1.0**. The 2007 credits at the site, applying Tribal and COE credit ratios, are presented in **Table 10**. It is anticipated that with proper monitoring of water levels that wetlands will continue to develop where Transitional Open Water and Mudflat were mapped.

Table 10: ***2007 Tribal and Corps of Engineers credits at the Alkali Lake Wetland Mitigation Site.***

Proposed Feature	2007 Delineated Acres	Tribal Credit Ratio and 2007 Calculated Credit	Tribal Credit Target	Corps Credit Ratio and 2007 Calculated Credit[a]	Corps Credit Target
Primary emergent wetland restoration	84.64	1:2.5 credit ratio 33.86 credit acres	29.77 credit acres	1:1 credit ratio 84.64 credit acres	74.42 credit acres
Shallow open water restoration	81.79	1:2.5 credit ratio 32.72 credit acres	40.56 credit acres	1:1 credit ratio (to a max. matching wetland acres) 81.79 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	166.43 (aquatic only)	**77.86 credit acres**	81.61 credit acres	**172.07 credit acres**[a]	154.48 credit acres

[a] Maximum credits as of 2007. Final credits are subject to compliance with the performance standards at the end of the monitoring period.

4.0 REFERENCES

Adams, B. 2005. Environmental Office, Blackfeet Nation, Browning, Montana. September 22nd telephone conversation with Jeff Berglund, Land & Water Consulting, Helena, Montana.

Berglund, J. 1999. *MDT Montana Wetland Assessment Method*. May 25th. Prepared for Montana Department of Transportation and Morrison-Maierle, Inc. Prepared by Western EcoTech. Helena, Montana. 18 pp.

Bollman, W. 2007. MDT Mitigated Wetland Monitoring Project: Aquatic Invertebrate Monitoring Summary 2001 – 2007. Rhithron Associates, Inc., Missoula, Montana.

Environmental Laboratory. 1987. *Corps of Engineers Wetlands Delineation Manual*. U.S. Army Corps of Engineers. Washington, DC.

Land & Water Consulting, Inc. (LWC). 2004a. *Conceptual Wetland Mitigation Plan for Southeast Alkali Lake Wetland Mitigation Project.* November 12th. Prepared for Montana Department of Transportation, Helena, Montana.

Land & Water Consulting, Inc. (LWC). 2004b. Review of Soil and Water Sampling Results for the Alkali Lake Wetland Restoration Project Area, Montana. Prepared for Montana Department of Transportation, Helena, Montana.

Land & Water Consulting, Inc. (LWC). 2005. *Biological Resources Report for Southeast Alkali Lake Wetland Mitigation Site.* Prepared for Montana Department of Transportation, Helena, Montana.

Post, Buckley, Schuh, and Jernigan (PBS&J). 2006. *Montana Department of Transportation Wetland Mitigation Monitoring Report: Year 2006.* December. Prepared for Montana Department of Transportation, Helena, Montana.

Reed, P.B. 1988. *National list of plant species that occur in wetlands: North West (Region 9).* Biological Report 88(26.9), May 1988. U.S. Fish and Wildlife Service, Washington, D.C.

Soil Conservation Service (SCS). 1980. *Soil Survey of Glacier County Area and Part of Pondera County, Montana*. In cooperation with Montana Agricultural Experiment Station.

Steinle, A. 2004a. Montana Program Manager, Helena Regulatory Office, U.S. Army Corps of Engineers, Helena, Montana. December 1st letter to Bonnie Steg, Montana Department of Transportation, regarding Southeast Alkali Lake Mitigation project, CN 5000, Corps File Number 200390853.

Steinle, A. 2004b. Montana Program Manager, Helena Regulatory Office, U.S. Army Corps of Engineers, Helena, Montana. December 21st letter to Jeff Berglund, Land & Water Consulting, regarding Southeast Alkali Lake Mitigation project, CN 5000, Corps File Number 200390853.

Steinle, A. 2005. Montana Program Manager, Helena Regulatory Office, U.S. Army Corps of Engineers, Helena, Montana. September meeting with Jeff Berglund of Land & Water Consulting.

U.S. Army Corps of Engineers (COE). 2005. Wetland compensatory mitigation ratios, Montana Regulatory Program, April 2005. Helena, Montana. 2 pp.

Steinle, A. 2006. Montana Program Manager, Helena Regulatory Office, U.S. Army Corps of Engineers, Helena, Montana. February 1st letter to Bonnie Steg, Montana Department of Transportation, regarding Alkali Lake Mitigation project, STPX-NH 0037(026), MDT Control Number 5000, Corps File Number 2003-90-853 and Meriwether-East, F-NH 1-3(31)225, MDT Control Number B594, Corps File Number 2001-90-007.

Weatherwax, M. 2006. Wetland Coordinator, Blackfeet Nation, Browning, Montana. Electronic mail correspondence to Jeff Berglund, Land & Water Consulting, regarding acceptance of proposed Alkali lake mitigation project Tribal credit ratios on September 23rd.

Weatherwax, M. 2007. Wetland Coordinator, Blackfeet Nation, Browning, Montana. Electronic mail correspondence on September 19th and 21st.

Western Regional Climate Center (WRCC). 2007. Precipitation data for the Valier Weather Station, Montana (248501). Obtained on October 16th from http://www.wrcc.dri.edu/CLIMATEDATA.html.

Appendix A

FIGURES 2 & 3

MDT Wetland Mitigation Monitoring
Alkali Lake
Pondera County, Montana

Figure 2 - 2007 Monitoring Activity Locations

LEGEND
Monitoring Area Limits and Fence
Photo point
Soil pit
Macroinvertebrate sample
Vegetation transect
Base Photograph Date: July 5, 2007

N
W
E
S

450 225 0 225 450
1"= 450'

Monitoring Limits
T2 start
Soil Pit 7
Soil Pit 6
Soil Pit 5
T2 end
PP2
PP3
Fence
Soil Pit9
T3 end
Soil Pit8
T3 start
T1 end
MS 1
Soil Pit 1
Soil Pit 2
Soil Pit 3
Soil Pit 4
T1 start
Monitoring Limits
Inlet
PP1
Soil Pit10
Outlet

PROJECT NAME
MDT Alkali Lake Wetland Mitigation
DRAWING TITLE
2007 Monitoring Activity Locations

DRAWN: RAA
PROJ MGR: A.Pipp
CHECKED:
APPVD:
PROJ NO: B43088.0308
LOCATION: Conrad, MT
SCALE: 1"= 450'
FILE NAME: L:\B43054.0308\Alkali\dwg\Alkali2007.dwg

PBSJ
1120 Cedar
Missoula, MT 59802

FIGURE
2 OF 3
REV -
Oct/31/2007

Figure 3 - 2007 Mapped Site Features

LEGEND

- Monitoring Area Limits and Fence
- Transitional Open Water / Mudflat
- Vegetation Community Boundary
- Wetland Boundary
- Base Photograph Date: July 5, 2007

Net Wetland Area	84.64 acres
Transitional Open Water / Mudflat	81.79 acres

N W E S

450 225 0 225 450
1"= 450'

Transitional Open Water / Mudflat

Vegetation Community Types

1. Upland
3. Hordeum Wetland
4. Scirpus Wetland
5. Suaeda Wetland
3/5. Hordeum/Suaeda Wetland

PROJECT NAME
MDT Alkali Lake Wetland Mitigation
DRAWING TITLE
2007Monitoring Activity Locations

PROJ NO: B43088.0302	DRAWN: LLL/RAA		
LOCATION: Conrad, MT	PROJ MGR: A.Pipp		
SCALE: 1"= 450'	CHECKED:	APPVD:	
FILE NAME: L:\B43054.0308\Alkali\dwg\Alkali2007.dwg			

1120 Cedar
Missoula, MT 59802

PBSJ

FIGURE
3 OF 3
REV -
Oct/31/2007

Appendix B

2007 WETLAND MITIGATION SITE MONITORING FORM
2007 BIRD SURVEY FORM
2007 COE WETLAND DELINEATION FORMS
2007 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: **B43088.00-0302**
Assessment Date: **August 20-21, 2007** 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: **Partially cloudy, 35mph winds, low 70's** Time of Day: **9:00-5:00**
Initial Evaluation Date: **August 22, 2006** Monitoring Year: **2** # 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: **0.5 feet** Range of Depths: **1-8 inches**
Percent of assessment area under inundation: **33%**
Depth at emergent vegetation-open water boundary: _____ **feet**
If assessment area is not inundated then are the soils saturated within 12 inches of surface: **Yes**
Other evidence of hydrology on the site (ex. – drift lines, erosion, stained vegetation, etc.):
drift lines; cracked 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:
The 19-K Canal was dry on May 15th; therefore, no water was flowing into the site. On May 20th, irrigation water was let into site until it filled. Surface water was allowed to draw down. During August 20th -21st about 33% of site was inundated, about 57% was saturated, and 10% was dry at 12 inches deep. It appeared that minor irrigation water was flowing into the site from the 19-K Canal. Water was also added to the site for 4 days after the irrigation season. On September 26th the site was still filling with irrigation water and was almost at full pool.

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%	Iva axillaris	2 = 6-10%
Puccinellia nuttalliana	1 = 1-5%	Sarcobatus vermiculatus	1 = 1-5%
Astragalus (bisulcatus)	1 = 1-5%	Suaeda calceoliformis	1 = 1-5%
Atriplex nuttallii	4 = 21-50%		

Comments / Problems: **Community present in 2006-2007.**

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.**

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

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

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

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

Comments / Problems: **The 2006 community increased in area and occurrence in 2007.**

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.**

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: _____

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		
Alopecurus arundinacea	3		
Aster falcatus	1		
Astragalus bisulcatus	1-3		
Atriplex nuttallii	1		
Atriplex patula	1-5		
Chenopodium glaucum	1-5		
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		
Lepidium (ramosissimum)	1-3		
Najas guadalupensis	5		
Poa juncifolia	1, 2		
Polygonum amphibium [syn. P. coccinea]	4		
Polygonum ramosissimum	3-5		
Puccinellia nuttalliana	1-5		
Sarcobatus vermiculatus	1		
Scirpus acutus	4		
Scirpus pungens	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
Badger		☐	☐	☒	
Richardson's ground squirrel	several	☐	☐	☒	
White-tailed deer		☒	☐	☐	
Black bear		☒	☐	☐	sow & 2 cubs
Raccoon		☒	☐	☐	
Vole (likely prairie vole)		☐	☐	☒	
		☐	☐	☐	
		☐	☐	☐	

Additional Activities Checklist:
Yes Macroinvertebrate Sampling (if required)

Comments / Problems: August: Some aquatic insects were found in the water with shallow inundation. Snales were common in inlet. September: Two coyotes were seen in different locations outside, but near the project boundaries.

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 20, 2007** 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 1 - Upland**	
Length of transect in this type: 0 - 8 feet	
Plant Species	**Cover**
Hordeum jubatum	3 = 11-20%
Iva axillaris	3 = 11-20%
Astragalus (bisulcatus) - not present in 2007	
Puccinellia nuttalliana	3 = 11-20%
Agropyron smithii	1 = 1-5%
Bare Ground (50%)	
Total Vegetative Cover:	50%

Vegetation Type B: **Type 3 - Hordeum Wetland**	
Length of transect in this type: 8 - 136 (approximate) feet	
Plant Species	**Cover**
Hordeum jubatum	4 = 21-50%
Puccinellia nuttalliana	+ = < 1%
Iva axillaris - not present in 2007	
Astragalus (bisulcatus) - not present in 2007	
Polygonum ramisossimum	1 = 1-5%
Chenopodium glaucum	+ = < 1%
Suaeda calceoliformis	+ = < 1%
Eleocharis acicularis	+ = < 1%
Bare Ground (50%)	
Total Vegetative Cover:	50%

Vegetation Type C: **Type 4 - Scirpus**	
Length of transect in this type: 136 - 194 (approximate) feet	
Plant Species	**Cover**
Hordeum jubatum	4 = 21-50%
Scirpus pungens	1 = 1-5%
Eleocharis acicularis	+ = < 1%
Bare Ground (50%)	
Total Vegetative Cover:	50%

Vegetation Type D: **Type 3 - Hordeum**	
Length of transect in this type: 194 - 262 feet	
Plant Species	**Cover**
Hordeum jubatum	4 = 21-50%
Puccinellia nuttalliana	+ = < 1%
Chenopodium glaucum	+ = < 1%
Suaeda calceoliformis	+ = < 1%
Eleocharis acicularis	+ = < 1%
Bare Ground (50%)	
Total Vegetative Cover:	50%

MDT WETLAND MONITORING – VEGETATION TRANSECT

Site: **Alkali Lake** Date: **August 20, 2007** Examiner: **A. Pipp**
Transect Number: **T-1** Approximate Transect Length: **412 feet** Compass Direction from Start: **311˚** Note: **Compass at 0 declination.**

Vegetation Type E: **Mudflat**	
Length of transect in this type: 262 - 412 feet	
Plant Species	**Cover**
No vegetation	
Total Vegetative Cover:	0%

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

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

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

MDT WETLAND MONITORING – VEGETATION TRANSECT

Site: **Alkali Lake** Date: **August 20, 2007** 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 - 58 feet	
Plant Species	**Cover**
Agropyron smithii	1 = 1-5%
Astragalus (bisulcatus)	+ = < 1%
Iva axillaris	3 = 11-20%
Polygonum spp. - not present in 2007	
Atriplex patula	2 = 6-10%
Lepidium (ramosissimum) - not present in 2007	
Hordeum jubatum	4 = 21-50%
Puccinellia nuttalliana	3 = 11-20%
Total Vegetative Cover:	70%

Vegetation Type F: **Type 3 - Hordeum Wetland**	
Length of transect in this type: 58 - 172 feet	
Plant Species	**Cover**
Agropyron smithii - not present in 2007	
Astragalus (bisulcatus)	1 = 1-5%
Iva axillaris	+ = < 1%
Polygonum ramosissimum	+ = < 1%
Atriplex patula	3 = 11-20%
Lepidium (ramosissimum) - not present in 2007	
Hordeum jubatum	3 = 11-20%
Puccinellia nuttalliana	1 = 1-5%
Bare ground = 50%	
Total Vegetative Cover:	50%

Vegetation Type G: **Type 5 - Suaeda Wetland**	
Length of transect in this type: 172 - 272 feet	
Plant Species	**Cover**
Suaeda calceoliformis	3 = 11-20%
Chenopodium glaucum	3 = 11-20%
Puccinellia nuttalliana	1 = 1-5%
Scirpus pungens	+ = < 1%
Hordeum jubatum	2 = 6-10%
Bare ground = 50%	
Total Vegetative Cover:	50%

Vegetation Type H: **Mudflat**	
Length of transect in this type: 272 - 297 feet	
Plant Species	**Cover**
No Vegetation	
Total Vegetative Cover:	%

MDT WETLAND MONITORING – VEGETATION TRANSECT

Site: **Alkali Lake** Date: **August 20, 2007** 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 1 - Upland**	
Length of transect in this type: 0 - 33 feet	
Plant Species	**Cover**
Agropyron smithii	4 = 21-50%
Astragalus (bisulcatus?)	4 = 21-50%
Atriplex patula	2 = 6-10%
Iva axillaris	4 = 21-50%
Polygonum ramosissimum	1 = 1-5%
Puccinellia nuttalliana	+ = < 1%
Hordeum jubatum	1 = 1-5%
Open Water (40%)	
Total Vegetative Cover:	60%

Vegetation Type J: **Type 3 - Hordeum Wetland**	
Length of transect in this type: 33 - 148 feet	
Plant Species	**Cover**
Hordeum brachyantherum	+ = < 1%
Hordeum jubatum	4 = 21-50%
Iva axillaris - not present in 2007	
Polygonum ramisissimum	4 = 21-50%
Puccinellia nuttalliana	1 = 1-5%
Suaeda calceoliformis	+ = < 1%
Bare ground = 50%	
Total Vegetative Cover:	50%

Vegetation Type K: **Type 5 - SuaedaWetland**	
Length of transect in this type: 148 - 173 feet	
Plant Species	**Cover**
Suaeda calceoliformis	4 = 21-50%
Hordeum jubatum	4 = 21-50%
Scirpus pungens	+ = < 1%
Atriplex patula	1 = 1-5%
Bare ground = 50%	
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 appeared to create wetland. Wetland developed along the entire perimeter and all wetland types were flourishing and still growing by late August 2007. Chenopodium glaucum and Suaeda calceoliformis were also actively colonizing inward toward the center. It is the center of the site that needs to develop vegetation which will come with proper water management and time.**

BIRD SURVEY – FIELD DATA SHEET

Site: **Alkali** Date: **5/7/07**
Survey Time: **11:00 am** to **12:30 pm**

Bird Species	#	Behavior	Habitat	Bird Species	#	Behavior	Habitat
American Avocet	4	F	OW				
Gadwall	2	F L	OW				
Gull (unidentified)	2	FO	OW UP				
Horned Lark	1	FO	MF UP				
Long-billed curlew	2	FO F	MF OW				
Northern Pintail	5	F L	OW				
Northern Shoveler	63	F L	OW				
Piping Plover	1	F	MF				
Sparrow (unidentified)	4	F FO	UP				
Willet	2	F	MF				
Wilson's Phalarope	10	F	MF OW				

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

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

Weather: **Partially cloudy; high 60's to low 70's; 20 mph winds.**

Notes: **Surveyed by Andrea Pipp: This was not an official bird survey vist. However, some time was taken to survey for birds, but only along the southern shore. Time was specifically taken to survey for Piping Plover. The 19K Canal and inlet to Alkali Lake were completely dry.**

BIRD SURVEY – FIELD DATA SHEET

Site: **Alkali Lake** Date: **5/15/07**
Survey Time: **9:00 am** to **1:00 pm**

Bird Species	#	Behavior	Habitat	Bird Species	#	Behavior	Habitat
American White Pelican	20+	FO	OW	Vesper Sparrow	4	F	UP
American Wigeon	8	F	MA, OW	Western Meadowlark	6	F	UP
Avocet	50+	F	MA, MF	Western Sandpiper	12	F	MA, MF
Blue-Winged Teal	2	F	OW	Willet	25	F	MA, MF
Brewer's Blackbird	6	F	UP	Wilson's Phalarope	100+	F	MA, OW
Canada Goose	6	F	MA, OW	Yellow-Headed Blackbird	2	F	MA
Common Tern	4	F	MA				
Franklin's Gull	14	F	OW				
Gadwall	6	F	MA, OW				
Grasshopper Sparrow	12	F	UP				
Horned Lark	50+	F	UP, MF				
Killdeer	50+	F	UP, MF				
Long-Billed Curlew	12	F	MA, MF				
Long-Billed Dowitcher	20	F	MA, MF				
Mallard	3	F	MA, OW				
Marbled Godwit	24	F	MA, MF				
Northern Pintail	24	F	MA, OW				
Northern Shoveler	70+	F	MA, OW				
Piping Plover	2	F	MA, MF				
Red-Winged Blackbird	2	F	MA				
Ring-Billed Gull	6	F	OW				
Ring-Necked Pheasant	1	F	UP				
Short-Billed Dowitcher	1	F	MF				

BEHAVIOR CODES
BP = One of a breeding pair
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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: **100% Sunny, light breeze, and 60-70 degrees.**

Notes: **Official Spring Bird Survey conducted by Larry Urban (MDT) and Jeff Berglund (PBS&J). Site was approximately 80% full. No water was entering into the site; the 19K Canal and Badger-Fisher Main Canal were dry.**
Several Richardson's ground squirrels observed in uplands; raccoon and deer tracks observed; several vole (likely prairie vole) burrows and runways present in uplands. Black bear tracks (sow and two yearling cubs) observed around west/southwest lakebed perimeter; likely from 1-3 days preceding the bird survey. Piping Plover male and female observed together along northeast shoreline; nesting not confirmed.

BIRD SURVEY – FIELD DATA SHEET

Site: **Alkali Lake** Date: **9/26/07**
Survey Time: **1230 pm** to **1630 pm**

Bird Species	#	Behavior	Habitat	Bird Species	#	Behavior	Habitat
American Wigeon	20	F, L	MA, OW				
Blue-Winged Teal	15	F, L, FO	MA, OW				
Cinnamon Teal	5	F, L	MA				
Ducks (unidentified)	40	F, L, FO	MA, OW				
Gadwall	20	F, L	MA, OW				
Grebe (Horned or Eared)	5	F, L	MA				
Horned Lark	18	F, L	UP				
Mallard	50+	F, L	MA, OW				
Northern Pintail	5	F, L	MA, OW				
Northern Shoveler	50	F, L	MA, OW				
Redhead	5	F, L	MA				
Ring-Billed Gull	5	F	MA				
Ruddy Duck	5	F, L	MA				
Sparrow (unidentified)	10	F, L	UP				
Western Meadowlark	1	L	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 with scattered clouds, low 60's, 35-40mph winds.**

Notes: **Official Fall Bird Survey conducted by Andrea Pipp. Site was actively being filled with water and was near the full level. Precipitation earlier in the week made the surrounding land very wet. Alkali lake water was muddy and very choppy from the wind.**

BIRD SURVEY – FIELD DATA SHEET

Site: **Alkali** Date: **10/29/07**
Survey Time: **11:00 am** to **12:30 pm**

Bird Species	#	Behavior	Habitat	Bird Species	#	Behavior	Habitat
Mallards	200	F	MA				
American Coot	12	F	MA				
Grebe (Horned)	2	F	MA				
Horned Lark	20	F	UP				
Bufflehead	12	F	MA				
Gadwall	10	F	MA				
Northern Shoveler	2	F	MA				
Killdeer	5	F	MF				
Canvasback	1	F	MF				
Northern Pintail	8	F	MA				
Snow Bunting	6	F	UP				
Swan	6	FO	MA				
Canada Goose	250	FO	MA				
Northern Harrier	1	FO	MA				

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: **Partially sunny; Calm; Dry; temperature in the 50's.**

Notes: **Official Fall Bird Survey conducted by Larry Urban and Bonnie Steg (MDT) and Jeff Berglund (PBS&J). Site was 95% inundated and the water gate was open though the 19K Canal was dry.**
Also saw deer tracks, goose scat, and owl pellets.

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

Project/Site: Alkali - 2007	**Project No:** B43088	**Date:** 21-Aug-2007
Applicant/Owner: -Montana Department of Transportation-		**County:** Pondera
Investigators: Andrea Pipp		**State:** Montana
		Plot ID: 1

Do Normal Circumstances exist on the site?	(Yes) No	**Community ID:** Mudflat
Is the site significantly disturbed (Atypical Situation:)?	Yes (No)	**Transect ID:** Soil Pit 1
Is the area a potential Problem Area? (If needed, explain on the reverse side)	Yes (No)	**Field Location:** On T-1 near end.

VEGETATION (USFWS Region No. 9)

Dominant Plant Species(Latin/Common)	Stratum	Indicator	Plant Species(Latin/Common)	Stratum	Indicator

Percent of Dominant Species that are OBL, FACW or FAC: (excluding FAC-) 0/0 = 0.00%

FAC Neutral: 0/0 = 0.00%
Numeric Index: 0/0 = 0.00

Remarks:
No vegetation present.

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:	= 2.0 *(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:
From 0-2 inches, the soil is dry and cracked. Cracks are 2-3 inches deep.

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

Project/Site: Alkali - 2007	**Project No:** B43088	**Date:** 21-Aug-2007
Applicant/Owner: -Montana Department of Transportation-		**County:** Pondera
Investigators: Andrea Pipp		**State:** Montana
		Plot ID: 1

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
0-12+	A	2.5Y5/1	2.5Y6/4	Common Distinct	Clay

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

Remarks:

WETLAND DETERMINATION

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

Remarks:
Area termed as 'mudflat' as vegetation is absent.

WetForm™

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

Project/Site:	Alkali - 2007	**Project No:** B43088	**Date:** 21-Aug-2007
Applicant/Owner:	-Montana Department of Transportation-		**County:** Pondera
Investigators:	Andrea Pipp		**State:** Montana
			Plot ID: 2

Do Normal Circumstances exist on the site?	(Yes) No	**Community ID:**	Emergent
Is the site significantly disturbed (Atypical Situation:)?	Yes (No)	**Transect ID:**	Soil Pit 2
Is the area a potential Problem Area?	Yes (No)	**Field Location:**	
(If needed, explain on the reverse side)		About mid-way on T-1.	

VEGETATION (USFWS Region No. 9)

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

Percent of Dominant Species that are OBL, FACW or FAC:	**FAC Neutral:** 1/1 = 100.00%
(excluding FAC-) 2/2 = 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	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: N/A *(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: = 0.0 *(in.)*	YES FAC-Neutral Test
	NO Other(Explain in Remarks)

Remarks:

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

Project/Site:	Alkali - 2007	**Project No:** B43088	**Date:** 21-Aug-2007
Applicant/Owner:	-Montana Department of Transportation-		**County:** Pondera
Investigators:	Andrea Pipp		**State:** Montana
			Plot ID: 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
0-0.25	A	10YR2/1	N/A	N/A	N/A	Clay, Organic
0.25-5.	A	2.5Y4/1	N/A	N/A	N/A	Clay
5-12+	B	2.5Y4/2	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:
The thin, jet-black organic layer is staining the soils underneath it.

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 - 2007	Project No: B43088	**Date:** 21-Aug-2007
Applicant/Owner: -Montana Department of Transportation-		**County:** Pondera
Investigators: Andrea Pipp		**State:** Montana
		Plot ID: 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? (If needed, explain on the reverse side)	Yes (No)	**Field Location:** Near inlet in Scirpus community.

VEGETATION (USFWS Region No. 9)

Dominant Plant Species(Latin/Common)	Stratum	Indicator	Plant Species(Latin/Common)	Stratum	Indicator
Hordeum jubatum	Herb	FAC+	*Juncus torreyi*	Herb	FACW
Barley,Fox-Tail			Rush,Torrey's		
Scirpus pungens	Herb	OBL	*Puccinellia nuttalliana*	Herb	OBL
Bulrush,Three-Square			Grass,Nuttall's Alkali		
Scirpus acutus	Herb	OBL	*Najas guadalupensis*	Herb	OBL
Bulrush,Hard-Stem			Naiad,Southern		

Percent of Dominant Species that are OBL, FACW or FAC: (excluding FAC-) 6/6 = 100.00%	**FAC Neutral:** 5/5 = 100.00% **Numeric Index:** 9/6 = 1.50

Remarks:
Also present, but not dominant is an unknown Polygonum species.

HYDROLOGY

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

YES No Recorded Data

Field Observations

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

Wetland Hydrology Indicators

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

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

Remarks:

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

Project/Site: Alkali - 2007	Project No: B43088	**Date:** 21-Aug-2007
Applicant/Owner: -Montana Department of Transportation-		**County:** Pondera
Investigators: Andrea Pipp		**State:** Montana
		Plot ID: 3

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
0-0.25	A	10YR2/1	N/A	N/A	N/A	Organic
0.25-5	A	2.5Y4/1	N/A	N/A	N/A	Clay
+	B	2.5Y4/2	2.5Y5/4	Common	Distinct	Clay

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

Remarks:

WETLAND DETERMINATION

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

Remarks:

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

Project/Site: Alkali - 2007	Project No: B43088	Date: 21-Aug-2007
Applicant/Owner: -Montana Department of Transportation-		County: Pondera
Investigators: Andrea Pipp		State: Montana
		Plot ID: 4

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

VEGETATION (USFWS Region No. 9)

Dominant Plant Species(Latin/Common)	Stratum	Indicator	Plant Species(Latin/Common)	Stratum	Indicator
Suaeda depressa	Herb	FACW-	*Polygonum ramosissimum*	Herb	FAC-
Seepweed,Pursh			Knotweed,Bushy		

Percent of Dominant Species that are OBL, FACW or FAC: (excluding FAC-) 1/2 = 50.00%

FAC Neutral: 1/1 = 100.00%

Numeric Index: 5/2 = 2.50

Remarks:

HYDROLOGY

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

YES No Recorded Data

Field Observations

Depth of Surface Water:	N/A *(in.)*
Depth to Free Water in Pit:	N/A *(in.)*
Depth to Saturated Soil:	= 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
- YES FAC-Neutral Test
- NO Other(Explain in Remarks)

Remarks:

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

Project/Site: Alkali - 2007	Project No: B43088	Date: 21-Aug-2007
Applicant/Owner: -Montana Department of Transportation-		County: Pondera
Investigators: Andrea Pipp		State: Montana
		Plot ID: 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
0-2.5	A	2.5Y5/1	10YR5/8	Common Prominent	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 - 2007 | Project No: B43088 | Date: 21-Aug-2007
Applicant/Owner: -Montana Department of Transportation- | County: Pondera
Investigators: Andrea Pipp | State: Montana | Plot ID: 5

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

Community ID: Emergent
Transect ID: Soil Pit 5
Field Location: On T-2.

VEGETATION (USFWS Region No. 9)

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

Percent of Dominant Species that are OBL, FACW or FAC: (excluding FAC-) 5/5 = 100.00%
FAC Neutral: 3/3 = 100.00%
Numeric Index: 10/5 = 2.00

Remarks:

HYDROLOGY

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

Field Observations
Depth of Surface Water: N/A *(in.)*
Depth to Free Water in Pit: N/A *(in.)*
Depth to Saturated Soil: = 5.5 *(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
YES FAC-Neutral Test
NO Other(Explain in Remarks)

Remarks:
0-5.5: Soil is dry and cracked up to 5.5 inches deep.

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

Project/Site: Alkali - 2007 | Project No: B43088 | Date: 21-Aug-2007
Applicant/Owner: -Montana Department of Transportation- | County: Pondera
Investigators: Andrea Pipp | State: Montana | Plot ID: 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
0-12	A	2.5Y5/1	2.5YR5/6	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
Wetland Hydrology Present? (Yes) No
Hydric Soils Present? (Yes) No
Is the Sampling Point within the Wetland? (Yes) No

Remarks:

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

Project/Site: Alkali - 2007	**Project No:** B43088	**Date:** 21-Aug-2007
Applicant/Owner: -Montana Department of Transportation-		**County:** Pondera
Investigators: Andrea Pipp		**State:** Montana
		Plot ID: 6

Do Normal Circumstances exist on the site?	(Yes) No	**Community ID:** Emergent
Is the site significantly disturbed (Atypical Situation:)?	Yes (No)	**Transect ID:** Soil Pit 6
Is the area a potential Problem Area? (If needed, explain on the reverse side)	Yes (No)	**Field Location:** On T-2.

VEGETATION (USFWS Region No. 9)

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

Percent of Dominant Species that are OBL, FACW or FAC: (excluding FAC-) 4/5 = 80.00%

FAC Neutral: 2/2 = 100.00%
Numeric Index: 12/5 = 2.40

Remarks:
Astragalus spp. present and dominant. Also present, but not dominant: Atriplex nutalli, Suaeda depressa, and Chenopodium glaucum.

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

Remarks:
0-11 inches is very dry. Soil slightly moist at 12 inches. Soil is cracked from about 0-3 inches deep. Soil was most likely saturated for at least 12.5% of the growing season earlier in the summer.

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

Project/Site: Alkali - 2007	**Project No:** B43088	**Date:** 21-Aug-2007
Applicant/Owner: -Montana Department of Transportation-		**County:** Pondera
Investigators: Andrea Pipp		**State:** Montana
		Plot ID: 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	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 - 2007	Project No: B43088	Date: 21-Aug-2007
Applicant/Owner: -Montana Department of Transportation-		County: Pondera
Investigators: Andrea Pipp		State: Montana
		Plot ID: 7

Do Normal Circumstances exist on the site? (Yes) No	Community ID: Emergent	
Is the site significantly disturbed (Atypical Situation:)? Yes (No)	Transect ID: Soil Pit 7	
Is the area a potential Problem Area? Yes (No)	Field Location:	
(If needed, explain on the reverse side)	On T-2 near start.	

VEGETATION (USFWS Region No. 9)

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

Percent of Dominant Species that are OBL, FACW or FAC: (excluding FAC-) 4/4 = 100.00%

FAC Neutral: 2/2 = 100.00%

Numeric Index: 9/4 = 2.25

Remarks:
Present, but not dominant is Astragalus spp. and 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
- 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 is dry from 0-12+ inches. Soil is deeply cracked, 5-8 inches!

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

Project/Site: Alkali - 2007	Project No: B43088	Date: 21-Aug-2007
Applicant/Owner: -Montana Department of Transportation-		County: Pondera
Investigators: Andrea Pipp		State: Montana
		Plot ID: 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	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:

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

Project/Site: Alkali - 2007	Project No: B43088	Date: 21-Aug-2007
Applicant/Owner: -Montana Department of Transportation-		County: Pondera
Investigators: Andrea Pipp		State: Montana
		Plot ID: 8

Do Normal Circumstances exist on the site? (Yes) No	Community ID: Emergent	
Is the site significantly disturbed (Atypical Situation:)? Yes (No)	Transect ID: Soil Pit 8	
Is the area a potential Problem Area? Yes (No)	Field Location:	
(If needed, explain on the reverse side)	On T-3.	

VEGETATION (USFWS Region No. 9)

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

Percent of Dominant Species that are OBL, FACW or FAC: (excluding FAC-) 4/4 = 100.00%

FAC Neutral: 3/3 = 100.00%
Numeric Index: 8/4 = 2.00

Remarks:

HYDROLOGY

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

YES No Recorded Data

Field Observations

Depth of Surface Water:	N/A *(in.)*
Depth to Free Water in Pit:	N/A *(in.)*
Depth to Saturated Soil:	> 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
  - YES FAC-Neutral Test
  - YES Other(Explain in Remarks)

Remarks:
Soil is dry from 0-11 inches. From 11.0 -12 inches the soil is moist; probably was saturated for at least 12.5% of the growing season.

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

Project/Site: Alkali - 2007	Project No: B43088	Date: 21-Aug-2007
Applicant/Owner: -Montana Department of Transportation-		County: Pondera
Investigators: Andrea Pipp		State: Montana
		Plot ID: 8

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
0-12	A	2.5Y5/1	10YR5/8	Common Prominent	Clay

Hydric Soil Indicators:

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

Remarks:

WETLAND DETERMINATION

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

Remarks:

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

Project/Site: Alkali - 2007	**Project No:** B43088	**Date:** 21-Aug-2007
Applicant/Owner: -Montana Department of Transportation-		**County:** Pondera
Investigators: Andrea Pipp		**State:** Montana
		Plot ID: 9

Do Normal Circumstances exist on the site?	(Yes) No	**Community ID:** Emergent
Is the site significantly disturbed (Atypical Situation:)?	Yes (No)	**Transect ID:** Soil Pit 9
Is the area a potential Problem Area? (If needed, explain on the reverse side)	Yes (No)	**Field Location:** On T-3.

VEGETATION (USFWS Region No. 9)

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

Percent of Dominant Species that are OBL, FACW or FAC: (excluding FAC-) 4/5 = 80.00%

FAC Neutral: 3/3 = 100.00%
Numeric Index: 11/5 = 2.20

Remarks:

HYDROLOGY

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

YES No Recorded Data

Field Observations

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

Wetland Hydrology Indicators
- Primary Indicators
  - NO Inundated
  - YES Saturated in Upper 12 Inches
  - NO Water Marks
  - NO Drift Lines
  - NO Sediment Deposits
  - 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:
0-12 inches is dry. From 12-13 inches, the soil is very moist and pliable - close to saturation.

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

Project/Site: Alkali - 2007	**Project No:** B43088	**Date:** 21-Aug-2007
Applicant/Owner: -Montana Department of Transportation-		**County:** Pondera
Investigators: Andrea Pipp		**State:** Montana
		Plot ID: 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
0-13	A	2.5Y5/1	10YR5/8	Many Prominent	Clay

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

Remarks:

WETLAND DETERMINATION

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

Remarks:

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

Project/Site: Alkali - 2007	**Project No:** B43088	**Date:** 21-Aug-2007
Applicant/Owner: -Montana Department of Transportation-		**County:** Pondera
Investigators: Andrea Pipp		**State:** Montana
		Plot ID: 10

Do Normal Circumstances exist on the site? (Yes) No	**Community ID:** Emergent	
Is the site significantly disturbed (Atypical Situation:)? Yes (No)	**Transect ID:** Soil Pit10	
Is the area a potential Problem Area? Yes (No)	**Field Location:** Outlet	
(If needed, explain on the reverse side)		

VEGETATION (USFWS Region No. 9)

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

Percent of Dominant Species that are OBL, FACW or FAC: (excluding FAC-) 3/4 = 75.00%

FAC Neutral: 2/2 = 100.00%
Numeric Index: 8/4 = 2.00

Remarks:
Present, but not dominant is Iva axillaris and Atriplex patula.

HYDROLOGY

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

YES No Recorded Data

Field Observations

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

Wetland Hydrology Indicators

Primary Indicators
- NO Inundated
- YES Saturated in Upper 12 Inches
- NO Water Marks
- NO Drift Lines
- NO Sediment Deposits
- 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:
Soil dry, but deeply cracked of 10-12 inches deep.

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

Project/Site: Alkali - 2007	**Project No:** B43088	**Date:** 21-Aug-2007
Applicant/Owner: -Montana Department of Transportation-		**County:** Pondera
Investigators: Andrea Pipp		**State:** Montana
		Plot ID: 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
0-14	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:

WetForm™

MDT MONTANA WETLAND ASSESSMENT FORM (revised May 25, 1999)

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

3. Evaluation Date: 8/20/2007 **4. Evaluator(s):** A. Pipp **5. Wetland / Site #(s):** Entire Site

6. Wetland Location(s) i. T: 31 N **R:** 6 W **S:** 31 **T:** 30 N **R:** 6 W **S:** 6

ii. Approx. Stationing / Mileposts: _____

iii. Watershed: 8 - Marias **GPS Reference No. (if applies):** _____

Other Location Information: Approximately 14 miles northwest of Valier, Montana.

7. A. Evaluating Agency MDT

8. Wetland Size (total acres): _____ (visually estimated)
84.6 (measured, e.g. GPS)

B. Purpose of Evaluation:
- ☐ Wetlands potentially affected by MDT project
- ☐ Mitigation wetlands; pre-construction
- ☒ Mitigation wetlands; post-construction
- ☐ Other

9. Assessment Area (total acres): _____ (visually estimated)
166.43 (measured, e.g. GPS)

Comments: _____

10. CLASSIFICATION OF WETLAND AND AQUATIC HABITATS IN AA

HGM CLASS [1]	SYSTEM [2]	SUBSYSTEM [2]	CLASS [2]	WATER REGIME [2]	MODIFIER [2]	% OF AA
Depression	Lacustrine	Littoral	Emergent Wetland	Seasonally Flooded	Excavated/Impounded	51
Depression	Lacustrine	Littoral	Unconsolidated Bottom	Intermittently Exposed	Excavated/Impounded	49
---	---	---	---	---	---	
---	---	---	---	---	---	

[1] = Smith et al. 1995. [2] = Cowardin et al. 1979.

Comments: _____

11. ESTIMATED RELATIVE ABUNDANCE (of similarly classified sites within the same Major Montana Watershed Basin)
Rare **Comments:** _____

12. GENERAL CONDITION OF AA

i. Regarding Disturbance: (Use matrix below to select appropriate response.)

Conditions Within AA	Predominant Conditions Adjacent (within 500 Feet) To AA		
	Land managed in predominantly natural state; is not grazed, hayed, logged, or otherwise converted; does not contain roads or buildings.	Land not cultivated, but moderately grazed or hayed or selectively logged or has been subject to minor clearing; contains few roads or buildings.	Land cultivated or heavily grazed or logged; subject to substantial fill placement, grading, clearing, or hydrological alteration; high road or building density.
AA occurs and is managed in predominantly a natural state; is not grazed, hayed, logged, or otherwise converted; does not contain roads or occupied buildings.	---	low disturbance	---
AA not cultivated, but moderately grazed or hayed or selectively logged or has been subject to relatively minor clearing, or fill placement, or hydrological alteration; contains few roads or buildings.	---	---	---
AA cultivated or heavily grazed or logged; subject to relatively substantial fill placement, grading, clearing, or hydrological alteration; high road or building density.	---	---	---

Comments: (types of disturbance, intensity, season, etc.) Surrounding land is grazed and cultivated, but very rural.

ii. Prominent weedy, alien, & introduced species: None observed.

iii. Briefly describe AA and surrounding land use / habitat: The AA is a wetland mitigation site that has been flooded. The surrounding land use is rangeland that is grazed by cows and agricultural land that is cultivated for wheat/barley.

13. STRUCTURAL DIVERSITY (Based on 'Class' column of #10 above.)

Number of 'Cowardin' Vegetated Classes Present in AA	≥3 Vegetated Classes or ≥ 2 if one class is forested	2 Vegetated Classes or 1 if forested	≤ 1 Vegetated Class
Select Rating	---	---	Low

Comments: _____

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

i. AA is Documented (D) or Suspected (S) to contain (check box):

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	☐ D ☐ S	_____

ii. Rating (Based on the strongest habitat chosen in 14A(i) above, find the corresponding rating of High (H), Moderate (M), or Low (L) for this function.

Highest Habitat Level	doc/primary	sus/primary	doc/secondary	sus/secondary	doc/incidental	sus/incidental	none
Functional Point & Rating	---	---	.8 (M)	---	---	---	---

If documented, list the source (e.g., observations, records, etc.)**:** A Piping Plover was observed foraging along Alkali Lake on May 7, 2007. A male and female Piping Plover were observed along Alkali Lake on May 15, 2007; nesting was not documented. Nesting by Piping Plovers were documented along the North Lake in 1990 and 1992.

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

i. AA is Documented (D) or Suspected (S) to contain (check box):

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	☐ D ☐ S	_____

ii. Rating: Based on the strongest habitat chosen in 14B(i) above, find the corresponding rating of High (H), Moderate (M), or Low (L) for this function.

Highest Habitat Level	doc/primary	sus/primary	doc/secondary	sus/secondary	doc/incidental	sus/incidental	none
Functional Point & Rating	---	---	---	.6 (M)	---	---	---

If documented, list the source (e.g., observations, records, etc.)**:** American White Pelicans nest in the North Lake and were sited at Alkali Lake in May 2006 and throughout 2007. Trumpeter Swan was observed in 2006 at Alkali Lake..

14C. GENERAL WILDLIFE HABITAT RATING

i. Evidence of overall wildlife use in the AA: Check either substantial, moderate, or low.

☒ **Substantial** (based on any of the following)
- ☒ 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
- ☐ interviews with local biologists with knowledge of the AA

☐ **Low** (based on any of the following)
- ☐ few or no wildlife observations during peak use periods
- ☐ little to no wildlife sign
- ☐ sparse adjacent upland food sources
- ☐ interviews with local biologists with knowledge of AA

☐ **Moderate** (based on any of the following)
- ☐ 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
- ☐ interviews with local biologists with knowledge of the AA

ii. Wildlife Habitat Features: Working from top to bottom, select the AA attribute to determine the exceptional (E), high (H), moderate (M), or low (L) rating. Structural diversity is from 13. For class cover to be considered evenly distributed, vegetated classes must be within 20% of each other in terms of their percent composition in the AA (see 10). Duration of Surface Water: P/P = permanent/perennial; S/I = seasonal/intermittent; T/E = temporary/ephemeral; A= absent.

Structural Diversity (from 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 12)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	E	--	--	--
Moderate disturbance at AA (see 12)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
High disturbance at AA (see 12)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

iii. Rating: Use 14C(i) and 14C(ii) above and the matrix below to arrive at the functional point and rating of exceptional (E), high (H), moderate (M), or low (L) for this function.

Evidence of Wildlife Use from 14C(i)	**Wildlife Habitat Features Rating** from 14C(ii)			
	☒ **Exceptional**	☐ **High**	☐ **Moderate**	☐ **Low**
Substantial	1 (E)	--	--	--
Moderate	--	--	--	--
Low	--	--	--	--

Comments: Numerous waterfowl species were observed in Fall 2005, Spring/Fall 2006, and Spring/Fall 2007. Deer tracks were observed.

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

If the AA is not or was not historically used by fish due to lack of habitat or excessive gradient, then check the NA box above.
Assess if the AA is used by fish or the existing situation is "correctable" such that the AA could be used by fish [*e.g.* fish use is precluded by perched culvert or other barrier, etc.]. If fish use occurs in the AA but is not desired from a resource management perspective (*e.g.* fish use within an irrigation canal], then Habitat Quality [14D(i)] below should be marked as "Low", applied accordingly in 14D(ii) below, and noted in the comments.

i. Habitat Quality: Pick the appropriate AA attributes in matrix to determine the quality rating of exceptional (E), high (H), moderate (M), or low (L).

Duration of Surface Water in AA	☐ **Permanent/Perennial**			☐ **Seasonal / Intermittent**			☐ **Temporary / Ephemeral**		
Cover - % of waterbody in AA containing cover objects (*e.g.* submerged logs, large rocks & boulders, overhanging banks, floating-leaved vegetation)	**>25%**	**10-25%**	**<10%**	**>25%**	**10-25%**	**<10%**	**>25%**	**10-25%**	**<10%**
Shading - >75% of streambank or shoreline of AA contains riparian or wetland scrub-shrub or forested communities	--	--	--	--	--	--	--	--	--
Shading – 50 to 75% of streambank or shoreline of AA contains riparian or wetland scrub-shrub or forested communities.	--	--	--	--	--	--	--	--	--
Shading - < 50% of streambank or shoreline of AA contains riparian or wetland scrub-shrub or forested communities.	--	--	--	--	--	--	--	--	--

ii. Modified Habitat Quality: Is fish use of the AA precluded or significantly reduced by a culvert, dike, other man-made structure or activity **or** is the waterbody included on the 'MDEQ list of waterbodies in need of TMDL development' with 'Probable Impaired Uses' listed as cold or warm water fishery or aquatic life support**?**
☐ **Y** ☐ **N** If yes, reduce the rating from 14D(i) by one level and check the modified habitat quality rating: ☐ E ☐ H ☐ M ☐ L

iii. Rating: Use the conclusions from 14D(i) and 14D(ii) above and the matrix below to arrive at the functional point and rating of exceptional (E), high (H), moderate (M), or low (L).

Types of Fish Known or Suspected within AA	**Modified Habitat Quality** from 14D(ii)			
	☐ **Exceptional**	☐ **High**	☐ **Moderate**	☐ **Low**
Native game fish	--	--	--	--
Introduced game fish	--	--	--	--
Non-game fish	--	--	--	--
No fish	--	--	--	--

Comments: Juvenile fish observed in inlet channel in October 2006, but not in 2007. Species is unknown and area is not managed for fish.

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

Applies only to wetlands subject to flooding via in-channel or overbank flow. If wetlands in AA do not flood from in-channel or overbank flow, then check NA.

i. Rating: Working from top to bottom, mark the appropriate attributes to arrive at the functional point and rating of high (H), moderate (M), or low (L) for this function.

Estimated wetland area in AA subject to periodic flooding	☐ **≥ 10 acres**			☐ **<10, >2 acres**			☐ **≤2 acres**		
% of flooded wetland classified as forested, scrub/shrub, or both	**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 residences, businesses, or other features which may be significantly damaged by floods located within 0.5 miles downstream of the AA? (check)
☐**Y** ☐**N** **Comments:** _____

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 NA above.

i. Rating: Working from top to bottom, use the matrix below to arrive at the functional point and rating of high (H), moderate (M), or low (L) for this function.
P/P = permanent/perennial; S/I = seasonal/intermittent; T/E = temporary/ephemeral.

Estimated maximum acre feet of water contained in wetlands within the AA that are subject to periodic flooding or ponding**.**	☒ **>5 acre feet**			☐ **<5, >1 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**	--	.9 (H)	--	--	--	--	--	--	--
Wetlands in AA flood or pond **< 5 out of 10 years**	--	--	--	--	--	--	--	--	--

Comments: _____

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

Applies to wetlands with the potential to receive excess 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 NA above.

i. Rating Working from top to bottom, use the matrix below to arrive at the functional point and rating of high (H), moderate (M), or low (L) for this function.

Sediment, Nutrient, and Toxicant Input Levels Within AA	AA receives or surrounding land use has potential to deliver low to moderate levels of sediments, nutrients, or compounds such that other functions are not substantially impaired. Minor sedimentation, sources of nutrients or toxicants, or signs of eutrophication present.				Waterbody 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 or ponding in AA	☐ **Yes**	☐ **No**	☒ **Yes**	☐ **No**	☐ **Yes**	☐ **No**	☐ **Yes**	☐ **No**
AA contains **no or restricted outlet**	--	--	.7 (M)	--	--	--	--	--
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 that is subject to wave action. If this does not apply, then check NA above.

i. Rating: Working from top to bottom, use the matrix below to arrive at the functional point and rating exceptional (E), high (H), moderate (M), or low (L) for this function.

% Cover of wetland streambank or shoreline by species with deep, binding rootmasses.	Duration of Surface Water Adjacent to Rooted Vegetation		
	☒Permanent / Perennial	☐Seasonal / Intermittent	☐Temporary / Ephemeral
≥ 65 %	--	--	--
35-64 %	--	--	--
< 35 %	.3 (L)	--	--

Comments: Hordeum jubatum rates as low stability. Chenopodium and Suaeda are annuals.

14I. PRODUCTION EXPORT / FOOD CHAIN SUPPORT

i. Rating: Working from top to bottom, use the matrix below to arrive at the functional point and rating of high (H), moderate (M), or low (L) for this function.
A = acreage of vegetated component in the AA. **B** = structural diversity rating from #13. **C** = Yes (Y) or No (N) as to whether or not the AA contains a surface or subsurface outlet. **P/P** = permanent/perennial; **S/I** = seasonal/intermittent; **T/E/A**= temporary/ephemeral/absent.

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	☐Y	☐N	☐Y	☐N	☐Y	☒N	☐Y	☐N	☐Y	☐N	☐Y	☐N	☐Y	☐N	☐Y	☐N	☐Y	☐N
P/P	--	--	--	--	--	.7M	--	--	--	--	--	--	--	--	--	--	--	--
S/I	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
T/E/A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Comments: _____

14J. GROUNDWATER DISCHARGE / RECHARGE (DR) (Check the indicators in i & ii below that apply to the AA.)

i. ☐ **Discharge Indicators**
- ☐ Springs 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.
- ☐ Other _____

ii. ☐ **Recharge Indicators**
- ☐ Permeable substrate presents without underlying impeding layer.
- ☐ Wetland contains inlet but not outlet.
- ☐ Other _____

iii. Rating: Use information from 14J(i) and 14J(ii) above and the table below to arrive at the functional point and rating of high (H) or low (L) for this function.

Criteria	Functional Point and Rating
AA has known Discharge/Recharge area or one or more indicators of D/R present	--
No Discharge/Recharge indicators present	0.1 (L)
Available Discharge/Recharge information inadequate to rate AA D/R potential	--

Comments: _____

14K. UNIQUENESS

i. Rating: Working from top to bottom, use the matrix below to arrive at the functional point and rating of high (H), moderate (M), or low (L) for this function.

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 from 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

i. Is the AA a known recreational or educational site? ☐ **Yes** [**Rate** ☐ **High (1.0)**, then proceed to 14L(ii) only] ☒ **No** [Proceed to 14L(iii)]

ii. Check categories that apply to the AA: ☒ Educational / scientific study ☒ Consumptive rec. ☒ Non-consumptive rec. ☐ Other

iii. Based on the location, diversity, size, and other site attributes, is there a strong potential for recreational or educational use?
☒ **Yes** [Proceed to 14L (ii) and then 14L(iv)] ☐ **No** [Rate as low in 14L(iv)]

iv. Rating Use the matrix below to arrive at the functional point and rating of high (H), moderate (M), or low (L) for this function.

Ownership	Disturbance at AA from 12(i)		
	☒ Low	☐ Moderate	☐ High
Public ownership	--	--	--
Private ownership	.7(M)	--	--

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

FUNCTION, VALUE SUMMARY, AND OVERALL RATING

Function and Value Variables	Rating	Actual Functional Points	Possible Functional Points	Functional Units (Actual Points x Estimated AA Acreage)
A. Listed/Proposed T&E Species Habitat	moderate	0.80	1	
B. MT Natural Heritage Program Species Habitat	moderate	0.60	1	
C. General Wildlife Habitat	exceptional	1.00	1	
D. General Fish/Aquatic Habitat	N/A		--	
E. Flood Attenuation	N/A		--	
F. Short and Long Term Surface Water Storage	high	0.90	1	
G. Sediment/Nutrient/Toxicant Removal	moderate	0.70	1	
H. Sediment/Shoreline Stabilization	low	0.30	1	
I. Production Export/Food Chain Support	moderate	0.70	1	
J. Groundwater Discharge/Recharge	low	0.10	1	
K. Uniqueness	moderate	0.50	1	
L. Recreation/Education Potential	moderate	0.70	1	
	Total:	**6.30**	**10.00**	____
		Percent of Total Possible Points:	**63%** (Actual / Possible) x 100 [rd to nearest whole #]	

Category I Wetland: (Must satisfy **one** of the following criteria. If not satisfied, proceed 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 total Possible Points is > 80%.

Category II Wetland: (Criteria for Category I not satisfied **and** meets any **one** of the following Category II criteria. If not satisfied, proceed to Category IV.)
- ☐ Score of 1 functional point for Species Rated S1, S2, or S3 by the MT Natural Heritage Program; **or**
- ☒ Score of .9 or 1 functional point for General Wildlife Habitat; **or**
- ☐ Score of .9 or 1 functional point for General Fish/Aquatic 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 total possible points is > 65%.

☐ **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 satisfied, return to Category III.)
- ☐ "Low" rating for Uniqueness; **and**
- ☐ "Low" rating for Production Export / Food Chain Support; **and**
- ☐ Percent of total possible points is < 30%.

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

☐ **I** ☒ **II** ☐ **III** ☐ **IV**

Appendix C

2007 REPRESENTATIVE PHOTOGRAPHS

MDT Wetland Mitigation Monitoring
Alkali Lake
Pondera County, Montana

2007 ALKALI LAKE WETLAND MITIGATION SITE

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

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

Photo 3: Photo taken west of Photo Point 2. View is east and shows Alkali Lake with shallow inundation and emerging *Suaeda* plants.

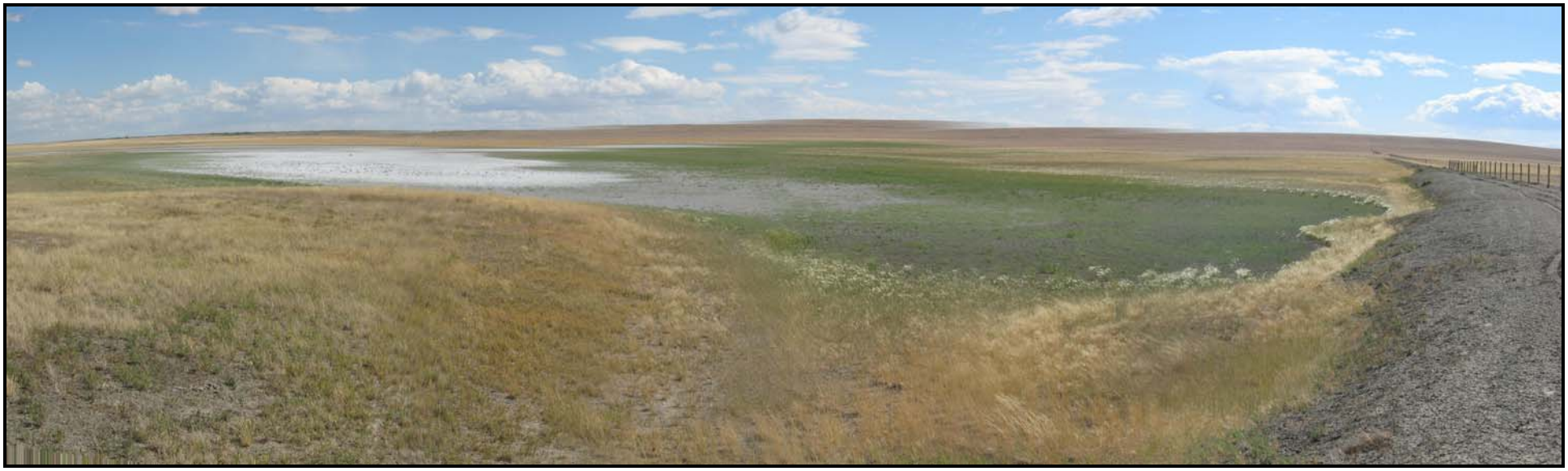


Photo 4: Photo Point 3 taken from the northwest corner of Alkali Lake. View is southeast.

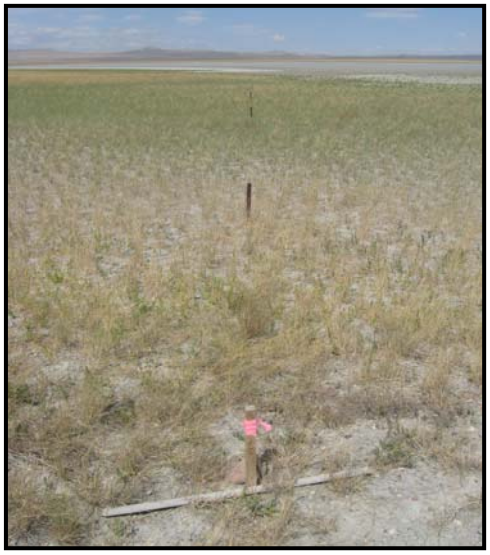


Photo 5: View is northwest (311˚) from Transect 1 start.

Photo 6: View is southeast (131˚) from Transect 1 end.

Photo 7: View is southeast (136˚) from Transect 2 start.

Photo 8: View is northwest (316˚) from Transect 2 end.

Photo 9: View is northeast (46˚) from Transect 3 start.

Photo 10: View is southwest (226˚) from Transect 3 end to start.

Photo 11: View is northeast (46˚) from Transect 3 end to lakebed.

Photo 12: View is east at macroinvertebrate sampling location.

Photo 13: View is east along north shore showing saturated alkaline soils.

Photo 14: View is east along north shore at Type 5-*Suaeda* wetland (green to red colors). Photo taken near Transect 2.

Photo 15: View is west along north shore at Type 5-*Suaeda* wetland (green to red colors). Photo taken near Transect 2.

Photo 16: View is south at Type 3-*Hordeum* wetland and at Soil Pit 6 on Transect 2.

Photo 17: View is east along west side of Alkali Lake at Type 3 – *Hordeum* wetland.

Photo 18: View is northeast at a dry population (yellowish) of Type 4-*Scirpus*.

Photo 19: View is southwest at Type 4-*Scirpus* near inlet.

Photo 20: Type 3-*Hordeum* with *Eleocharis acicularis* near Transect 1.

Photo 21: View is northeast at Type 3-*Hordeum* with *Eleocharis palustris* in outlet (at Soil Pit 10).

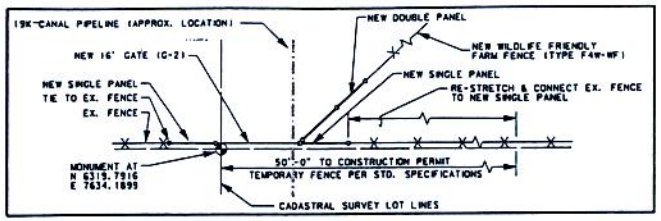
Photo 22: View is east at Type 1-Upland in the southwest corner of Alkali Lake.

Photo 23: View is northeast at Type 1-Upland along the south shore.

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.

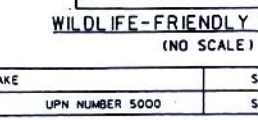
GATE COORDINATES ARE APPROXIMATE. SET GATES AND FENCING WITHIN THE LEGAL BOUNDARIES AS DISCUSSED ABOVE AND IN ACCORDANCE WITH GATE AND FARM FENCE STANDARD DETAILED DRAWINGS.

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 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, some sites continued to be mapped using the Trimble GEO III GPS unit while most 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

2007 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 – 2007

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

INTRODUCTION

Aquatic invertebrate assemblages were collected at a number of mitigated wetlands throughout Montana. This report summarizes data generated from seven years of collection. Over all years of sampling, a total of 182 invertebrate samples were collected. Table 1 lists the currently monitored sites at which aquatic invertebrates were collected in 2007, 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 and 2007 by personnel of PBS&J. Sampling procedures utilized were based on the protocols developed by the Montana Department of Environmental Quality (MT DEQ) 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.

Quality assurance systems

Quality control procedures for initial sample processing and subsampling involved checking sorting efficiency. These checks were conducted on 96% of the samples by independent observers who microscopically re-examined 20% of sorted substrate from each sample. All organisms that were missed were counted and this number was added to the total number obtained in the original sort. Sorting efficiency was evaluated by applying the following calculation:

$$SE = \frac{n_1}{n_{1+2}} \times 100$$

where: SE is the sorting efficiency, expressed as a percentage, n_1 is the total number of specimens in the first sort, and n_{1+2} is the total number of specimens in the first and second sorts combined.

Quality control procedures for taxonomic determinations of invertebrates involved checking accuracy, precision and enumeration. At least 10% of samples are targeted for quality assurance procedures. For this project, three samples were randomly selected and all organisms re-identified and counted by an independent taxonomist. Taxa lists and enumerations were compared by calculating a Bray-Curtis similarity statistic (Bray and Curtis 1957) for each

selected sample. Routinely, discrepancies between the original identifications and the QC identifications are discussed among the taxonomists, and necessary rectifications to the data are made. Discrepancies that cannot be rectified by discussions are routinely sent out to taxonomic specialists for identification. However, taxonomic certainty for identifications in this project was high, and no external verifications were necessary.

Assessment

The method employed to assess these wetlands is based on an index incorporating a battery of 12 bioassessment metrics or attributes (Table 1) tested and recommended by Stribling et al. (1995) in a report to the Montana Department of Health and Environmental Science. In that study, it was determined that some of the metrics were of limited use in some geographic regions, and for some wetland types. Despite that finding, all 12 metrics are used in this evaluation of mitigated wetlands, since detailed geographic information and wetland classifications were unavailable. 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, "optimal" 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 optimal, 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.

Several 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 2007, the lotic sites were Camp Creek (2 sites), Cloud Ranch stream, Kleinschmidt stream, Jack Creek, and Woodson Creek-Ringling stream. 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 (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 (the 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 2007 samples are given in Tables 4a-4c and 5.

In 2007, thermal preference of the invertebrate assemblages was calculated when possible, using the tool developed by 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 monitored in 2007 are included. An asterisk (*) indicates lotic sites.

Site Identifier	2001	2002	2003	2004	2005	2006	2007
Roundup	+	+	+	+	+	+	+
Ridgeway	+	+	+	+	+	+	+
Hoskins Landing MS-1		+	+	+	+		+
Hoskins Landing MS-2							+
Peterson Ranch pond 1		+	+	+	+	+	+
Peterson Ranch pond 2		+		+	+	+	+
Peterson Ranch pond 4		+	+	+	+	+	+
Peterson Ranch pond 5		+	+	+	+	+	+
Camp Creek MS-1*		+	+	+	+	+	+
Camp Creek MS-2*						+	+
Kleinschmidt		+	+	+	+	+	+
Kleinschmidt – stream*			+	+	+	+	+
Cloud Ranch Pond				+	+		+
Cloud Ranch Stream*				+			+
Jack Creek – pond				+	+		+
Jack Creek – McKee*							+
Norem				+	+	+	+
Rock Creek Ranch					+	+	+
Wagner Marsh					+	+	+
Alkali Lake 1						+	+
Charley Creek							+
Woodson pond MI 1							+
Woodson stream MI 2*							+
Little Muddy Creek							+
Selkirk Ranch							+
DH Ranch							+

Table 2. Aquatic invertebrate metrics employed for wetland (lentic) invertebrate assemblages in the MDT mitigated wetlands study, 2001 – 2007.

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 section of individual project monitoring reports. Summary tables for lentic (4a – 4c) and lotic (5) sites and project specific taxa listings and metrics reports are provided on the following pages.)

Quality Assurance

Table 3 gives the results of quality assurance procedures for sample sorting efficiency (SE) and Bray-Curtis similarity statistics for comparisons of taxonomic determinations and enumeration. Sorting efficiency averaged 97.54% for the project, and taxonomic similarity averaged 97.44%.

Table 3. Results of quality control procedures for subsampling and taxonomic and enumeration similarity.

Site name	SE	Bray-Curtis similarity
Roundup	100.00%	
Ridgeway	100.00%	
Hoskins Landing MS-1	100.00%	
Hoskins Landing MS-2	93.40%	
Peterson Ranch pond 1	100.0%	95.38%
Peterson Ranch pond 2	96.64%	
Peterson Ranch pond 4	91.66%	
Peterson Ranch pond 5	96.64%	
Camp Creek MS-1	100.00%	
Camp Creek MS-2	100.00%	96.94%
Kleinschmidt – pond	100.00%	
Kleinschmidt – stream	99.10%	
Cloud Ranch Pond	95.65%	
Cloud Ranch Stream	91.61%	
Jack Creek – pond	n.a.	
Jack Creek - McKee	96.49%	
Norem	100.00%	100.00%
Rock Creek Ranch	100.00%	
Wagner Marsh	100.00%	
Alkali Lake 1	98.04%	
Charley Creek	100.00%	
Woodson pond	91.37%	
Woodson stream	100.00%	
Little Muddy Creek	92.31%	
Selkirk Ranch	95.56%	
DH Ranch	100.00%	

Table 4a. Metric values and scores for wetland (lentic) sites in the MDT mitigated wetland study – 2007 sampling.

	ROUNDUP	RIDGEWAY	HOSKINS LANDING MS-1	HOSKINS LANDING MS-2	PETERSON RANCH 1	PETERSON RANCH 2	PETERSON RANCH 4	PETERSON RANCH 5
Total taxa	7	13	18	21	17	18	26	18
POET	0	2	3	5	2	0	6	4
Chironomidae taxa	5	5	2	8	8	12	12	6
Crustacea + Mollusca	1	2	5	4	4	5	4	4
% Chironomidae	7.62%	30.00%	18.75%	52.68%	36.45%	51.79%	42.59%	14.78%
Orthocladiinae/Chir	0.38	0.17	0.00	0.03	0.08	0.16	0.09	0.12
%Amphipoda	0.00%	10.00%	0.00%	0.00%	0.93%	0.00%	21.30%	1.74%
%Crustacea + %Mollusca	89.52%	15.00%	26.79%	8.04%	10.28%	43.75%	28.70%	37.39%
HBI	8.02	7.11	7.23	6.55	7.42	7.76	6.53	7.23
%Dominant taxon	89.52%	30.00%	17.86%	35.71%	39.25%	23.21%	17.59%	30.43%
%Collector-Gatherers	92.38%	70.00%	78.57%	82.14%	49.53%	71.43%	38.89%	26.96%
%Filterers	0.00%	0.00%	0.89%	6.25%	9.35%	3.57%	1.85%	5.22%
Total taxa	1	1	3	5	3	3	5	3
POET	1	1	3	5	1	1	5	5
Chironomidae taxa	3	3	1	5	5	5	3	3
Crustacea + Mollusca	1	1	3	3	3	3	1	3
% Chironomidae	5	3	3	1	3	1	1	5
Orthocladiinae/Chir	3	1	1	1	1	1	3	1
%Amphipoda	5	3	5	5	5	5	5	5
%Crustacea + %Mollusca	1	5	5	5	5	3	5	3
HBI	1	3	3	5	3	1	5	3
%Dominant taxon	1	5	5	3	3	5	1	5
%Collector-Gatherers	5	3	3	5	3	3	3	1
%Filterers	3	3	3	1	1	3	5	3
Total score	**30**	**32**	**38**	**44**	**36**	**34**	**42**	**40**
Percent of maximum score	**50.00%**	**53.33%**	**63.33%**	**73.33%**	**60.00%**	**56.67%**	**70.00%**	**66.67%**
Impairment classification	**poor**	**sub-optimal**	**optimal**	**optimal**	**sub-optimal**	**sub-optimal**	**optimal**	**optimal**

Table 4b. Metric values and scores for wetland (lentic) sites in the MDT mitigated wetland study – 2007 sampling.

	KLEIN-SCHMIDT POND	CLOUD RANCH POND	JACK CREEK POND	NOREM	ROCK CREEK RANCH	WAGNER MARSH	ALKALI LAKE 1	CHARLEY CREEK
Total taxa	25	13	9	6	18	11	9	13
POET	5	2	0	1	2	2	0	0
Chironomidae taxa	8	11	5	2	4	4	2	3
Crustacea + Mollusca	8	1	4	1	4	0	2	3
% Chironomidae	18.63%	81.54%	92.79%	31.58%	4.76%	11.39%	1.96%	27.17%
Orthocladiinae/Chir	0.53	0.38	0.03	0.00	0.60	0.44	0.50	0.68
%Amphipoda	10.78%	3.08%	0.00%	0.00%	17.14%	0.00%	0.00%	22.83%
%Crustacea + %Mollusca	36.27%	3.08%	7.21%	21.05%	23.81%	0.00%	61.76%	53.26%
HBI	7.35	7.22	9.73	6.63	6.33	7.28	8.07	6.88
%Dominant taxon	13.73%	18.46%	62.16%	26.32%	29.52%	45.57%	60.78%	29.35%
%Collector-Gatherers	53.92%	84.62%	70.27%	57.89%	29.52%	15.19%	70.59%	32.61%
%Filterers	11.76%	9.23%	0.90%	0.00%	0.95%	0.00%	0.00%	0.00%
Total taxa	5	1	1	1	3	1	1	1
POET	5	1	1	1	1	1	1	1
Chironomidae taxa	5	5	3	1	3	3	1	3
Crustacea + Mollusca	5	1	3	1	3	1	1	1
% Chironomidae	3	1	1	3	5	5	5	3
Orthocladiinae/Chir	5	3	1	1	5	3	5	5
%Amphipoda	3	5	5	5	3	5	5	3
%Crustacea + %Mollusca	3	5	5	5	5	5	3	3
HBI	3	3	1	5	5	3	1	5
%Dominant taxon	5	5	1	5	5	3	1	5
%Collector-Gatherers	3	5	3	3	1	1	3	1
%Filterers	1	1	3	3	3	3	3	3
Total score	**46**	**36**	**28**	**34**	**42**	**34**	**30**	**34**
Percent of maximum score	**76.67%**	**60.00%**	**46.67%**	**56.67%**	**70.00%**	**56.67%**	**50.00%**	**56.67%**
Impairment classification	**optimal**	**sub-optimal**	**poor**	**sub-optimal**	**poor**	**sub-optimal**	**poor**	**sub-optimal**

Table 4c. Metric values and scores for wetland (lentic) sites in the MDT mitigated wetland study – 2007 sampling.

	WOODSON POND	LITTLE MUDDY CREEK	SELKIRK RANCH	DH RANCH
Total taxa	12	2	16	8
POET	0	0	2	1
Chironomidae taxa	9	0	8	4
Crustacea + Mollusca	1	1	2	2
% Chironomidae	85.71%	0.00%	77.27%	27.50%
Orthocladiinae/Chir	0.32	0.00	0.61	0.00
%Amphipoda	0.00%	0.00%	0.00%	0.00%
%Crustacea + %Mollusca	2.86%	75.00%	8.18%	64.17%
HBI	9.34	8.50	7.82	7.38
%Dominant taxon	33.33%	75.00%	46.36%	39.17%
%Collector-Gatherers	55.24%	75.00%	32.73%	27.50%
%Filterers	0.00%	0.00%	8.18%	17.50%
Total taxa	1	1	3	1
POET	1	1	1	1
Chironomidae taxa	5	1	5	3
Crustacea + Mollusca	1	1	1	1
% Chironomidae	1	5	1	3
Orthocladiinae/Chir	3	1	5	1
%Amphipoda	5	5	5	5
%Crustacea + %Mollusca	5	1	5	1
HBI	1	1	1	3
%Dominant taxon	5	1	3	3
%Collector-Gatherers	3	3	1	1
%Filterers	3	3	1	1
Total score	**34**	**24**	**32**	**24**
Percent of maximum score	**56.67%**	**40.00%**	**53.33%**	**40.00%**
Impairment classification	**sub-optimal**	**poor**	**sub-optimal**	**poor**

Table 5. Metric values and scores for stream (lotic) sites in the MDT mitigated wetland study – 2007 sampling.

	CAMP CREEK MS-1	CAMP CREEK MS-2	KLEIN-SCHMIDT STREAM	CLOUD RANCH STREAM	JACK CREEK - MCKEE	WOODSON STREAM
E Richness	6	6	0	2	1	1
P Richness	0	0	0	2	0	0
T Richness	4	6	2	4	4	0
Pollution Sensitive Richness	3	4	0	1	0	0
Filterer Percent	4.85%	5.56%	7.14%	3.57%	2.83%	16.67%
Pollution Tolerant Percent	32.04%	34.26%	9.82%	14.29%	58.49%	8.33%
E Richness	3	3	0	1	0	0
P Richness	0	0	0	2	0	0
T Richness	2	3	1	2	2	0
Pollution Sensitive Richness	2	3	0	1	0	0
Filterer Percent	3	2	2	3	3	1
Pollution Tolerant Percent	1	1	2	1	0	2
Total score	**11**	**12**	**5**	**10**	**5**	**3**
Percent of maximum score	**61.11%**	**66.67%**	**27.78%**	**55.56%**	**27.78%**	**16.67%**
Impairment classification	**slight**	**slight**	**moderate**	**slight**	**moderate**	**severe**

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.

Bray, J. R. and J. T. Curtis. 1957. An ordination of upland forest communities of southern Wisconsin. Ecological Monographs 27: 325-349.

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: MDT07PBSJ
RAI No.: MDT07PBSJ021

RAI No.: MDT07PBSJ021 **Sta. Name:** Alkali Lake
Client ID:
Date Coll.: 8/20/2007 **No. Jars:** 1 **STORET ID:**

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Non-Insect							
Nematoda	4	3.92%	Yes	Unknown		5	PA
Ostracoda	62	60.78%	Yes	Unknown		8	CG
Naididae							
Naididae	10	9.80%	Yes	Unknown		8	CG
Physidae							
Physa sp.	1	0.98%	Yes	Unknown		8	SC
Heteroptera							
Corixidae							
Corixidae	17	16.67%	Yes	Larva		10	PH
Diptera							
Dolichopodidae							
Dolichopodidae	1	0.98%	Yes	Larva		4	PR
Tabanidae							
Tabanidae	5	4.90%	Yes	Larva		6	PR
Chironomidae							
Chironomidae							
Cricotopus (Cricotopus) sp.	1	0.98%	Yes	Larva		7	SH
Cryptochironomus sp.	1	0.98%	Yes	Larva		8	PR
Sample Count	**102**						

Metrics Report

Project ID: MDT07PBSJ
RAI No.: MDT07PBSJ021
Sta. Name: Alkali Lake
Client ID:
STORET ID:
Coll. Date: 8/20/2007

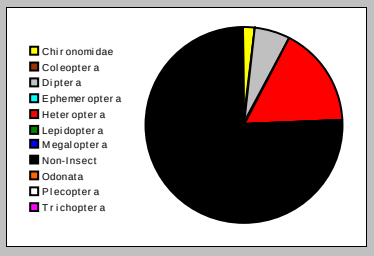
Abundance Measures

Sample Count: 102
Sample Abundance: 255.00 40.00% of sample used

Coll. Procedure:
Sample Notes:

Taxonomic Composition

Category	R	A	PRA
Non-Insect	4	77	75.49%
Odonata			
Ephemeroptera			
Plecoptera			
Heteroptera	1	17	16.67%
Megaloptera			
Trichoptera			
Lepidoptera			
Coleoptera			
Diptera	2	6	5.88%
Chironomidae	2	2	1.96%

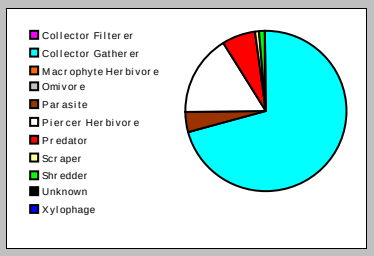


Dominant Taxa

Category	A	PRA
Ostracoda	62	60.78%
Corixidae	17	16.67%
Naididae	10	9.80%
Tabanidae	5	4.90%
Nematoda	4	3.92%
Physa	1	0.98%
Dolichopodidae	1	0.98%
Cryptochironomus	1	0.98%
Cricotopus (Cricotopus)	1	0.98%

Functional Composition

Category	R	A	PRA
Predator	3	7	6.86%
Parasite	1	4	3.92%
Collector Gatherer	2	72	70.59%
Collector Filterer			
Macrophyte Herbivore			
Piercer Herbivore	1	17	16.67%
Xylophage			
Scraper	1	1	0.98%
Shredder	1	1	0.98%
Omivore			
Unknown			

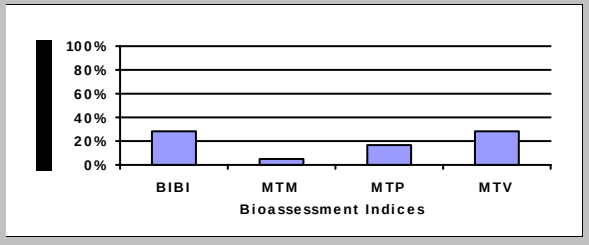


Metric Values and Scores

Metric	Value	BIBI	MTP	MTV	MTM
Composition					
Taxa Richness	9	1	0		0
Non-Insect Percent	75.49%				
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	9.80%				
Baetidae/Ephemeroptera	0.000				
Hydropsychidae/Trichoptera	0.000				
Dominance					
Dominant Taxon Percent	60.78%		0		0
Dominant Taxa (2) Percent	77.45%				
Dominant Taxa (3) Percent	87.25%	1			
Dominant Taxa (10) Percent	100.00%				
Diversity					
Shannon H (loge)	1.285				
Shannon H (log2)	1.854		1		
Margalef D	1.730				
Simpson D	0.405				
Evenness	0.123				
Function					
Predator Richness	3		1		
Predator Percent	6.86%	1			
Filterer Richness	0				
Filterer Percent	0.00%			3	
Collector Percent	70.59%		2		1
Scraper+Shredder Percent	1.96%		0		0
Scraper/Filterer	0.000				
Scraper/Scraper+Filterer	0.000				
Habit					
Burrower Richness	0				
Burrower Percent	0.00%				
Swimmer Richness	1				
Swimmer Percent	16.67%				
Clinger Richness	1	1			
Clinger Percent	0.98%				
Characteristics					
Cold Stenotherm Richness	0				
Cold Stenotherm Percent	0.00%				
Hemoglobin Bearer Richness	1				
Hemoglobin Bearer Percent	0.98%				
Air Breather Richness	2				
Air Breather Percent	5.88%				
Voltinism					
Univoltine Richness	5				
Semivoltine Richness	0	1			
Multivoltine Percent	66.67%		1		
Tolerance					
Sediment Tolerant Richness	0				
Sediment Tolerant Percent	0.00%				
Sediment Sensitive Richness	0				
Sediment Sensitive Percent	0.00%				
Metals Tolerance Index	4.711				
Pollution Sensitive Richness	0	1		0	
Pollution Tolerant Percent	7.84%	5		2	
Hilsenhoff Biotic Index	8.069		0		0
Intolerant Percent	0.00%				
Supertolerant Percent	89.22%				
CTQa	108.000				

Bioassessment Indices

BioIndex	Description	Score	Pct	Rating
BIBI	B-IBI (Karr et al.)	14	28.00%	
MTP	Montana DEQ Plains (Bukantis 1998)	5	16.67%	Severe
MTV	Montana Revised Valleys/Foothills (Bollman 1998)	5	27.78%	Moderate
MTM	Montana DEQ Mountains (Bukantis 1998)	1	4.76%	Severe



Appendix G

FIGURE 4
2004 - 2007 SOILS METALS DATA

MDT Wetland Mitigation Monitoring
Alkali Lake
Pondera County, Montana

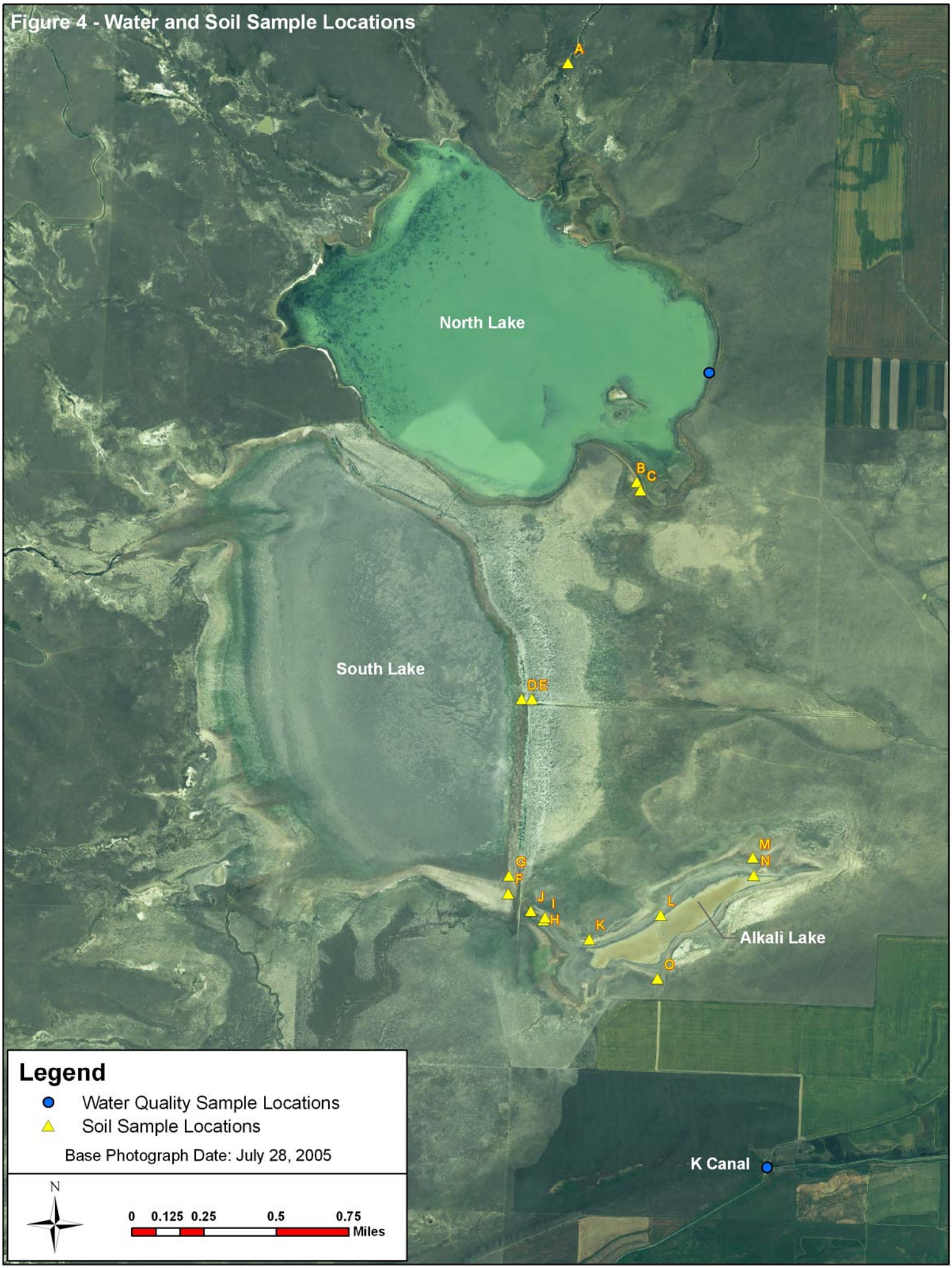
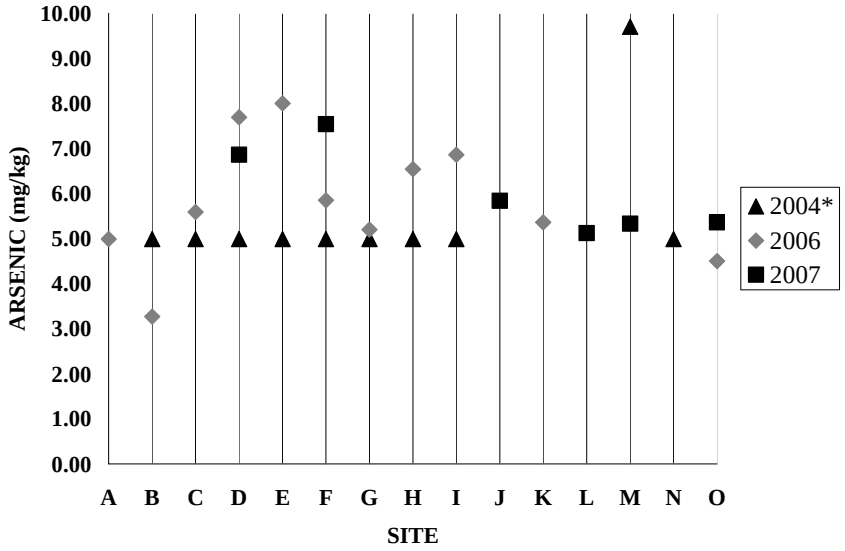


Figure 4 - Water and Soil Sample Locations
A
North Lake
B
C
South Lake
D
E
G
F
J
I
H
K
L
M
N
Alkali Lake
O
K Canal
Legend
Water Quality Sample Locations
Soil Sample Locations
Base Photograph Date: July 28, 2005
N
0 0.125 0.25 0.5 0.75
Miles

Table 11. ***Years sampled for each water (1-2) and soil (A-O) sample location at North Alkali, South Alkali, and Alkali Lakes.***

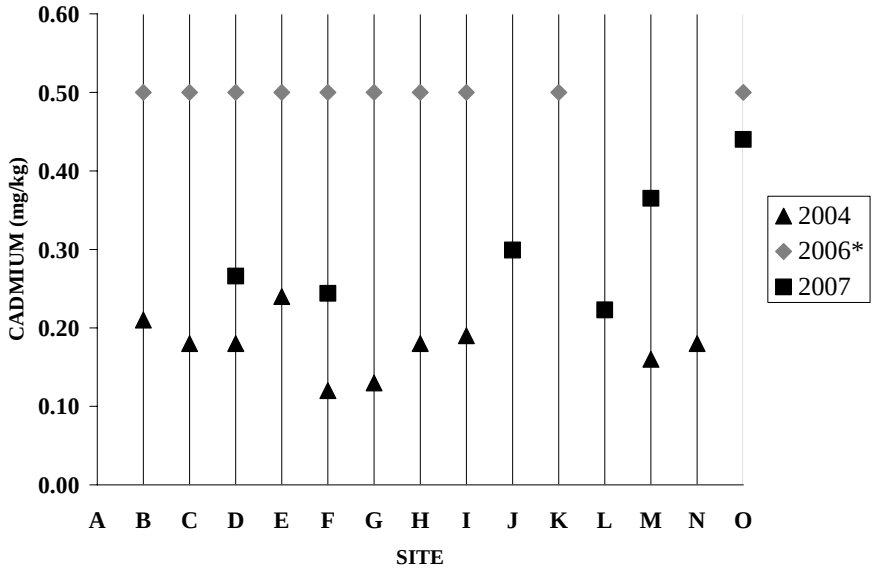
YEAR	SAMPLING SITES																
	1	2	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
2004	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓				✓	✓	
2006			✓	✓	✓	✓	✓	✓	✓	✓	✓		✓				✓
2007						✓		✓				✓		✓	✓		✓

Chart 8: ***Arsenic metal levels in soil samples collected from 2004 to 2007 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 from 2004 to 2007 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 B to I, K, and O.**

Chart 10: ***Nickel metal levels in soil samples collected from 2004 to 2007 for North Alkali, South Alkali, and Alkali lakes.***

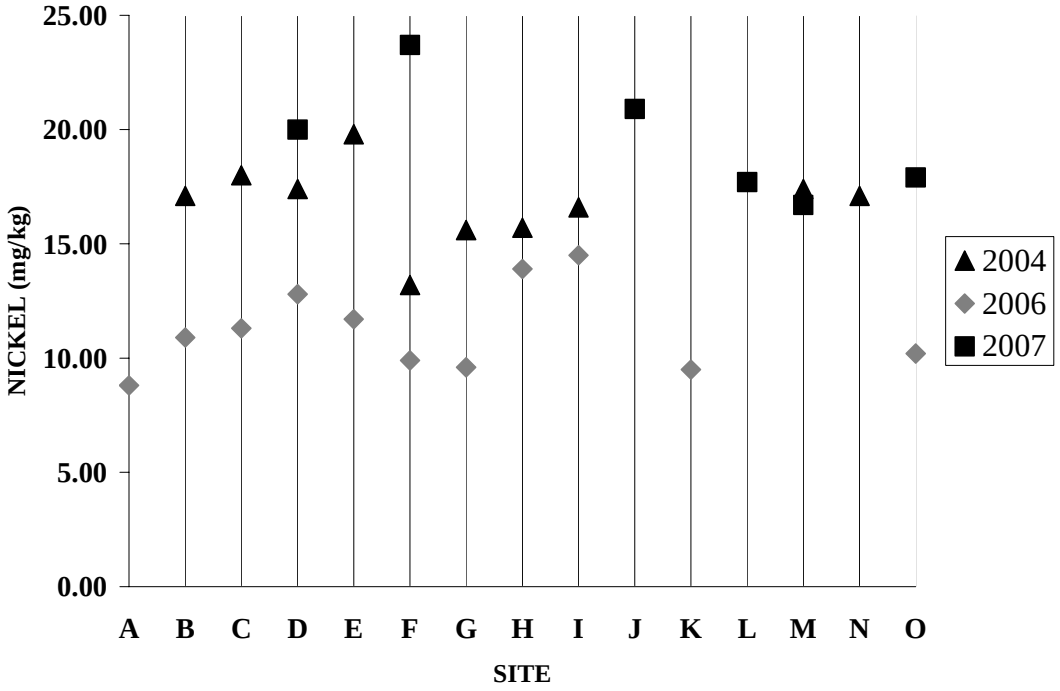
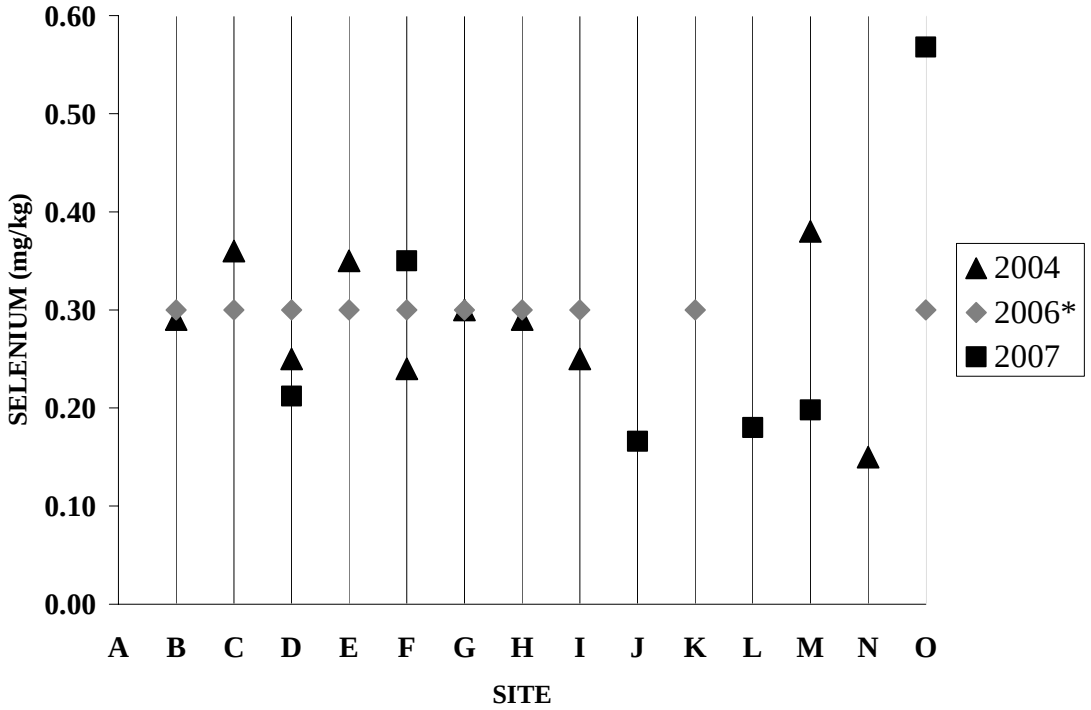


Chart 11: ***Selenium metal levels in soil samples collected from 2004 to 2007 for North Alkali, South Alkali, and Alkali lakes.***



***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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LABORATORY ANALYTICAL REPORT

Client: PBS and J
Project: Alkali Lake Wetland Monitoring B43088.00
Lab ID: H07080238-002
Client Sample ID: SE Arm, #1 (unnamed) = Site M on Figure 4

Report Date: 09/04/07
Collection Date: 08/20/07 14:00
DateReceived: 08/23/07
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, TOTAL							
Arsenic	5.33	mg/kg	D	0.47		SW6020	08/31/07 05:17 / eli-b
Cadmium	0.365	mg/kg	D	0.049		SW6020	08/31/07 05:17 / eli-b
Nickel	16.7	mg/kg		0.10		SW6020	08/31/07 05:17 / eli-b
Selenium	0.198	mg/kg	D	0.064		SW6020	08/31/07 05:17 / eli-b

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
D - RL increased due to sample matrix interference.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

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LABORATORY ANALYTICAL REPORT

Client: PBS and J
Project: Alkali Lake Wetland Monitoring B43088.00
Lab ID: H07080238-005
Client Sample ID: South Lake, #4/#5 = Site F on Figure 4

Report Date: 09/04/07
Collection Date: 08/20/07 16:30
DateReceived: 08/23/07
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, TOTAL							
Arsenic	7.54	mg/kg	D	0.47		SW6020	08/31/07 05:37 / eli-b
Cadmium	0.244	mg/kg	D	0.064		SW6020	08/31/07 05:37 / eli-b
Nickel	23.7	mg/kg		0.10		SW6020	08/31/07 05:37 / eli-b
Selenium	0.350	mg/kg	D	0.064		SW6020	08/31/07 05:37 / eli-b

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
D - RL increased due to sample matrix interference.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

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LABORATORY ANALYTICAL REPORT

Client: PBS and J
Project: Alkali Lake Wetland Monitoring B43088.00-0301
Lab ID: H07090329-001
Client Sample ID: #6/#7, South Lake = Site D on Figure 4

Report Date: 10/15/07
Collection Date: 09/26/07 14:00
DateReceived: 09/27/07
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, TOTAL							
Arsenic	6.86	mg/kg	D	0.24		SW6020	10/10/07 00:24 / eli-b
Cadmium	0.266	mg/kg	D	0.032		SW6020	10/10/07 00:24 / eli-b
Nickel	20.0	mg/kg	D	0.10		SW6010B	10/02/07 21:40 / eli-b
Selenium	0.212	mg/kg	D	0.032		SW6020	10/10/07 00:24 / eli-b

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
D - RL increased due to sample matrix interference.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

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LABORATORY ANALYTICAL REPORT

Client: PBS and J
Project: Alkali Lake Wetland Monitoring B43088.00
Lab ID: H07080238-001
Client Sample ID: SE Arm, #8 Inlet = Site O on Figure 4

Report Date: 09/04/07
Collection Date: 08/20/07 11:30
DateReceived: 08/23/07
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, TOTAL							
Arsenic	5.36	mg/kg	D	0.47		SW6020	08/31/07 04:35 / eli-b
Cadmium	0.440	mg/kg	D	0.049		SW6020	08/31/07 04:35 / eli-b
Nickel	17.9	mg/kg		0.10		SW6020	08/31/07 04:35 / eli-b
Selenium	0.568	mg/kg	D	0.064		SW6020	08/31/07 04:35 / eli-b

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
D - RL increased due to sample matrix interference.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

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LABORATORY ANALYTICAL REPORT

Client: PBS and J
Project: Alkali Lake Wetland Monitoring B43088.00
Lab ID: H07080238-003
Client Sample ID: SE Arm, #9 = Site L on Figure 4

Report Date: 09/04/07
Collection Date: 08/20/07 14:30
DateReceived: 08/23/07
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, TOTAL							
Arsenic	5.12	mg/kg	D	0.47		SW6020	08/31/07 05:23 / eli-b
Cadmium	0.223	mg/kg	D	0.064		SW6020	08/31/07 05:23 / eli-b
Nickel	17.7	mg/kg		0.10		SW6020	08/31/07 05:23 / eli-b
Selenium	0.180	mg/kg	D	0.064		SW6020	08/31/07 05:23 / eli-b

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
D - RL increased due to sample matrix interference.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

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LABORATORY ANALYTICAL REPORT

Client: PBS and J
Project: Alkali Lake Wetland Monitoring B43088.00
Lab ID: H07080238-004
Client Sample ID: SE Arm, #10/#11 = Site J on Figure 4

Report Date: 09/04/07
Collection Date: 08/20/07 16:00
DateReceived: 08/23/07
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, TOTAL							
Arsenic	5.84	mg/kg	D	0.47		SW6020	08/31/07 05:30 / eli-b
Cadmium	0.299	mg/kg	D	0.064		SW6020	08/31/07 05:30 / eli-b
Nickel	20.9	mg/kg		0.10		SW6020	08/31/07 05:30 / eli-b
Selenium	0.166	mg/kg	D	0.064		SW6020	08/31/07 05:30 / eli-b

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
D - RL increased due to sample matrix interference.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

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QA/QC Summary Report

Client: PBS and J
Project: Alkali Lake Wetland Monitoring B43088.00

Report Date: 09/04/07
Work Order: H07080238

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020								Batch: B_28436	
Sample ID: MB-28436	Method Blank				Run: SUB-B98747			08/31/07 04:15	
Arsenic	ND	mg/kg	0.5						
Cadmium	ND	mg/kg	0.05						
Nickel	0.2	mg/kg	0.1						
Selenium	ND	mg/kg	0.06						
Sample ID: LCS-28436	Laboratory Control Sample				Run: SUB-B98747			08/31/07 04:22	
Arsenic	162	mg/kg	5.0	107	70	130			
Cadmium	98.1	mg/kg	1.0	103	70	130			
Nickel	112	mg/kg	5.0	110	70	130			
Selenium	146	mg/kg	5.0	106	70	130			
Sample ID: H07080238-001A	Serial Dilution				Run: SUB-B98747			08/31/07 04:42	
Arsenic	5.33	mg/kg	5.0		0	0		10	N
Cadmium	0.514	mg/kg	1.0		0	0		10	N
Nickel	17.7	mg/kg	5.0		0	0	1.6	10	
Selenium	0.580	mg/kg	5.0		0	0		10	N
Sample ID: B07082128-021AMS3	Sample Matrix Spike				Run: SUB-B98747			08/31/07 05:50	
Arsenic	60.3	mg/kg	5.0	102	75	125			
Cadmium	25.5	mg/kg	1.0	98	75	125			
Nickel	65.1	mg/kg	5.0	104	75	125			
Selenium	47.5	mg/kg	5.0	95	75	125			
Sample ID: B07082128-021AMSD3	Sample Matrix Spike Duplicate				Run: SUB-B98747			08/31/07 05:57	
Arsenic	60.5	mg/kg	5.0	102	75	125	0.2	20	
Cadmium	25.6	mg/kg	1.0	99	75	125	0.5	20	
Nickel	65.3	mg/kg	5.0	104	75	125	0.3	20	
Selenium	47.9	mg/kg	5.0	95	75	125	0.7	20	

Qualifiers:

RL - Analyte reporting limit.

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

ND - Not detected at the reporting limit.

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QA/QC Summary Report

Client: PBS and J
Project: Alkali Lake Wetland Monitoring B43088.00

Report Date: 09/04/07
Work Order: H07080238

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020								Analytical Run: SUB-B98747	
Sample ID: QCS-ME070201A, ME07	Initial Calibration Verification Standard							08/30/07 10:06	
Selenium	0.051	mg/L	0.0010	101	90	110			
Arsenic	0.051	mg/L	0.0010	101	90	110			
Cadmium	0.026	mg/L	0.0010	105	90	110			
Nickel	0.051	mg/L	0.0010	102	90	110			
Sample ID: ICSA	Interference Check Sample A							08/30/07 10:27	
Selenium	0.0011	mg/L	0.0010						
Arsenic	0.0012	mg/L	0.0010						
Cadmium	0.0017	mg/L	0.0010						
Nickel	0.0014	mg/L	0.0010						
Sample ID: ICSAB	Interference Check Sample AB							08/30/07 10:34	
Selenium	0.0097	mg/L	0.0010	97	70	130			
Arsenic	0.010	mg/L	0.0010	104	70	130			
Cadmium	0.011	mg/L	0.0010	105	70	130			
Nickel	0.021	mg/L	0.0010	105	70	130			
Sample ID: QCS-ME070201A, ME07	Initial Calibration Verification Standard							08/30/07 22:51	
Selenium	0.051	mg/L	0.0010	102	90	110			
Arsenic	0.050	mg/L	0.0010	101	90	110			
Cadmium	0.026	mg/L	0.0010	103	90	110			
Nickel	0.051	mg/L	0.0010	102	90	110			

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 Lake Wetland Monitoring B43088.00-0301

Report Date: 10/15/07
Work Order: H07090329

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020									Batch: B_29047
Sample ID: MB-29047	Method Blank				Run: SUB-B100734				10/10/07 00:04
Arsenic	ND	mg/kg	0.5						
Cadmium	ND	mg/kg	0.05						
Selenium	ND	mg/kg	0.06						
Sample ID: LCS-29047	Laboratory Control Sample				Run: SUB-B100734				10/10/07 00:11
Arsenic	168	mg/kg	5.0	111	70	130			
Cadmium	110	mg/kg	1.0	115	70	130			
Selenium	163	mg/kg	5.0	118	70	130			
Sample ID: B07100047-021AMS3	Sample Matrix Spike				Run: SUB-B100734				10/10/07 00:37
Arsenic	110	mg/kg	5.0	97	75	125			
Cadmium	52.8	mg/kg	1.0	105	75	125			
Selenium	106	mg/kg	5.0	106	75	125			
Sample ID: B07100047-021AMSD3	Sample Matrix Spike Duplicate				Run: SUB-B100734				10/10/07 00:44
Arsenic	111	mg/kg	5.0	97	75	125	0.2	20	
Cadmium	53.4	mg/kg	1.0	106	75	125	1.1	20	
Selenium	106	mg/kg	5.0	105	75	125	0.7	20	
Sample ID: B07100076-001ADIL	Serial Dilution				Run: SUB-B100734				10/10/07 01:32
Arsenic	ND	mg/kg	5.0		0	0	0.0	10	
Cadmium	ND	mg/kg	1.0		0	0	0.0	10	
Selenium	1.57	mg/kg	5.0		0	0	0.0	10	
Method: SW6020									Analytical Run: SUB-B100734
Sample ID: QCS-ME070703A,ME070	Initial Calibration Verification Standard								10/09/07 14:20
Selenium	0.051	mg/L	0.0010	103	90	110			
Arsenic	0.049	mg/L	0.0010	98	90	110			
Cadmium	0.026	mg/L	0.0010	105	90	110			
Sample ID: ICSA	Interference Check Sample A								10/09/07 14:41
Selenium	9.2E-05	mg/L	0.0010						
Arsenic	8.9E-05	mg/L	0.0010						
Cadmium	0.00056	mg/L	0.0010						
Sample ID: ICSAB	Interference Check Sample AB								10/09/07 14:48
Selenium	0.011	mg/L	0.0010	107	70	130			
Arsenic	0.011	mg/L	0.0010	108	70	130			
Cadmium	0.011	mg/L	0.0010	107	70	130			

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 Lake Wetland Monitoring B43088.00-0301

Report Date: 10/15/07
Work Order: H07090329

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.7								Analytical Run: SUB-B100364	
Sample ID: QCS	Initial Calibration Verification Standard							10/02/07 13:23	
Nickel	0.995	mg/L	0.050	100	90	110			
Sample ID: ICSA	Interference Check Sample A							10/02/07 13:37	
Nickel	0.000290	mg/L	0.050		-0.05	0.05			
Sample ID: ICSAB	Interference Check Sample AB							10/02/07 13:40	
Nickel	0.958	mg/L	0.050	96	80	120			
Method: SW6010B								Batch: B_29047	
Sample ID: MB-29047	Method Blank				Run: SUB-B100364			10/02/07 21:00	
Nickel	ND	mg/kg	0.2						
Sample ID: LCS-29047	Laboratory Control Sample				Run: SUB-B100364			10/02/07 21:04	
Nickel	115	mg/kg	5.0	112	70	130			
Sample ID: B07100047-021AMS3	Sample Matrix Spike				Run: SUB-B100364			10/02/07 22:14	
Nickel	112	mg/kg	5.0	100	75	125			
Sample ID: B07100047-021AMSD3	Sample Matrix Spike Duplicate				Run: SUB-B100364			10/02/07 22:17	
Nickel	118	mg/kg	5.0	106	75	125	5.1	20	
Sample ID: B07100047-022ADIL	Serial Dilution				Run: SUB-B100364			10/02/07 22:24	
Nickel	9.99	mg/kg	5.0		0	0		10	N

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

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