MONTANA DEPARTMENT OF TRANSPORTATION
WETLAND MITIGATION MONITORING REPORT: YEAR 2006

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
P.O. Box 239
Helena, MT 59624

December 2006

Project No: B43054.00 - 0308

PBS&J

MONTANA DEPARTMENT OF TRANSPORTATION

WETLAND MITIGATION MONITORING REPORT:

YEAR 2006

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
P.O. Box 239
Helena, MT 59624

December 2006

Project No: B43054.00 – 0308

"MDT attempts to provide accommodations for any known disability that may interfere with a person participating in any service, program, or activity of the Department of Transportation. Alternative accessible formats of this information will be provided upon request. For further information, call 406-444-7228 or TTY (800-335-7592) or by calling Montana Relay at 711."

PBSJ

TABLE OF CONTENTS

TABLES

CHARTS

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 is comprised of an approximate 175.8-acre historic lakebed and was constructed and flooded in late summer/early fall 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.

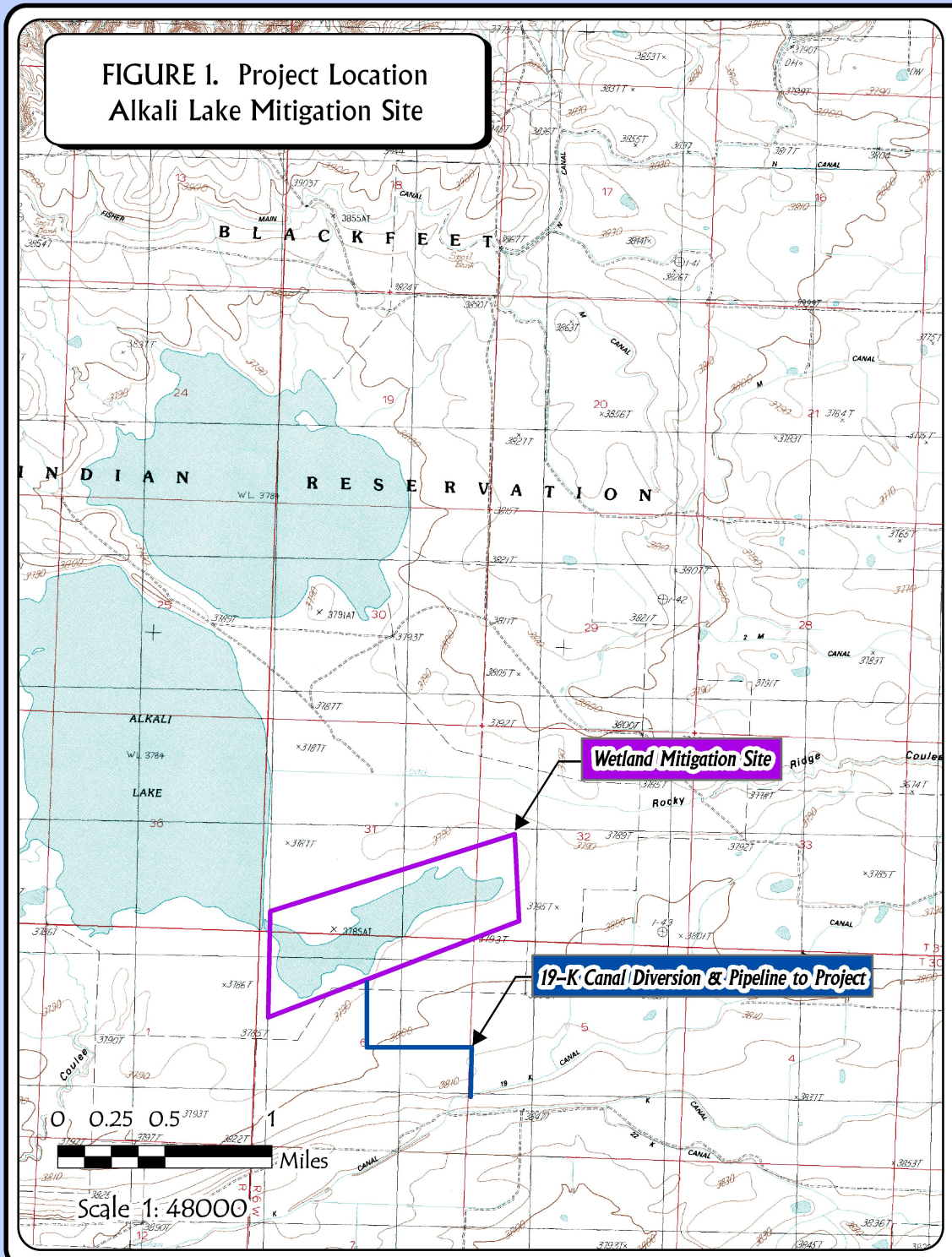
Final approved performance standards (Steinle 2004a, 2004b) are as follows:

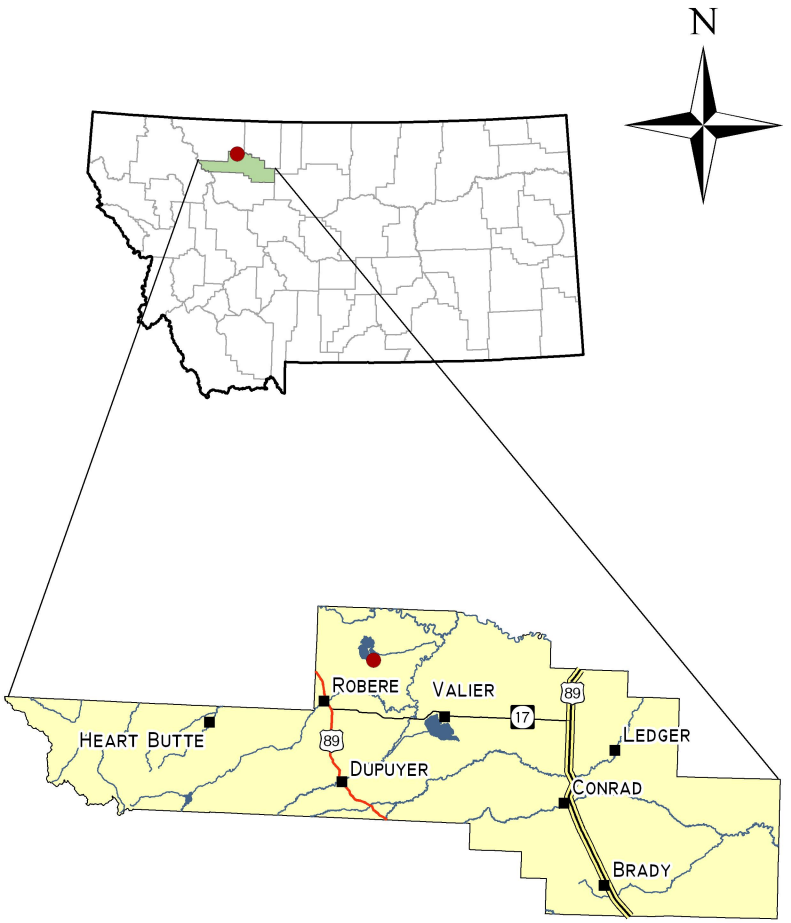
Wetland Hydrology Success will be achieved where wetland hydrology is present as per the technical guidelines in the 1987 COE Wetland Delineation Manual.

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

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

FIGURE 1. Project Location
Alkali Lake Mitigation Site





PROJECT #: B43054.00 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 alkali 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 first 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 24th (spring bird survey), August 21-22nd (mid-season survey), and October 23rd (fall bird survey) of 2006. All information contained on the Wetland Mitigation Site Monitoring Form was collected during these three 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 transects; soils data; hydrology data; bird and general wildlife use; macroinvertebrate sampling; photograph points; and a non-engineering examination of the dike structure.

2.2 Hydrology

Hydrologic indicators were evaluated during the mid-season visit on August 21-22, 2006. 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 300 feet long by 10 feet wide and 600 feet long by 10-foot wide 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 2006. 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.

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 11 locations within the North Alkali Lake, South Alkali Lake, and the project area (southeast Alkali Lake) during May and August of 2006. Soil samples collected in the north and south lakes serve as a comparison for samples collected at the project site. Soil was collected using a covered shovel blade. Soil in the upper six inches of a 1-foot radius circle 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

Two macroinvertebrate samples were 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 samples 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 2006 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 2006 (**Figure 2** in **Appendix A**). Panoramic photographs were taken at each point.

2.11 GPS Data

During the 2006 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 boundaries, and macroinvertebrate sampling locations.

2.12 Maintenance Needs

Construction and flooding of the site occurred in early fall 2005. In 2006, 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).

During the spring visit on May 24th it was noted that the inlet channel was dry. However, during the mid-season visit, the inlet channel was flowing and water levels had gone beyond the fence perimeter in several localities and breached the berm (**Figure 2** in **Appendix A**; **Photos 12-14** in **Appendix C**). Water continued to flow in the site until sometime in September. During the fall visit on October 23rd the inlet channel was dry and the water level had receded somewhat. Wetland development may have been hampered by this long full inundation period as some plants require a drawdown period to germinate and grow.

Although hydrology is primarily supplied from applied water rights, direct precipitation will also play a role in wetland development. From January to August in 2006, 10.08 inches of precipitation was measured at the Valier Weather Station (#248501) (Western Regional Climate Center [WRCC] 2006). During this period precipitation peaked during May (2.07) and June (2.52) (WRCC 2006). The long-term January to August average calculated from August of 1911 to 2006 was 9.96, which was slightly less than 10.08 received in 2006 (WRCC 2006).

3.2 Vegetation

Vegetation community types were based on topography, hydrology, and plant composition. Plant species observed within each community type was compiled into a comprehensive list (**Table 2**). In 2006, four community types were mapped: Type 1 – *Dry Upland*, Type 2 – *Inundated Upland*, Type 3 - *Puccinellia Wetland*, and Type 4 – *Scirpus Wetland*. In addition, a large percentage of the monitoring area was mapped as Transitional Open Water.

The Type 1 – *Dry Upland* is comprised of plant species present prior to construction. Though occasional wetland plants may be present [e.g. foxtail barley (*Hordeum jubatum*) and Pursh seepweed (*Suaeda calceoliformis*)], the dominant vegetation species [e.g. alkali bluegrass (*Poa juncifolia*), western wheatgrass (*Agropyron smithii*), greasewood (*Sarcobatus vermiculatus*), and Nuttall's saltbush (*Atriplex gardneri*)], reflect upland conditions (**Figure 3** in **Appendix A**). The Type 2 – *Inundated Upland* also has a small percentage of wetland plants [e.g. small-flower sumpweed (*Iva axillaris*) and halberd-leaf saltbush (*Atriplex patula*)], but is dominated by upland western wheatgrass and alkali bluegrass (**Photo 5** and **14** in **Appendix C**). A large percentage of Type 2 became inundated as water levels increased between the spring and mid-season visits. (see *Section 3.1 Hydrology*).

Type 3 – *Puccinellia Wetland* occupied inundated areas with a consistent assemblage of wetland plants [e.g. Nuttall's alkali grass (*Puccinellia nuttalliana*), foxtail barley, small-flower sumpweed, and halberd-leaf saltbush] (**Photo 8** in **Appendix C**). Type 4 – *Scirpus Wetland* represented a new assemblage of plant species not observed during field visits in 2003 to 2005 (**Photos 9-10** in **Appendix C**). Type 4 – *Scirpus Wetland* occurred in two localities and comprehensively consisted of scattered stems of three-square bulrush (*Scirpus pungens*), a round-stemmed bulrush (*Scipus* spp.), and broadleaf cat-tail (*Typha latifolia*) emerging just above the water-level (**Figure 3** in **Appendix A**). Also present in Type 4, but inundated, was Pursh seepweed, foxtail barley, and Nuttall's alkali grass. In 2003 *Salicornia rubra* (pickleweed) was observed in the northwest tip of the site (near to where the present *Scirpus* had emerged), but this species was not observed in 2006. The remainder of the project site was mapped as Transitional Open Water where no plants could be observed above the water surface; however, it is anticipated that wetland vegetation will colonize this shallow water in the near future (**Figure 3** in **Appendix A**).

Three vegetation transects were set up at Alkali Lake in 2006 (**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 (**Chart 1**). The start of Transect 1 was photographed (**Photo 4** in **Appendix C**). The entire Transect 1 traversed through the Type 1 – *Puccinellia Wetland* community (**Table 2**; **Chart 1**). However, the Type 4 – *Scirpus* community entered the end of Transect 1 (**Monitoring Form** in **Appendix B**). Transect 1 consisted of open water mixed with moderately dense plant species of foxtail barley, small-flowered sumpweed, Nuttall's alkali grass, and milkvetch (*Astragalus* spp.) (**Monitoring Form** in **Appendix B**). All but the first four feet of Transect 1 was inundated.

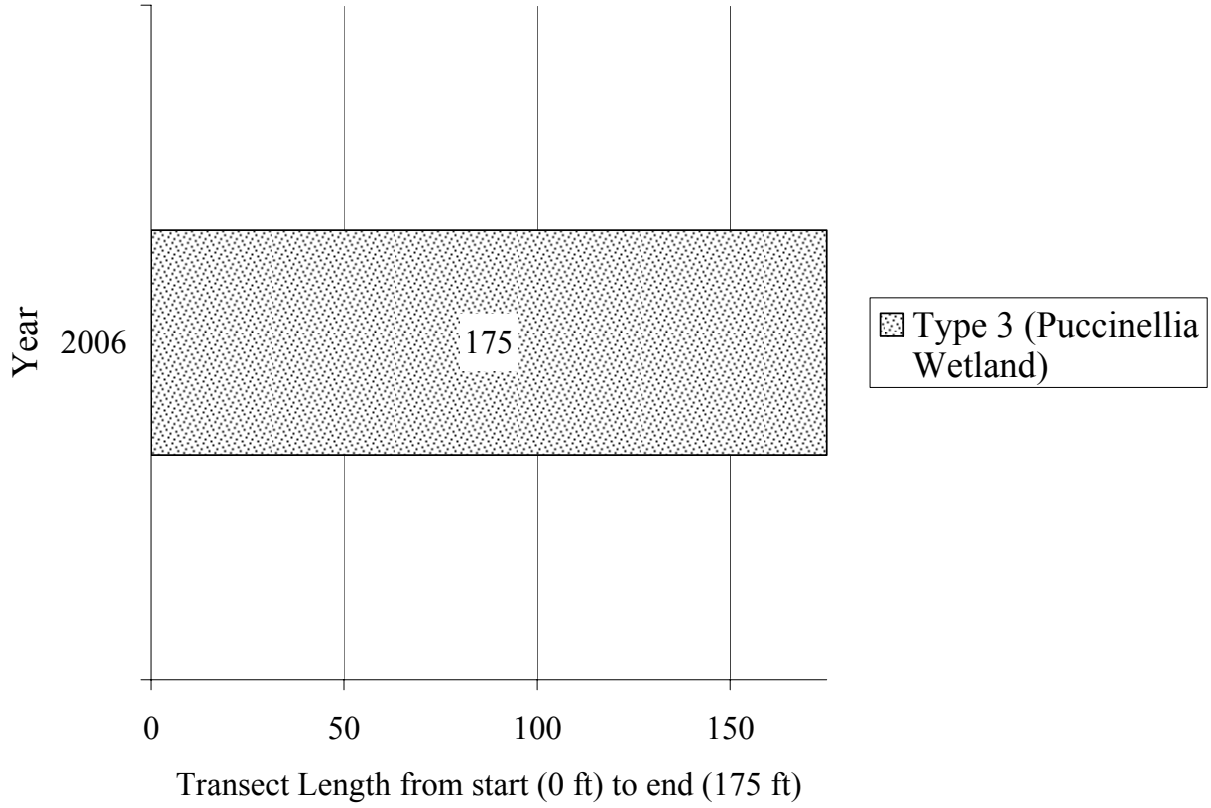
Table 2: ***2006 vegetation species list for Alkali Lake Wetland Mitigation Site.***

Scientific Name	Indicator Status[1]
Agropyron smithii	FACU
Aster falcatus	FACU
Astragalus (*bisulcatus*?)	---
Atriplex gardneri (syn. *A. nuttallii*)	---
Atriplex patula	FACW
Grindelia squarrosa	FACU
Gutierrezia sarothrae	---
Hordeum brachyantherum	FACW
Hordeum jubatum	FAC+
Iva axillaris	FAC
Lepidium (*ramossissimum*?)	---
Koeleria macrantha (syn. *K. cristata*)	---
Poa juncifolia	FACU+
Polygonum spp.	---
Puccinellia nuttalliana	OBL
Sarcobatus vermiculatus	FACU+
Scirpus spp.	OBL
Scirpus pungens (syn. *S. americanus*)	OBL
Suaeda calceoliformis (syn. *S. depressa*)	FACW-
Typha latifolia	OBL

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

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

Chart 1: ***Transect map showing the vegetation type of Transect 1 from start (0 feet) to end (175 feet) in 2006.***

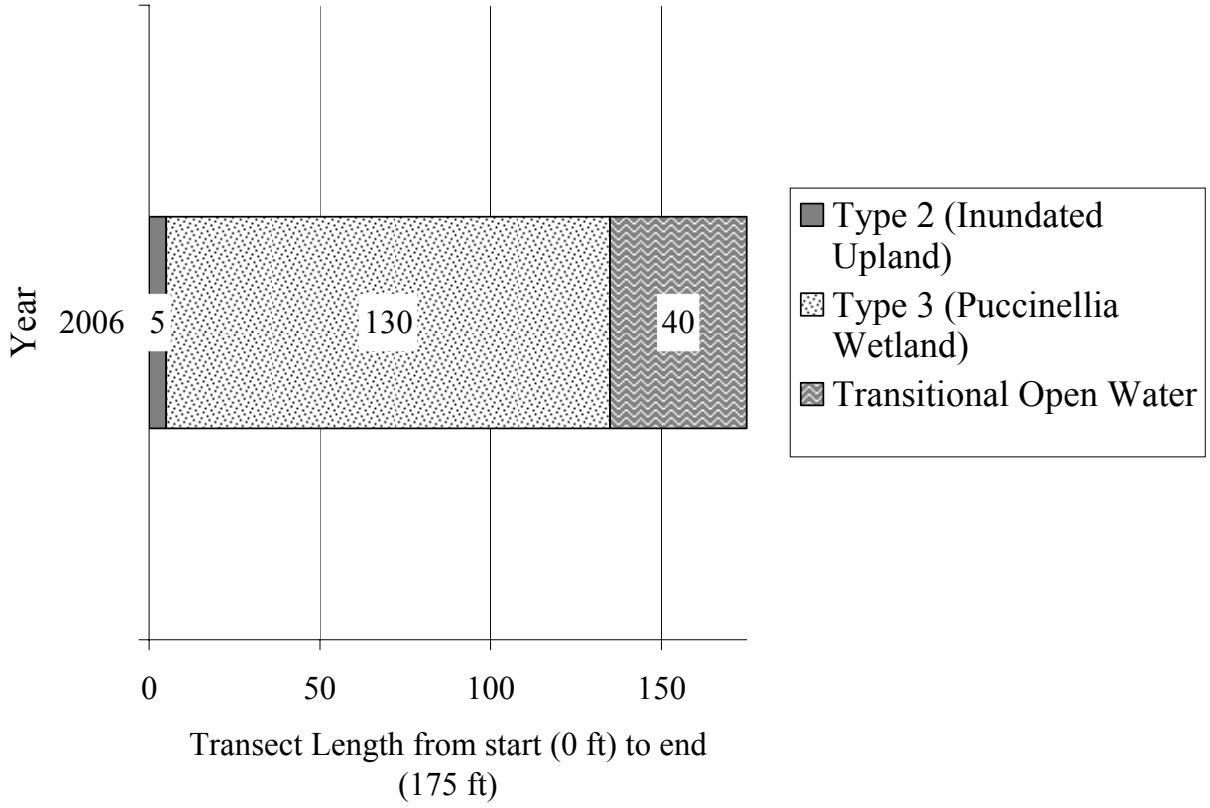


Data recorded from Transect 2 (**Monitoring Form** in **Appendix B**) were summarized in tabular format (**Table 4**) and graphically illustrated (**Chart 2**). The start and end of Transect 2 was photographed (**Photos 6-7** in **Appendix C**). Transect 2 consisted of approximately 5% Type 2 – *Dry Upland* with saturated soils, 74% Type 3 – *Puccinellia Wetland*, and 23% transitional open Water (**Photo 6-8** in **Appendix C**; **Table 4**; **Chart 2**). Prevalent species along Transect 2 included western wheatgrass, small-flower sumpweed, milkvetch, polygonum, harlberd saltbush, foxtail barley, and Nuttall's alkali grass.

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

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

Chart 2: ***Transect map showing vegetation types of Transect 2 from start (0 feet) to end (175 feet) in 2006.***

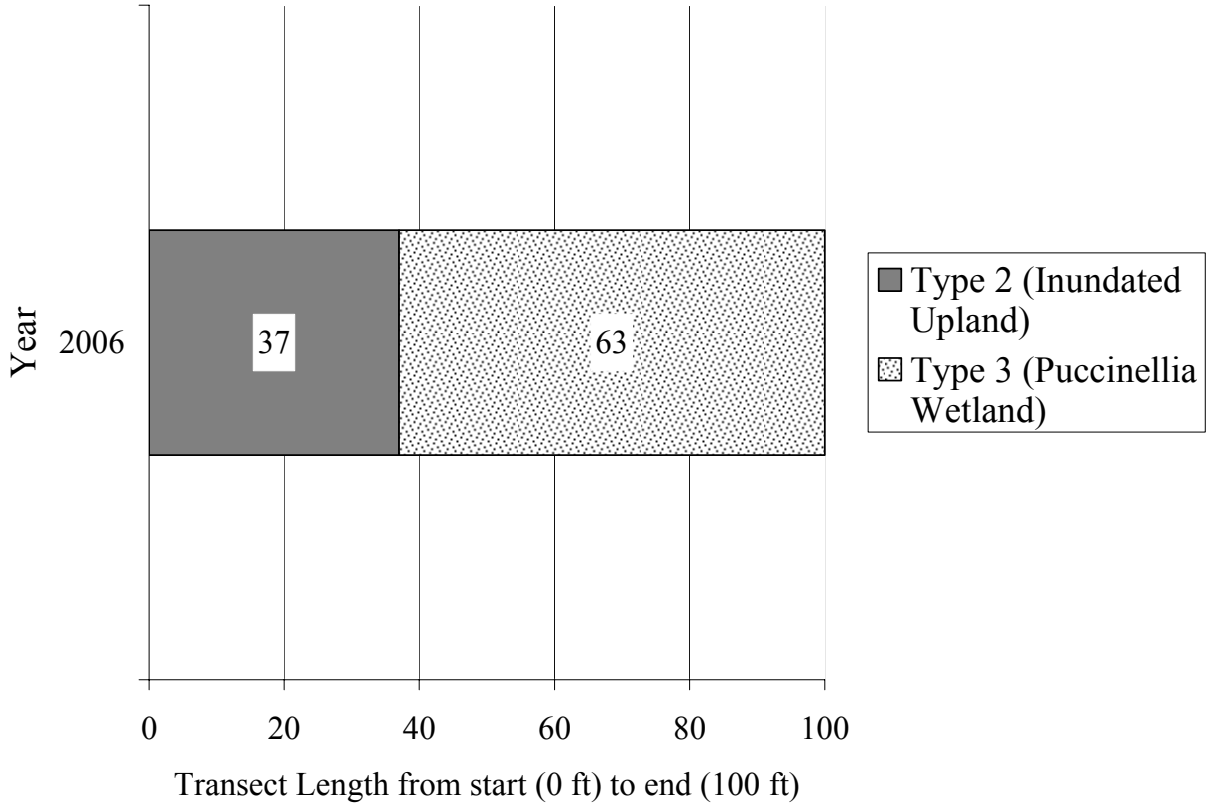


Data recorded from Transect 3 (**Monitoring Form** in **Appendix B**) were summarized in tabular format (**Table 5**) and graphically illustrated (**Chart 3**). The start and end of Transect 3 was photographed (**Photo 5** in **Appendix C**). Transect 3 was entirely inundated. However, based on vegetation, about 37% was classified as Type 2 – *Inundated Upland* with the remainder classified as Type 3- *Puccinellia Wetland* (**Photo 5** in **Appendix C**; **Table 5**; **Chart 3**). The upland portion was dominated by western wheatgrass and milkvetch while the wetland portion was dominated by meadow and foxtail barleys (**Monitoring Form** in **Appendix B**).

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

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

Chart 3: ***Transect maps showing vegetation types of Transect 3 from start (0 feet) to end (100 feet) for 2006.***



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 taken 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 2006, five soil pits were dug revealing, saturated clay soils with similar soil matrix colors ranging from 2.5Y4/2 to 10YR 4/1 (**COE Forms** in **Appendix B**). Four of the five soil pits had mottle colors of 7.5YR 4/6 or 10YR 5/8. Mottles were generally faint, but abundant (**COE Forms** in **Appendix B**).

In June 2004, baseline soil data was collected from 10 sites and analyzed for arsenic, cadmium, nickel, and selenium (**Figure 4** in **Appendix G**). Soils collected from the north and south lakes were used as a comparison for project area samples. 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.

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 2006 10 soil samples were collected at or near the 2004 collection sites and also at the project inlet channel and the inlet channel to North Alkali Lake (**Figure 4** in **Appendix G**). The full 2006 soils metals analysis is provided in **Appendix G.** Arsenic levels in 2006 for most sites were higher than the 2004 levels, but were all below those recommended for protection of aquatic life (**Tables 6** and **7**). Cadmium concentrations in 2006 were consistent with the 2004 results and were all below those recommended for protection of aquatic life (**Tables 6** and **7**). Nickel concentrations were predominately lower in the 2006 samples than in the 2004 levels and all were below those recommended for protection of aquatic life (**Tables 6** and **7**). Selenium concentrations in all but one soil sample were found to be below those recommended for protection of aquatic life (**Tables 6** and **7**). The selenium concentration within the inlet to the North Lake was found to be less than 5.0 mg/kg which may be within the range of concern according to the Canadian Interim and National Irrigation Water Quality Program guidelines (**Tables 6** and **7**). Unfortunately, due to an accidental sample corruption (broken container) during delivery to the lab, this sample had to be re-collected in August and was analyzed using higher minimum detection levels; therefore, the exact concentration is unknown. It should be noted that water from North Alkali Lake does not reach the mitigation site.

Table 7: ***2006 soil metals analysis for North Lake, South Lake, and Alkali Lake.***

SOIL SAMPLE LOCATION	SOIL SAMPLE MAP #	ARSENIC (As) mg/kg	CADMIUM (Cd) mg/kg	NICKEL (Ni) mg/kg	SELENIUM (Se) mg/kg
North Lake, Inlet	1	<5.00	<0.50	8.8	< 5.0
North Lake, VEG 2	2	3.27	<0.50	10.9	< 0.30
North Lake, VEG 2	3	5.59	<0.50	11.3	< 0.30
South Lake, VEG 3	4	5.20	<0.50	9.6	< 0.30
South Lake, VEG 4	5	5.85	<0.50	9.9	< 0.30
South Lake, VEG 5	6	7.69	<0.50	12.8	< 0.30
South Lake, VEG 6	7	8.00	<0.50	11.7	< 0.30
Alkali Lake, Inlet	8	4.50	<0.50	10.2	< 0.30
Alkali Lake, VEG 5	9	5.36	<0.50	9.5	< 0.30
Alkali Lake, VEG 6	10	6.54	<0.50	13.9	< 0.30
Alkali Lake, VEG 7	11	6.86	<0.50	14.5	< 0.30

3.4 Wetland Delineation

Prior to project implementation, wetland vegetation and hydric soils were present, but 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 in 2006 the site was inundated beyond the designed project boundary.

In 2006, inundation resulted in the restoration / emergence of two wetland communities, totaling 38.7 acres: Type 3 – *Puccinellia Wetland* and Type 4 – *Scirpus Wetland* (**Figure 3** in **Appendix A**). Additionally, the site contained 118.61 acres of transitional shallow open water, for a total of 157.31 acres of aquatic habitat. Another approximate 53.53 acres was inundated in 2006, but was dominated by upland plant species. Approximately 18.09 acres of these additional 53.53 inundated upland acres are within the estimated historic lakebed and may revert to wetlands over time. Wetland development within the shallow open water area may have been hampered by the long full inundation period as some plants require a drawdown period to germinate and grow. Many of the expected species (i.e., *Juncus balticus*, *J. torreyi*, *Suaeda calceoliformis*, and *Chenopodium glaucum*) tend to colonize saturated soils and not soil inundated for long periods. On the other hand, the inundation facilitated the removal of colonizing upland species. Please refer to **Section 3.10** for discussion regarding 2006 crediting.

3.5 Wildlife

Direct observations of all wildlife species and sign indicating their presence were recorded (**Table 8**; **Monitoring Forms** in **Appendix B**). In 2006 a white-tailed jackrabbit and several white-tailed deer were observed within and around the project site. No amphibian or reptile species were observed in 2006. Juvenile fish were observed in the inlet channel during the fall visit, but were not during the mid-season visit. A dramatic change in bird guilds was observed from 2004 to 2006. In 2004 only sparrows were observed within the lakebed. Upon filling of the site in fall 2005, a diversity of waterfowl species were observed. In 2006, 19 species of waterfowl and shorebirds were observed during monitoring (**Bird Survey Forms** in **Appendix B**). The most abundant species included American White Pelican (*Pelecanus erythrorhynchos*), Canada Goose (*Branta Canadensis*), Killdeer (*Charadrius vociferous*), Northern Pintail (*Anas acuta*), Tundra Swan (*Cygnus columbianus*), Northern Shoveler (*Anas clypeata*), and Ruddy Duck (*Oxyura jamaicensis*). In addition, several sparrows and Horned Larks (*Eremophila alpestris*) were observed in the surrounding uplands. Additional species were incidentally observed by MDT (**Table 8**).

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

FISH, AMPHIBIANS, REPTILES	
Juvenile fish (unidentified species)	
BIRDS	
American Avocet (*Recurvirostra americana*)	**Long-billed Curlew (*Numenius americanus*)**[2]
American White Pelican (*Pelecanus erythrorhynchos*)	**Mallard (*Anas platyrhynchos*)**
American Wigeon (*Anas americana*)[2]	**Marbled Godwit (*Limosa fedoa*)**
Bufflehead (*Bucephala albeola*)	**Northern Harrier (*Circus cyaneus*)**
Canada Goose (*Branta Canadensis*)	**Northern Pintail (*Anas acuta*)**
Canvasback (*Aythya valisineria*)	**Northern Shoveler (*Anas clypeata*)**
Cinnamon Teal (*Anas cyanoptera*)[2]	**Osprey (*Pandion haliaetus*)**[2]
Common Goldeneye (*Bucephala clangula*)[2]	Prairie Falcon (*Falco mexicanus*)[1]
Common Snipe (*Gallinago gallinago*)	**Ruddy Duck (*Oxyura jamaicensis*)**
Golden Eagle (*Aquila chrysaetos*)[1]	**Sanderling (*Calidris alba*)**[2]
Greater Yellowlegs (*Tringa melanoleuca*)	**Sparrow (*unidentified species*)**
Green-winged Teal (*Anas crecca*)[2]	**Swallow (*unidentified species*)**
Gull (California, *Larus californixus, or* Ring-bill, *L. delawarensis*)	**Tundra Swan (*Cygnus columbianus*)**
Gadwall (*Anas strepera*)	**Vesper Sparrow (*Pooecetes gramineus*)**
Horned Lark (*Eremophila alpestris*)	**Willet (*Catoptrophorus semipalmatus*)**
Killdeer (*Charadrius vociferous*)	**Wilson's Phalarope (*Phalaropus tricolor*)**[2]
Lesser Yellowlegs (*Tringa flavipes*)[2]	
MAMMALS	
American Badger (*Taxidea taxus*)	
Porcupine (*Erethizon dorsatum*)[2]	
White-tailed Jack Rabbit (*Lepus townsendii*)	
White-tailed Deer (*Odocoileus virginianus*)	

Bolded species were observed in 2006; [1] observed during fall 2005 post-construction inspection; [2] observed by MDT.

3.6 Macroinvertebrates

Numerous macroinvertebrates were present, though their distribution appeared patchy. Sampling occurred at two locations and samples were analyzed by Rhithron and Associates, Inc (**Figure 2** in **Appendix A**; **Appendix F**). A 2006 summary written by Rhithron and Associates is presented below:

> *Two samples were collected from Alkali Lake in 2006. Neither sample contained enough organisms to produce reliable bioassessment scores. Sample 1 contained a total of 14 animals, and Sample 2 totaled 21 animals. Poor conditions were indicated by both assemblages. Scores for these samples were 43% and 53% respectively. Limited habitats and/or poor water quality may be indicated by these findings.*

Both samples contained species that function as piercer herbivores and collector/gathers while only one sample contained species that function as macrophyte herbivores, shredders, or scrapers. 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. It is expected that the diversity and number of aquatic macroinvertebrates would increase yearly as wetland plants establish and bird use increases. Detailed reports of these samples are found in **Appendix F**.

3.7 Functional Assessment

A functional assessment was completed for the entire Alkali Lake Site as wetland was developing during 2006 (**Functional Assessment Form** in **Appendix B**). In 2006, the Alkali Lake Wetland Mitigation Site rated as a Category II wetland because of its high wildlife habitat rating (**Table 9**). The site also rated high or moderate for the following functions or values: MTNHP Species Habitat; Short and Long Term Surface Water Storage; Sediment, Nutrient, Toxicant Removal; Production Export/Food Chain Support; Uniqueness; and Recreation/Education Potential (**Table 9**).

Table 9: ***Summary of 2006 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
Listed/Proposed T&E Species Habitat	Low (0.3)
MTNHP Species Habitat	Mod (0.6)
General Wildlife Habitat	High (0.9)
General Fish/Aquatic Habitat	N/A
Flood Attenuation	N/A
Short and Long Term Surface Water Storage	High (0.9)
Sediment, Nutrient, Toxicant Removal	Mod (0.7)
Sediment/Shoreline Stabilization	Low (0.2)
Production Export/Food Chain Support	Mod (0.6)
Groundwater Discharge/Recharge	Low (0.1)
Uniqueness	Mod (0.5)
Recreation/Education Potential	Mod (0.7)
Actual Points/Possible Points	5.5 / 10
% of Possible Score Achieved	55%
Overall Category	II
Total Acreage of Assessed Wetlands and Other Aquatic Habitats within Site Boundaries (ac)	**157.31**
Functional Units (acreage x actual points)	**865.2**

3.8 Photographs

The 2006 aerial photograph taken on July 7th was used for **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 each of three photo points (**Appendix C**).

3.9 Maintenance Needs / Recommendations

The excavated inlet channel was in good condition during the mid-season and fall visits. Though inundation limits crossed the fence in many locations (**Figure 2** in **Appendix A**), the fence remained in functioning condition. Water flooded a portion of the protected cultural resource area. Water flowed through a dip in the berm/road that occurs along the west project boundary, and flooded the property (south Alkali Lake) west of the site (**Photo 12** in **Appendix C**). This area will be examined in future monitoring years and recommendations may ultimately be made to raise the berm in this confined location. The dip is narrow and shallow, and may not affect water retention in the site under normal fill conditions.

3.10 Current Credit Summary

In 2006, 38.7 acres of emergent wetlands were delineated at the site. These areas satisfied soils, hydrology, and vegetation performance standards listed in **Section 1.0**. Additionally, the site contained 118.61 acres of transitional shallow open water, for a total of 157.31 acres of aquatic habitat. The upland buffer also satisfied applicable performance standards as listed in **Section 1.0**. The 2006 credits at the site, applying Tribal and COE credit ratios, are presented in **Table 10**. It is anticipated that wetlands will continue to develop over time.

Table 10: ***2006 Tribal and Corps of Engineers credits at the Alkali Lake Wetland Mitigation Site.***

Proposed Feature	2006 Delineated Acres	Tribal Credit Ratio and 2006 Calculated Credit	Tribal Credit Target	Corps Credit Ratio and 2006 Calculated Credit	Corps Credit Target
Primary emergent wetland restoration	38.7	1:2.5 credit ratio 15.48 credit acres	29.77 credit acres	1:1 credit ratio 38.7 credit acres	74.42 credit acres
Shallow open water restoration	118.61	1:2.5 credit ratio 47.44 credit acres	40.56 credit acres	1:1 credit ratio (to a max. matching wetland acres) 38.7 credit acres	74.42 credit acres
100-ft-wide upland buffer	45.12	1:4 credit ratio 11.28 credit acres	1:4 credit ratio 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	157.31 (aquatic only)	**74.2 credit acres**	81.61 credit acres	**83.04 credit acres**	154.48 credit acres

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.

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.

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

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

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

Steinle, A. 2006. February 1, 2006 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. U.S. Army Corps of Engineers, Helena Regulatory Office, Helena, Montana.

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

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

Western Regional Climate Center (WRCC). 2006. Precipitation data for the Valier Weather Station, Montana (248501). Obtained on December 4th from http://www.wrcc.dri.edu/CLIMATEDATA.html

Appendix A

FIGURES 2 & 3

MDT Wetland Mitigation Monitoring
Alkali Lake
Pondera County, Montana

Figure 2 - 2006 Monitoring Activity Locations

LEGEND

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

Base Photograph Date: July 7, 2006

N
W
E
S

Monitoring Limits

T2 start
Soil Pit3
T2 end

PP2

MS-2

Fence

Soil Pit5
T3 end
T3 start

PP3

Monitoring Limits

Soil Pit2
T1 end
MS-1
Soil Pit1
Soil Pit4
T1 start
Inlet
PP1

PROJECT NAME
MDT Alkali Lake Wetland Mitigation

DRAWING TITLE
2006 Monitoring Activity Locations

DRAWN: LLL
PROJ MGR: A.Pipp
CHECKED: APPVD:
SCALE: 1" = 250'
FILE NAME: L:\B43054.0308Alkali\dwg\Alkali2006.dwg

PROJ NO: B43054.0308
LOCATION: Conrad, MT

PBSJ
1120 Cedar
Missoula, MT 59802

FIGURE
2 OF 3
REV -
Dec/14/2006

Figure 3 - 2006 Mapped Site Features

LEGEND
- Monitoring Area Limits and Fence
- Transitional Open Water
- Vegetation Community Boundary
- Base Photograph Date: July 7, 2006

N
W E
S

Net Wetland Area	38.70 acres
Transitional Open Water	118.61 acres

Monitoring Limits

Transitional Open Water

Fence

Monitoring Limits

Vegetation Community Types
1. Dry Upland
2. Inundated Upland
3. Puccinellia Wetland
4. Scirpus Wetland

PROJECT NAME
MDT Alkali Lake Wetland Mitigation
DRAWING TITLE
2006 Monitoring Activity Locations

DRAWN: LLL
PROJ MGR: A.Pipp
CHECKED: APPVD:
SCALE: 1" = 250'
PROJ NO: B43054.0308
LOCATION: Conrad, MT
FILE NAME: L:\B43054.0308\Alkali\dwg\Alkali2006.dwg

PBSJ
1120 Cedar
Missoula, MT 59802

FIGURE
3 OF 3
REV -
Dec/14/2006

Appendix B

2006 WETLAND MITIGATION SITE MONITORING FORM
2006 BIRD SURVEY FORM
2006 COE WETLAND DELINEATION FORMS
2006 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: **B43054.00-0308**
Assessment Date: **August 22-23, 2006** Person(s) conducting the assessment: **A. Pipp**
Location: **14 miles NW of Valier** MDT District: **Great Falls** Milepost: ____
Legal Description: T **31N** R **6W** Section **31 T 30N R 6W** Section **6**
Weather Conditions: **Sunny, Calm, Mild** Time of Day: **9:00-5:00**
Initial Evaluation Date: **August 22, 2006** Monitoring Year: **2006** # 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: **3 feet** Range of Depths: **0-3+**
Percent of assessment area under inundation: **100%**
Depth at emergent vegetation-open water boundary: **1.0 feet**
If assessment area is not inundated then are the soils saturated within 12 inches of surface: _
Other evidence of hydrology on the site (ex. – drift lines, erosion, stained vegetation, etc.):

____

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 site was full and still filling with water during the August 21st and 22nd field visits. The site was inundated beyond the fenceline in many places and breached the road on the west side. Water was not turned off until sometime in September. In October, water had slightly receded.

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

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

Comments / Problems: _____

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

Dominant Species	% Cover	Dominant Species	% Cover
Agropyron smithii	1 = 1-5%	Astragalus (biculcatus)	1 = 1-5%
Puccinellia nuttalliana	4 = 21-50%	Polygonum spp.	1 = 1-5%
Hordeum jubatum	4 = 21-50%	Atriplex patula	2 = 6-10%
Astragalus (bisulcatus)	2 = 6-10%	Hordeum brachyantherum	+ = < 1%
Iva axillaris	2 = 6-10%		
Suaeda calceoliformis	+ = < 1%		

Comments / Problems: _____

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

Dominant Species	% Cover	Dominant Species	% Cover
Scirpus pungens	2 = 6-10%		
Scirpus spp. (round-stem)	1 = 1-5%		
Typha latifolia	+ = < 1%		
Puccinellia nuttalliana	2 = 6-10%		
Hordeum jubatum	2 = 6-10%		

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		
Hordeum jubatum	1-4		
Hordeum brachyantherum	3		
Koeleria macrantha	1		
Poa juncifolia	1, 2		
Puccinellia nuttalliana	1-4		
Scirpus spp. (round-stem)	4		
Scirpus pungens	4		
Typha latifolia	4		
Astragalus bisulcatus	1-3		
Atriplex nuttallii	1		
Atriplex patula	1-3		
Grindelia squarrosa	1		
Gutierrezia sarothrae	1		
Iva axillaris	1-4		
Lepidium (ramosissimum)	1-3		
Polygonum spp.	1-3		
Sarcobatus vermiculatus	1		
Suaeda calceoliformis (S. depressa)	1-3		

Comments / Problems: _____

PLANTED WOODY VEGETATION SURVIVAL

Plant Species	Number Originally Planted	Number Observed	Mortality Causes

Comments / Problems: **Seeded species were: Eleocharis palustris, Juncus balticus, Juncus torreyi, Puccinellia nuttalliana, Scirpus acutus, Scirpus americanus, 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		☐	☐	☒	
White-tailed Jack Rabbit	1	☐	☐	☐	
White-tailed Deer	4	☒	☐	☐	4 were outside site; tracks in site.
		☐	☐	☐	
		☐	☐	☐	
		☐	☐	☐	
		☐	☐	☐	
		☐	☐	☐	

Additional Activities Checklist:
Yes Macroinvertebrate Sampling (if required)

Comments / Problems: August: Numerous aquatic insects were found in the water along the western end and dragonflies were present. October: Numerous aquatic insects and at least 30 juvenile fish were found swimming in the inlet channel.

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 (°)

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: **The wetland-upland boundary was difficult to discern as the line of saturated soil was moving during the site visits.**

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? **NA**
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? **NA**
If yes, are the structures working properly and in good working order? **NA**
If no, describe the problems below.

Comments / Problems: _____

MDT WETLAND MONITORING – VEGETATION TRANSECT

Site: **Alkali Lake** Date: **August 21, 2006** Examiner: **A. Pipp**
Transect Number: **T-1** Approximate Transect Length: **175 feet** Compass Direction from Start: **311˚** Note: **Compass at 0 declination.**

Vegetation Type A: **Type 3 - Puccinellia Wetland**	
Length of transect in this type: 0 - 4 feet	
Plant Species	**Cover**
Hordeum jubatum	3 = 11-20%
Iva axillaris	2 = 6-10%
Astragalus (bisulcatus?)	1 = 1-5%
Saturated soil; no surface water.	
Total Vegetative Cover:	30%

Vegetation Type B: **Type 3 - Puccinellia Wetland**	
Length of transect in this type: 4 - 175 feet	
Plant Species	**Cover**
Hordeum jubatum	5 = > 50%
Puccinellia nuttalliana	2 = 6-10%
Iva axillaris	+ = < 1%
Astragalus (bisulcatus?)	+ = < 1%
Scirpus spp. (round-stem) - few extended into the end of T-1.	+ = < 1%
Open Water (30%)	
Total Vegetative Cover:	70%

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

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

MDT WETLAND MONITORING – VEGETATION TRANSECT

Site: **Alkali Lake** Date: **August 21, 2006** Examiner: **A. Pipp**
Transect Number: **T-2** Approximate Transect Length: **175 feet** Compass Direction from Start: **136˚** Note: **Compass at 0 declination.**

Vegetation Type E: **Type 1 - Dry Upland**	
Length of transect in this type: 0 - 5 feet	
Plant Species	**Cover**
Agropyron smithii	3 = 11-20%
Astragalus (bisulcatus?)	2 = 6-10%
Iva axillaris	4 = 21-50%
Polygonum spp.	3 = 11-20%
Atriplex patula	2 = 6-10%
Lepidium (ramosissimum?)	1 = 1-5%
Saturated soil; no surface water.	
Total Vegetative Cover:	70%

Vegetation Type F: **Type 3 - Puccinellia Wetland**	
Length of transect in this type: 5 - 175 feet	
Plant Species	**Cover**
Agropyron smithii	3 = 11-20%
Astragalus (bisulcatus?)	2 = 6-10%
Iva axillaris	4 = 21-50%
Polygonum spp.	3 = 11-20%
Atriplex patula	2 = 6-10%
Lepidium (ramosissimum?)	1 = 1-5%
Hordeum jubatum	4 = 21-50%
Puccinellia nuttalliana	3 = 11-20%
Open Water (30%)	
Total Vegetative Cover:	70%

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 22, 2006** Examiner: **A. Pipp**
Transect Number: **T-3** Approximate Transect Length: **100 feet** Compass Direction from Start: **46˚** Note: **Compass at 0 declination**

Vegetation Type I: **Type 2 - Inundated Upland**	
Length of transect in this type: 0 - 37 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 spp.	1 = 1-5%
Puccinellia nuttalliana	+ = < 1%
Hordeum jubatum	1 = 1-5%
Open Water (40%)	
Total Vegetative Cover:	60%

Vegetation Type J: **Type 3 - Puccinellia Wetland**	
Length of transect in this type: 37 - 100 feet	
Plant Species	**Cover**
Hordeum brachyantherum	3 = 11-20%
Hordeum jubatum	3 = 11-20%
Iva axillaris	2 = 6-10%
Polygonum spp.	1 = 1-5%
Puccinellia nuttalliana	+ = < 1%
Open Water (50%)	
Total Vegetative Cover:	50%

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

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

MDT WETLAND MONITORING – VEGETATION TRANSECT

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

Percent of perimeter developing wetland vegetation (excluding dam/berm structures): **75%**

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: _____

BIRD SURVEY – FIELD DATA SHEET

Site: **Alkali Lake** Date: **5/24/06**
Survey Time: **11:30 am** to **1:30 pm**

Bird Species	#	Behavior	Habitat	Bird Species	#	Behavior	Habitat
American White Pelican	12	FO	MA				
American Avocet	4	FO N	MA MF				
Canada Goose	29	F L	MA OW				
Gadwall	6	F L	MA OW				
Gull spp. (CA/Ring-bill	9	F FO	MA OW				
Horned Lark	22	F FO	MA UP				
Killdeer	50+	F	MA MF				
Mallard	6	F	MA				
Marbled Godwit	9	F FO	MA MF				
Northern Harrier	1	F	UP				
Northern Pintail	24	F L	OW				
Northern Shoveller	4	F	MA				
Vesper Sparrow	2	F	UP				
Willett	8	F	MA MF				
On August 22, 2006 saw:							
Greater Yellowlegs (immature)	2	FO	MA MF				

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: **80% Sunny; Gusty Winds; No precipitation; Temperatures in the 70's.**

Notes: **The lakebed was 75-80% full with no water flowing into site. Water had receded leaving an inner ring of saturated soil and an outer ring of dry surface soil with 3 inch deep cracks. T-1 was inundated by 2 inches of water at its end point.**

BIRD SURVEY – FIELD DATA SHEET

Site: **Alkali** Date: **10/23/06**
Survey Time: **1:00 pm** to **3:12 pm**

Bird Species	#	Behavior	Habitat	Bird Species	#	Behavior	Habitat
Buffleheads	6	F	OW				
Canada Goose	1	L	MA OW				
Canvasback	10	F	OW				
Common Snipe	1	L	UP				
Gadwall	5	F	OW				
Horned Lark	3	F	UP				
Killdeer	1	L	UP				
Mallard	1	FO	OW				
Northern Pintail	5	F L	OW				
Northern Shoveler	15	F L	OW				
Ruddy Ducks	25	F	OW				
Sparrow (unidentified)	6	F	UP				
Swallow (unidentified)	15	FO F	UP MA OW				
Tundra Swan	25	FO F	MA OW				
Ducks (unidentified)	13	F L	OW				

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

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

Weather: **Sunny with some clouds; 56 degrees; Calm breeze; No precipitation; A Beautiful Day!!**

Notes: **Saw at least 30 juvenile fish in the inlet channel, which were not observed in the August visit.**

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

Project/Site: Alkali Lake - 2006 Project No:
Applicant/Owner: Montana Department of Transportation
Investigators: Andrea Popp
Date: 21-Aug-2006
County: Pondera
State: Montana
Plot ID: Soil Pit 1

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

Community ID: Emergent
Transect ID:
Field Location:
At 5 feet from Start on T-1.

VEGETATION (USFWS Region No. 9)

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

Percent of Dominant Species that are OBL, FACW or FAC: (excluding FAC-) 2/3 = 66.67%
FAC Neutral: 1/2 = 50.00%
Numeric Index: 8/3 = 2.67

Remarks:

HYDROLOGY

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

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

Wetland Hydrology Indicators
Primary Indicators
YES Inundated
YES Saturated in Upper 12 Inches
NO Water Marks
NO Drift Lines
NO Sediment Deposits
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:

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

Project/Site: Alkali Lake - 2006 Project No:
Applicant/Owner: Montana Department of Transportation
Investigators: Andrea Popp
Date: 21-Aug-2006
County: Pondera
State: Montana
Plot ID: Soil Pit 1

SOILS

Map Unit Name (Series and Phase): Alkali Lake not mapped as a soil unit
Map Symbol: unk Drainage Class: Unknown
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	A/B	2.5Y4/2	7.5YR4/6	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:
Mottles were also very fine and faint and difficult to accurately color.

WETLAND DETERMINATION

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

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

Remarks:

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

Project/Site: Alkali Lake - 2006	Project No:	Date: 21-Aug-2006
Applicant/Owner: -Montana Department of Transportation-		County: Pondera
Investigators: Andrea Pipp		State: Montana
		Plot ID: Soil Pit 2

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

VEGETATION (USFWS Region No. 9)

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

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

FAC Neutral: 3/3 = 100.00%

Numeric Index: 7/4 = 1.75

Remarks:
Typha latifolia and another Scirpus species may also be present, but are just emerging within the water.

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: = 12 (in.)
- Depth to Free Water in Pit: N/A (in.)
- Depth to Saturated Soil: N/A (in.)

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

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

Remarks:

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

Project/Site: Alkali Lake - 2006	Project No:	Date: 21-Aug-2006
Applicant/Owner: -Montana Department of Transportation-		County: Pondera
Investigators: Andrea Pipp		State: Montana
		Plot ID: Soil Pit 2

SOILS

Map Unit Name (Series and Phase): Alkali Lake-not mapped as a soil unit
Map Symbol: unk. Drainage Class: unknown
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
0-10	A	2.5Y5/1	7.5YR4/6	Few 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:

WetFarm™

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

Project/Site: Alkali Lake - 2006 **Project No:** **Date:** 21-Aug-2006
Applicant/Owner: -Montana Department of Transportation- **County:** Pondera
Investigators: Andrea Pipp **State:** Montana
Plot ID: Soil Pit 3

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

Community ID: Emergent
Transect ID:
Field Location:
On Transect 2.

VEGETATION (USFWS Region No. 9)

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

Percent of Dominant Species that are OBL, FACW or FAC: (excluding FAC-) 4/4 = 100.00%
FAC Neutral: 2/2 = 100.00%
Numeric Index: 10/4 = 2.50

Remarks:
Also found Astragalus bisulcatus, Polygonum Unknown 2, and probably Lepidum ramosissimum Unknown 3.

HYDROLOGY

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

Field Observations
Depth of Surface Water: = 2.0 *(in.)*
Depth to Free Water in Pit: N/A *(in.)*
Depth to Saturated Soil: N/A *(in.)*

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

Remarks:
Soils from 0-9 were saturated while the soils from 9-12 were drier. The entire site is filling up with water and so the perimeter areas have not been saturated for as long as has the middle of the site.

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

Project/Site: Alkali Lake - 2006 **Project No:** **Date:** 21-Aug-2006
Applicant/Owner: -Montana Department of Transportation- **County:** Pondera
Investigators: Andrea Pipp **State:** Montana
Plot ID: Soil Pit 3

SOILS

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

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle Abundance/Contrast		Texture, Concretions, Structure, etc
0-9	A	2.5Y5/1	N/A	N/A	N/A	Clay
9-12	B	10YR4/1	N/A	N/A	N/A	Clay

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

Remarks:

WETLAND DETERMINATION

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

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

Remarks:

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

Project/Site: Alkali Lake - 2006	**Project No:**	**Date:** 22-Aug-2006
Applicant/Owner: -Montana Department of Transportation-		**County:** Pondera
Investigators: Andrea Pipp		**State:** Montana
		Plot ID: Soil Pit 4

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

VEGETATION (USFWS Region No. 9)

Dominant Plant Species(Latin/Common)	Stratum	Indicator	Plant Species(Latin/Common)	Stratum	Indicator
Suaeda depressa	Herb	FACW-	*Iva axillaris*	Herb	FAC
Seepweed,Pursh			Sumpweed,Small-Flower		

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

FAC Neutral: 1/1 = 100.00%

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

Wetland Hydrology Indicators

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

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

Remarks:

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

Project/Site: Alkali Lake - 2006	**Project No:**	**Date:** 22-Aug-2006
Applicant/Owner: -Montana Department of Transportation-		**County:** Pondera
Investigators: Andrea Pipp		**State:** Montana
		Plot ID: Soil Pit 4

SOILS

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

Map Symbol: unk. **Drainage Class:** unknown

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
0-11	A	2.5Y5/2	10YR5/8	Common	Faint	Clay

Hydric Soil Indicators:

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

Remarks:

WETLAND DETERMINATION

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

Remarks:

Along inlet channel there is a 1-foot wide fringe of wetland on each side.

WetFormTM

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

Project/Site: Alkali Lake - 2006	Project No:	Date: 22-Aug-2006
Applicant/Owner: -Montana Department of Transportation-		County: Pondera
Investigators: Andrea Pipp		State: Montana
		Plot ID: Soil Pit 5

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

VEGETATION (USFWS Region No. 9)

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

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

FAC Neutral: 2/3 = 66.67%
Numeric Index: 13/5 = 2.60

Remarks:
Also present was Polygonum Unknown 2

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:	= 12.0 (in.)
Depth to Free Water in Pit:	N/A (in.)
Depth to Saturated Soil:	N/A (in.)

Wetland Hydrology Indicators

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

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

Remarks:

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

Project/Site: Alkali Lake - 2006	Project No:	Date: 22-Aug-2006
Applicant/Owner: -Montana Department of Transportation-		County: Pondera
Investigators: Andrea Pipp		State: Montana
		Plot ID: Soil Pit 5

SOILS

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

Profile Description

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle Abundance/Contrast		Texture, Concretions, Structure, etc
0-10+	A	2.5Y4/2	10YR5/8	Few	Faint	Clay

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

Remarks:

WETLAND DETERMINATION

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

Remarks:

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: 8/21/2006 **4. Evaluator(s):** A. Pipp **5. Wetland / Site #(s):** All Wetlands

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 10 miles northwest of Valier, Montana.

7. A. Evaluating Agency MDT

8. Wetland Size (total acres): _____ (visually estimated)
38.7 (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)
157.31 (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	20
Depression	Lacustrine	Littoral	Unconsolidated Bottom	Seasonally Flooded	Excavated/Impounded	80
---	---	---	---	---	---	
---	---	---	---	---	---	

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

Comments: The remainder of the analysis area is inundated upland with herbaceous vegetation.

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 noted.

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 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	_____
Incidental habitat **(list species)**	☐ D	☒ S	Piping Plover
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	---	---	---	---	---	.3 (L)	---

If documented, list the source (e.g., observations, records, etc.)**:** Piping plovers were documented to nest 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.

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)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	H	--	--
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	--	.9 (H)	--	--
Moderate	--	--	--	--
Low	--	--	--	--

Comments: Numerous waterfowl species were observed in Fall 2005, Spring 2006, and Fall 2006. 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. 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 %	--	.2 (L)	--

Comments: _____

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	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
S/I	--	--	--	--	--	.6M	--	--	--	--	--	--	--	--	--	--	--	--
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	low	0.30	1	
B. MT Natural Heritage Program Species Habitat	moderate	0.60	1	
C. General Wildlife Habitat	high	0.90	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	0.20	1	
I. Production Export/Food Chain Support	moderate	0.60	1	
J. Groundwater Discharge/Recharge	low	0.10	1	
K. Uniqueness	moderate	0.50	1	
L. Recreation/Education Potential	moderate	0.70	1	
	Total:	**5.50**	**10.00**	____
	Percent of Total Possible Points:		**55%** (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

2006 REPRESENTATIVE PHOTOGRAPHS

MDT Wetland Mitigation Monitoring
Alkali Lake
Pondera County, Montana

2006 ALKALI LAKE WETLAND MITIGATION SITE

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

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

Photo 3: Photo Point 3 taken from the west side of Alkali Lake. View is northeast.

Photo 4: Start of Transect 1. View is north in Type 3-Wetland.

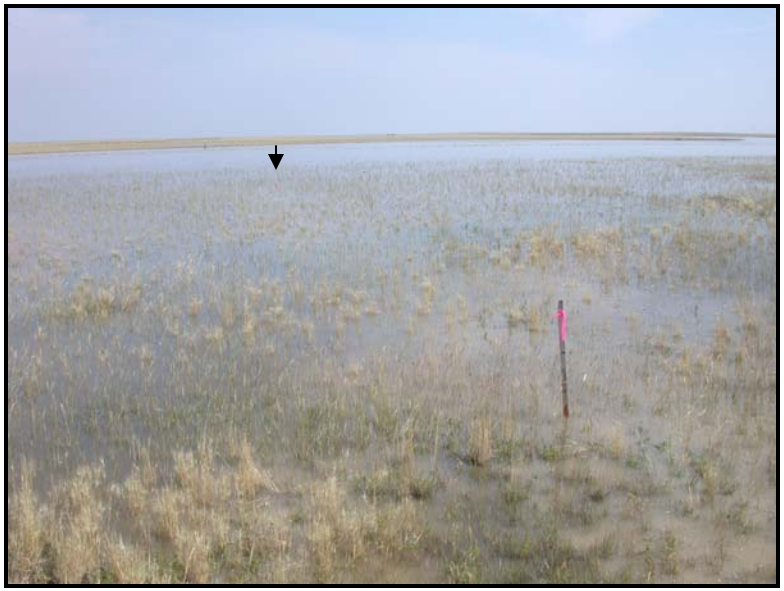


Photo 5: Start and End (arrow) of Transect 3. View is east of Type 2-Upland, Type 3-Wetland, and Transitional Open Water.

Photo 6: Start of Transect 2. View is south. Note surface water near stake.

Photo 7: Stick marks end of Transect 2. View is south of Type 2–Wetland.

Photo 8: Type 2–Wetland on T-2. Foxtail barley, saltbush, & sumpweed.

Photo 9: Type 4 – *Scirpus Wetland*. View is north. Note greenish color in vegetation.

Photo 10: Close-up of Type 4 – *Scirpus* plants.

Photo 11: Type 2 – Wetland shoreline. View is southwest.

Photo 12: Inundated road along the west perimeter View is north.

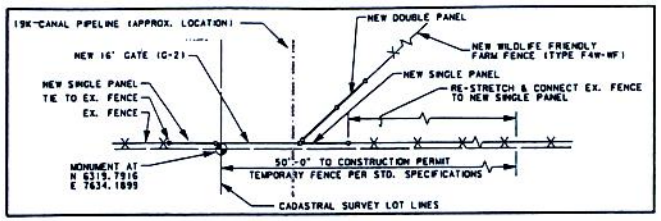
Photo 13: Expanding water at the inlet channel. View is north.

Photo 14: Expanding water beyond fence. View is west.

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.

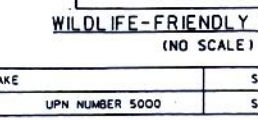
GATE COORDINATES ARE APPROXIMATE. SET GATES AND FENCING WITHIN THE LEGAL BOUNDARIES AS DISCUSSED ABOVE AND IN ACCORDANCE WITH GATE AND FARM FENCE STANDARD DETAILED DRAWINGS.

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

The following is an outline of the MDT Wetland Mitigation Site Monitoring Bird Survey Protocol. Though each site is vastly different, the bird survey data collection methods must be standardized to a certain degree to increase repeatability. An Area Search within a restricted time frame will be used to collect the following data: a bird species list, density, behavior, and habitat-type use. There will be some decisions that team members must make to fit the protocol to their particular site. Each of the following sections and the desired result describes the protocol established to reflect bird species use over time.

Species Use within the Mitigation Wetland: Survey Method

Result: To conduct a bird survey of the wetland mitigation site within a restricted period of time and the budget allotment.

Sites that can be circumambulated or walked throughout.

These types of sites will include ponds, enhanced historic river channels, wet meadows, and any area that can be surveyed from the entirety of its perimeter or walked throughout. If the wetland is not uncomfortably inundated, conduct several "meandering" transects through the site in an orderly fashion (record the number and approximate location/direction of the transects in the field notebook; they do not have to be formalized or staked). If a very small portion of the site cannot be crossed due to inundation, this method will also apply. Though the sizes of the site vary, each site will require surveying to the fullest extent possible within a set time limit. The optimum times to conduct the survey are in the morning hours. Conduct the survey from sunrise to no later than 11:00 AM. (Note: some sites may have to be surveyed in the late afternoon or evening due to time constraints or weather; if this is the case, record the time of day and include this information in your report discussion.) If the survey is completed before 11:00 AM and no additions are being made to the list, then the task is complete. The overall limiting factor regarding the number of hours that are spent conducting this survey is the number of budgeted hours; this determination must be made by site by each individual.

In many cases, binoculars will be the only instrument that is needed to identify and count the birds using the wetland. If the wetland includes deep water habitat that can not be assessed with binoculars, then a scope and tripod are necessary. If this is the case, establish as many lookout posts as necessary from key vantage points to collect the data. Depending on the size of the open water, more time may be spent viewing the mitigation area from these vantage points than is spent walking the peripheries of more shallow-water wetlands.

Sites that cannot be circumambulated.

These types of sites will include large-bodied waters, such as reservoirs, particularly those with deep water habitat (>6 ft) close to the shore and no wetland development in that area of the shoreline. If one area of the reservoir was graded in such a way to create or enhance the development of a wetland, then that will be the area in which the ambulatory bird survey is conducted. The team member must then determine the length of the shoreline that will be surveyed during each visit.

As stated above in the ambulatory site section, these large sites most likely will have to be surveyed from established vantage points.

Species Use within the Mitigation Wetland: Data Recording

Result: A complete list of bird species using the site, an estimate of bird densities and associated behaviors, and identification of habitat use.

1. Bird Species List

Record the bird species on the Bird Survey - Field Data Sheet using the appropriate 4-letter code of the common name. The coding uses the first two letters of the first two words of the birds' common name or if one name, the first four (4) letters. For example, mourning dove is coded MODO and mallard is MALL. If an unknown individual is observed, use the following protocol and define your abbreviation at the bottom of the field data sheet: unknown shorebird: UNSB; unknown brown bird (UNBR); unknown warbler (UNWA); unknown waterfowl (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 parentheses; do not fill in the habitat column. For example, a flock of black, medium-sized birds could be coded: UNBB / FO (25). You may also note on the data sheet if that particular individual is using a constructed nest box.

2. Bird Density

In the office, sum the Bird Survey – Field Data Sheet data by species and by behavior. Record this data in the Bird Summary Table.

3. Bird Behavior

Bird behavior must be identified by what is known. When a species is simply observed, the behavior that it is immediately exhibiting is what is recorded. Only behaviors that have discreet descriptive terms should be used. The following terms are recommended: breeding pair individual (BP); foraging (F); flyover (FO); loafing (L; e.g. sleeping, roosting, floating with head tucked under wing are loafing behaviors); and, nesting (N). If more behaviors are observed that do have a specific descriptive word, use them and we will add it to the protocol; descriptive words or phrases such as "migrating" or "living on site" are unknown behaviors.

4. Bird Species Habitat Use

We are interested in what bird species are using which particular habitat within the mitigation wetlands. This data is easily collected by simply recording what habitat the species was initially observed. Use the following broad category habitat classifications: aquatic bed (AB - rooted floating, floating-leaved, or submergent vegetation); forested (FO); marsh (MA – cattail, bulrush, emergent vegetation, etc. with surface water); open water (OW – primarily unvegetated); scrub-shrub (SS); and upland buffer (UP); wet meadow (WM – sedges, rushes, grasses with little to no surface water). If other categories are observed onsite that are not suggested here, we will make a new category next year.

GPS Mapping and Aerial Photo Referencing Procedure

The wetland boundaries, photograph location points and sampling locations were field located with mapping grade Trimble Geo III GPS units. The data was collected with a minimum of three positions per feature using Course/Acquisition code. The collected data was then transferred to a PC and differentially corrected to the nearest operating Community Base Station. The corrected data was then exported to ACAD drawings in Montana State Plain Coordinates NAD 83 international feet.

The GPS positions collected and processed had a 68% accuracy of 7 feet except in isolated areas of Tasks .008 and .011, where it went to 12 feet. This is within the 1 to 5 meter range listed as the expected accuracy of the mapping grade Trimble GPS.

Aerial reference points were used to position the aerial photographs. This positioning did not remove the distortion inherent in all photos; this imagery is to be used as a visual aide only. The located wetland boundaries were given a final review by the wetland biologist and adjustments were made if necessary.

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

2006 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. Wildco is a good source of these.
- Spare net.
- 1-liter plastic sample jars, wide-mouth. VWR has these: catalog #36319-707.
- 95% ethanol: Northwest Scientific in Billings carries this.

All these other things are generally available at hardware or sporting goods stores. Make the labels on an ink jet printer preferably.

- hip waders.
- pre-printed sample labels (printed on Rite-in-the-Rain or other coated paper, two labels per sample).
- pencil.
- plastic pail (3 or 5 gallon).
- large tea strainer or framed screen.
- towel.
- tape for affixing label to jar.
- cooler with ice for sample storage.

Site Selection

Select the sampling site with these considerations in mind:

- Select a site accessible with hip waders. If substrates are too soft, lay a wide board down to walk on.
- Determine a location that is representative of the overall condition of the wetland.

Sampling

Wetland invertebrates inhabit the substrate, the water column, the stems and leaves of aquatic vegetation, and the water surface. Your goal is to sweep the collecting net through each of these habitat types, and then to combine the resulting samples into the 1-liter sample jar.

Dip out about a gallon of water into the pail. Pour about a cup of ethanol into the sample jar. Fill out the top half of the sample labels, using pencil, since ink will dissolve in the ethanol.

Ideally, you can sample a swath of water column from near-shore outward to a depth of approximately 3 feet with a long sweep of the net, keeping the net at about half the depth of the water throughout the sweep. Sweep the water surface as well. Pull the net through a vegetated area, beneath the water surface, for at least a meter of distance.

Sample the substrate by pulling the net along the bottom, bumping it against the substrate several times as you pull.

This step is optional, but it gives you a chance to <u>see</u> that you've collected some invertebrates. Rinse the net out into the bucket, and look for insects, crustaceans, etc. If necessary, repeat the sampling process in a nearby location, and add the net contents to the bucket. Remember to sample all four environments.

Sieve the contents of the bucket through the straining device and pour or carefully scrape the contents of the strainer into the sample jar.

If you skip the bucket-and-sieve steps, simply lift handfuls of material out of the sampling net into the jars. In either case, please include some muck or mud and some vegetation in the jar. Often, you will have collected a large amount of vegetable material. If this is the case, lift out handfuls of material from the sieve into the jar, until the jar is about half full. Please limit material you include in the sample, so that there is only a single jar for each sample.

Top off the sample jar with enough ethanol to cover all the material in the jar. Leave as little headroom as possible.

It is not necessary to sample habitats in any specified order. Keep in mind that disturbing the habitats prior to sampling will chase off the animals you are trying to capture.

Complete the sample labels. Place one label inside the sample jar and tape the other label securely to the outside of the jar. Dry the jar before attaching the outer label if necessary. In some situations, it may be necessary to collect more than one sample at a site. If you take multiple samples from the same site, clearly indicate this by using individual sample numbers, along with the total number of samples collected at the site (e.g. Sample #3 of 5 total samples).

Photograph the sampled site.

Sample Handling/Shipping

- In the field, keep collected samples cool by storing them in a cooler. Only a small amount of ice is necessary.
- Inventory all samples, preparing a list of all sites and enumerating all samples, before shipping or delivering to the laboratory.
- Deliver samples to Rhithron.

MDT Mitigated Wetland Monitoring Project: Aquatic Invertebrate Monitoring Summary 2001 – 2006

Prepared for PBS&J, Inc.
Prepared by W.Bollman, Rhithron Associates, Inc.

INTRODUCTION

Among other monitoring activities, aquatic invertebrate assemblages were collected at a number of mitigated wetlands throughout Montana. This report summarizes data generated from six years of collection. Over all years of sampling, a total of 182 invertebrate samples were collected. Table 2 summarizes sites and sampling years.

METHODS

Sample processing

Aquatic invertebrate samples were collected at mitigated wetland sites in the summer months of 2001, 2002, 2003, 2004, 2005 and 2006 by personnel of PBS&J, Inc. Sampling procedures utilized were based on the protocols developed by the Montana Department of Environmental Quality (MT DEQ). 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.

At Rhithron's laboratory, Caton subsamplers and stereomicroscopes with 10X magnification were used to randomly select a minimum of 100 organisms from each sample. In some instances, the entire sample contained fewer than 100 organisms; in these cases, all organisms from the sample were taken. Animals were identified to lowest practical taxonomic levels using relevant published resources. Quality control (QC) procedures were applied to sample sorting, taxonomic determinations and enumeration, and data entry. QC statistics are presented in Table 3. The identified samples have been archived at Rhithron's laboratory.

Assessment

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

Scoring criteria for metrics were developed by generally following the tactic used by Stribling et al. Boxplots were generated using a statistical software package (Statistica™), and distributions, median values, ranges, and quartiles for each metric were examined. All sites in all years of sampling were used. Camp Creek, which was sampled in 2002, 2003, 2004, 2005 and 2006, and Kleinschmidt Creek, sampled in 2003, 2004, 2005 and 2006, were assessed using the tested metric battery developed for montane streams of Western Montana (Bollman 1998).Invertebrate assemblages at these sites differed from those of the other sites, and suggested montane or foothill stream conditions rather than wetland conditions. 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. 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.

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. The nature of the action needed is not determined solely by the index score, however, 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

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.

Metric scoring criteria were re-examined each year as new data was added. For 2005, all 151 records were utilized. Ranges of individual metrics, as well as median metric values remained remarkably consistent over all 5 years of analysis. Since metric value distributions changed insignificantly with the addition of the 2006 data, no changes were made to scoring criteria this year. Summary metric values and scores for the 2006 samples are given in Tables 3a-3d.

Quality control

Quality control procedures for initial sample processing and subsampling involved checking sorting efficiency. These checks were conducted on 100% of the samples by independent technicians 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:

$$SE = \frac{n_1}{n_2} \times 100$$

Where: SE is the sorting efficiency, expressed as a percentage, n_1 is the total number of specimens in the first sort, and n_2 is the total number of specimens in the first and second sorts combined.

Quality control procedures for taxonomic determinations involved checking accuracy, precision and enumeration. Four samples were randomly selected and all organisms re-identified by independent taxonomists. A Bray-Curtis similarity statistic (Bray and Curtis 1957) was generated to evaluate identifications.

Table 1. Montana Department of Transportation Mitigated Wetlands Monitoring Project sites. 2001 – 2006.

Site identifier	2001	2002	2003	2004	2005	2006
Beaverhead 1	+	+	+	+	+	+
Beaverhead 2	+	+				
Beaverhead 3	+	+		+	+	+
Beaverhead 4	+	+	+			
Beaverhead 5	+	+	+	+	+	+
Beaverhead 6	+	+	+	+	+	+
Big Sandy 1	+					
Big Sandy 2	+					
Big Sandy 3	+					
Big Sandy 4	+					
Johnson-Valier	+					
VIDA	+					
Cow Coulee	+	+	+			
Fourchette – Puffin	+	+	+	+		
Fourchette – Flashlight	+	+	+	+		
Fourchette – Penguin	+	+	+	+		
Fourchette – Albatross	+	+	+	+		
Big Spring	+	+	+	+	+	
Vince Ames	+					
Ryegate	+					
Lavinia	+					
Stillwater	+	+	+	+	+	
Roundup	+	+	+	+	+	+
Wigeon	+	+	+	+	+	+
Ridgeway	+	+	+	+	+	+
Musgrave – Rest. 1	+	+	+	+	+	+
Musgrave – Rest. 2	+	+	+	+	+	+
Musgrave – Enh. 1	+	+	+	+	+	+
Musgrave – Enh. 2	+					+
Hoskins Landing		+	+	+	+	
Hoskins Landing						
Peterson - 1		+	+	+	+	+
Peterson – 2		+		+	+	+
Peterson – 4		+	+	+	+	+
Peterson – 5		+	+	+	+	+
Jack Johnson - main		+	+			
Jack Johnson - SW		+	+			
Creston		+	+	+	+	
Lawrence Park		+				
Perry Ranch		+			+	
SF Smith River		+	+	+	+	+
Camp Creek		+	+	+	+	+
Camp Creek						+
Kleinschmidt		+	+	+	+	+
Kleinschmidt – stream			+	+	+	+
Ringling - Galt			+			
Circle				+		
Cloud Ranch Pond				+	+	
Cloud Ranch Stream				+		
American Colloid				+	+	+
Jack Creek				+	+	
Jack Creek						
Norem				+	+	+
Rock Creek Ranch					+	+
Wagner Marsh					+	+
Alkali Lake 1						+
Alkali Lake 2						+

Table 2. Aquatic invertebrate metrics employed in the MTDT mitigated wetland monitoring study, 2001-2005.

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

RESULTS

(Note: Individual site discussions were removed from this report by PBS&J and are included in the macroinvertebrate sections of individual monitoring reports. Summary tables (4a – 4d) are provided on the following pages.)

.

Quality Assurance

Table 3 gives the results of quality assurance procedures for sample sorting and taxonomic determinations and enumeration.

Table 3. *Results of quality control procedures for subsampling and taxonomy.*

Sample ID	Site name	SE	Bray-Curtis similarity
MDT06PBSJ001	MUSGRAVE LAKE ES-1	91.67%	
MDT06PBSJ002	MUSGRAVE LAKE ES-2	94.44%	
MDT06PBSJ003	MUSGRAVE LAKE RS-1	87.30%	
MDT06PBSJ004	MUSGRAVE LAKE RS-2	100.00%	
MDT06PBSJ005	ROCK CREEK RANCH	96.49%	95.25%
MDT06PBSJ006	Alkali Lake Sample 1	100.00%	
MDT06PBSJ007	Alkali Lake Sample 2	100.00%	
MDT06PBSJ008	Peterson Ranch Pond # 4	100.00%	
MDT06PBSJ009	Peterson Ranch Pond # 1	97.35%	
MDT06PBSJ010	Peterson Ranch Pond # 5	91.67%	
MDT06PBSJ011	South Fork Smith River	100.00%	
MDT06PBSJ012	Beaverhead 1	100.00%	
MDT06PBSJ013	Beaverhead 3	95.65%	
MDT06PBSJ014	Beaverhead 5	100.00%	
MDT06PBSJ015	Beaverhead 6	94.12%	98.38%
MDT06PBSJ016	Peterson Ranch Pond # 2	91.67%	99.66%
MDT06PBSJ017	American Colloid	100.00%	
MDT06PBSJ018	Norem	100.00%	
MDT06PBSJ019	Cloud Ranch	85.56%	98.89%
MDT06PBSJ020	Jack Creek Pond	100.00%	
MDT06PBSJ021	Jack Creek Stream	100.00%	
MDT06PBSJ022	Camp Creek 1	99.10%	
MDT06PBSJ023	Camp Creek 2	100.00%	
MDT06PBSJ024	Kleinschmidt Pond	100.00%	
MDT06PBSJ025	Kleinschmidt Stream	96.49%	
MDT06PBSJ026	Hoskins Landing 1	97.35%	
MDT06PBSJ027	Hoskins Landing 2	96.49%	
MDT06PBSJ028	Wagner Marsh	100.00%	
MDT06PBSJ029	Wigeon Reservoir	100.00%	
MDT06PBSJ030	Ridgeway	98.21%	
MDT06PBSJ031	Roundup	100.00%	

Table 4a. Metric values and scores for Montana Department of Transportation mitigated wetland sites. 2006.

	BEAVERHEAD #1	BEAVERHEAD #3	BEAVERHEAD #5	BEAVERHEAD #6	ROUNDUP	WIDGEON	RIDGEWAY	MUSGRAVE RS-1
Total taxa	12	11	4	15	11	11	21	23
POET	1	0	1	3	2	1	3	4
Chironomidae taxa	5	3	1	7	4	3	10	7
Crustacea + Mollusca	1	4	2	3	2	2	5	7
% Chironomidae	52.38%	25.22%	0.69%	63.06%	18.87%	6.42%	37.25%	9.62%
Orthocladiinae/Chir	0.181818	0.965517	0	0.142857	0.2	0.285714	0.289474	0.7
%Amphipoda	0.00%	0.00%	0.00%	0.90%	0.00%	6.42%	11.76%	1.92%
%Crustacea + %Mollusca	9.52%	69.57%	98.62%	3.60%	73.58%	79.82%	45.10%	51.92%
HBI	7.857143	7.773913	7.97931	7.243243	8.09434	8.100917	7.127451	7.403846
%Dominant taxon	33.33%	39.13%	97.93%	27.93%	72.64%	73.39%	28.43%	23.08%
%Collector-Gatherers	61.90%	68.70%	100.00%	84.68%	87.74%	6.42%	49.02%	47.12%
%Filterers	0.00%	2.61%	0.00%	1.80%	0.00%	0.00%	0.00%	4.81%
Total taxa	1	1	1	3	1	1	5	5
POET	1	1	1	3	1	1	3	5
Chironomidae taxa	3	3	1	5	3	3	5	5
Crustacea + Mollusca	1	3	1	1	1	1	3	5
% Chironomidae	1	3	5	1	3	5	3	5
Orthocladiinae/Chir	1	5	1	1	3	3	3	5
%Amphipoda	5	5	5	5	5	3	3	5
%Crustacea + %Mollusca	5	1	1	5	1	1	3	3
HBI	1	1	1	3	1	1	3	3
%Dominant taxon	5	3	1	5	1	1	5	5
%Collector-Gatherers	3	3	5	5	5	1	3	3
%Filterers	3	3	3	3	3	3	3	3
Total score	30	32	26	40	28	24	42	52
Percent of maximum score	0.5	0.533333	0.433333	0.666667	0.466667	0.4	0.7	0.866667
Impairment classification	**poor**	**poor**	**poor**	**sub-optimal**	**poor**	**poor**	**optimal**	**optimal**

Table 4b. Metric values and scores for Montana Department of Transportation mitigated wetland sites. 2006.

	MUSGRAVE RS- 2	MUSGRAVE ES- 1	MUSGRAVE ES- 2	HOSKINS LANDING 1	HOSKINS LANDING 2	PETERSON RANCH 1	PETERSON RANCH 2	PETERSON RANCH 4	PETERSON RANCH 5
Total taxa	10	21	10	22	29	19	17	28	26
POET	1	2	1	5	4	2	2	3	4
Chironomidae taxa	2	7	4	6	6	7	4	13	9
Crustacea + Mollusca	3	6	0	5	9	5	6	5	6
% Chironomidae	3.96%	10.89%	10.00%	18.18%	11.71%	64.08%	7.48%	27.52%	14.29%
Orthocladiinae/Chir	0	0.181818	0.125	0.055556	0.307692	0.757576	0.75	0.6	0.75
%Amphipoda	0.00%	2.97%	0.00%	5.05%	1.80%	1.94%	22.43%	2.75%	15.18%
%Crustacea + %Mollusca	8.91%	75.25%	0.00%	20.20%	23.42%	8.74%	42.06%	19.27%	40.18%
HBI	6.326733	6.940594	6	7.111111	7.585586	6.631068	6.719626	7.293578	7.321429
%Dominant taxon	70.30%	38.61%	83.75%	25.25%	42.34%	47.57%	28.04%	20.18%	16.07%
%Collector-Gatherers	15.84%	8.91%	3.75%	64.65%	62.16%	72.82%	31.78%	34.86%	50.89%
%Filterers	0.00%	0.00%	0.00%	6.06%	5.41%	3.88%	3.74%	8.26%	0.89%
Total taxa	1	5	1	5	5	3	3	5	5
POET	1	1	1	5	5	1	1	3	5
Chironomidae taxa	1	5	3	3	3	5	3	5	5
Crustacea + Mollusca	1	5	1	3	5	3	5	3	5
% Chironomidae	5	5	5	3	5	1	5	3	5
Orthocladiinae/Chir	1	1	1	1	3	5	5	5	5
%Amphipoda	5	5	5	3	5	5	3	5	3
%Crustacea + %Mollusca	5	1	5	5	5	5	3	5	3
HBI	5	3	5	3	3	5	5	3	3
%Dominant taxon	1	3	1	5	3	3	5	5	5
%Collector-Gatherers	1	1	1	3	3	3	1	1	3
%Filterers	3	3	3	1	3	3	3	1	3
Total score	30	38	32	40	48	42	42	44	50
Percent of maximum score	0.5	0.633333	0.533333	0.666667	0.8	0.7	0.7	0.733333	0.833333
Impairment classification	**poor**	**sub-optimal**	**poor**	**sub-optimal**	**optimal**	**optimal**	**optimal**	**optimal**	**optimal**

Table 4c. Metric values and scores for Montana Department of Transportation mitigated wetland sites. 2006

	SOUTH FORK SMITH RIVER	CAMP CREEK 1*	CAMP CREEK 2*	KLEINSCH MIDT POND	KLEINSCH MIDT STREAM*	CLOUD RANCH	COLLOID	JACK CREEK POND	JACK CREEK STREAM
Total taxa	14	31	29	20	22	13	7	7	5
POET	4	8	8	5	1	1	2	0	0
Chironomidae taxa	3	10	8	6	8	6	4	4	0
Crustacea + Mollusca	4	1	3	2	5	3	0	2	2
% Chironomidae	18.02%	45.87%	16.07%	8.04%	77.68%	23.81%	84.21%	75.00%	0.00%
Orthocladiinae/Chir	0.05	0.26	0.277778	0.222222	0.448276	0.65	0.25	0.555556	0
%Amphipoda	18.02%	0.00%	0.00%	25.00%	0.00%	4.76%	0.00%	0.00%	5.00%
%Crustacea + %Mollusca	58.56%	0.92%	3.57%	25.89%	5.36%	11.90%	0.00%	16.67%	7.50%
HBI	7.540541	4.504587	4.294643	7.241071	5.928571	7.535714	6.315789	8.833333	7.325
%Dominant taxon	25.23%	24.77%	37.50%	25.00%	33.93%	36.90%	52.63%	33.33%	60.00%
%Collector-Gatherers	41.44%	48.62%	31.25%	62.50%	46.43%	64.29%	21.05%	58.33%	67.50%
%Filterers	15.32%	6.42%	7.14%	3.57%	38.39%	2.38%	0.00%	0.00%	0.00%
Total taxa	1	5	5	3	5	1	1	1	1
POET	5	5	5	5	1	1	1	1	1
Chironomidae taxa	3	5	5	3	5	3	3	3	1
Crustacea + Mollusca	3	1	1	1	3	1	1	1	1
% Chironomidae	3	1	5	5	1	3	1	1	5
Orthocladiinae/Chir	1	3	3	3	3	5	3	5	1
%Amphipoda	3	5	5	1	5	3	5	5	3
%Crustacea + %Mollusca	3	5	5	5	5	5	5	5	5
HBI	3	5	5	3	5	3	5	1	3
%Dominant taxon	5	5	3	5	5	3	1	5	1
%Collector-Gatherers	1	3	1	3	3	3	1	3	3
%Filterers	1	1	1	3	1	3	3	3	3
Total score	32	44	44	40	42	34	30	34	28
Percent of maximum score	0.533333	*0.733333*	*0.733333*	0.666667	*0.7*	0.566667	0.5	0.566667	0.466667
Impairment classification	**poor**	***optimal***	***optimal***	**sub-optimal**	***optimal***	**sub-optimal**	**poor**	**sub-optimal**	**poor**

*Sites indicated by asterisks were dominated by lotic fauna, and were evaluated with the MDEQ index for streams in the text and charts. Scores and impairment classifications in this table (italicized) are included only for completeness and are not reliable indications of conditions at these sites. See text.

Table 4d. Metric values and scores for Montana Department of Transportation mitigated wetland sites. 2006.

	NOREM	ROCK CREEK RANCH	WAGNER MARSH	ALKALI LAKE 1	ALKALI LAKE 2
Total taxa	6	15	11	6	5
POET	1	0	0	0	0
Chironomidae taxa	2	4	4	3	0
Crustacea + Mollusca	1	4	3	1	1
% Chironomidae	82.93%	8.40%	13.51%	42.86%	0.00%
Orthocladiinae/Chir	0	0.2	0.6	0.666667	0
%Amphipoda	0.00%	0.00%	0.00%	0.00%	0.00%
%Crustacea + %Mollusca	7.32%	65.55%	23.42%	7.14%	9.52%
HBI	7.317073	7.638655	7.036036	7.785714	7.904762
%Dominant taxon	65.85%	47.06%	45.95%	42.86%	52.38%
%Collector-Gatherers	68.29%	56.30%	47.75%	28.57%	9.52%
%Filterers	17.07%	0.00%	0.90%	0.00%	0.00%
Total taxa	1	3	1	1	1
POET	1	1	1	1	1
Chironomidae taxa	1	3	3	3	1
Crustacea + Mollusca	1	3	1	1	1
% Chironomidae	1	5	5	1	5
Orthocladiinae/Chir	1	3	5	5	1
%Amphipoda	5	5	5	5	5
%Crustacea + %Mollusca	5	1	5	5	5
HBI	3	1	3	1	1
%Dominant taxon	1	3	3	3	1
%Collector-Gatherers	3	3	3	1	1
%Filterers	1	3	3	3	3
Total score	24	34	38	30	26
Percent of maximum score	0.4	0.566667	0.633333	0.5	0.433333
Impairment classification	**poor**	**sub-optimal**	**sub-optimal**	**poor**	**poor**

Literature cited

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

Bukantis, R. 1998. Rapid bioassessment macroinvertebrate protocols: Sampling and sample analysis SOP's. Working draft. Montana Department of Environmental Quality. Planning Prevention and Assistance Division. Helena, Montana.

McCune, B. and J.B. Grace. 2002. Analysis of Ecological Communities. MjM Software Design, Gleneden Beach, Oregon, USA.

McCune, B. and M.J. Mefford. 2002. PC-ORD. Multivariate Analysis of Ecological Data, Version 4. MjM Software Design, Gleneden Beach, Oregon, USA.

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: MDT06PBSJ
RAI No.: MDT06PBSJ006

RAI No.: MDT06PBSJ006 **Sta. Name:** Alkali Lake Sample 1
Client ID:
Date Coll.: 8/21/2006 **No. Jars:** 1 **STORET ID:**

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Non-Insect							
Physidae							
Physidae	1	7.14%	Yes	Unknown		8	SC
Heteroptera							
Corixidae							
Corixidae	6	42.86%	Yes	Larva		10	PH
Coleoptera							
Hydrophilidae							
Helophorus sp.	1	7.14%	Yes	Adult		11	SH
Chironomidae							
Chironomidae							
Corynoneura sp.	1	7.14%	Yes	Larva		7	CG
Limnophyes sp.	3	21.43%	Yes	Larva		8	CG
Polypedilum sp.	2	14.29%	Yes	Larva		6	SH
Sample Count	**14**						

Metrics Report

Project ID: MDT06PBSJ
RAI No.: MDT06PBSJ006
Sta. Name: Alkali Lake Sample 1
Client ID:
STORET ID:
Coll. Date: 8/21/2006

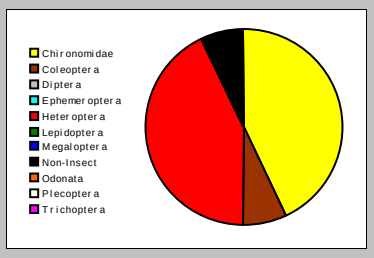
Abundance Measures

Sample Count: 14
Sample Abundance: 14.00 100.00% of sample used

Coll. Procedure:
Sample Notes:

Taxonomic Composition

Category	R	A	PRA
Non-Insect	1	1	7.14%
Odonata			
Ephemeroptera			
Plecoptera			
Heteroptera	1	6	42.86%
Megaloptera			
Trichoptera			
Lepidoptera			
Coleoptera	1	1	7.14%
Diptera			
Chironomidae	3	6	42.86%

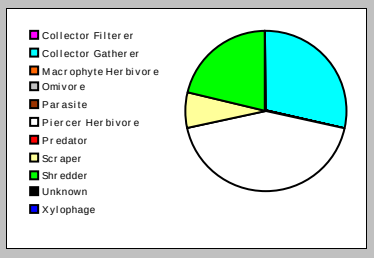


Dominant Taxa

Category	A	PRA
Corixidae	6	42.86%
Limnophyes	3	21.43%
Polypedilum	2	14.29%
Physidae	1	7.14%
Helophorus	1	7.14%
Corynoneura	1	7.14%

Functional Composition

Category	R	A	PRA
Predator			
Parasite			
Collector Gatherer	2	4	28.57%
Collector Filterer			
Macrophyte Herbivore			
Piercer Herbivore	1	6	42.86%
Xylophage			
Scraper	1	1	7.14%
Shredder	2	3	21.43%
Omivore			
Unknown			

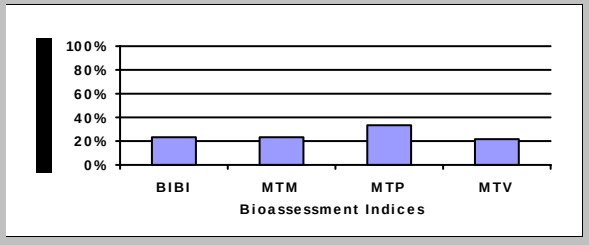


Metric Values and Scores

Metric	Value	BIBI	MTP	MTV	MTM
Composition					
Taxa Richness	6	1	0		0
Non-Insect Percent	7.14%				
E Richness	0	1		0	
P Richness	0	1		0	
T Richness	0	1		0	
EPT Richness	0		0		0
EPT Percent	0.00%		0		0
Oligochaeta+Hirudinea Percent					
Baetidae/Ephemeroptera	0.000				
Hydropsychidae/Trichoptera	0.000				
Dominance					
Dominant Taxon Percent	42.86%		2		1
Dominant Taxa (2) Percent	64.29%				
Dominant Taxa (3) Percent	78.57%	1			
Dominant Taxa (10) Percent	100.00%				
Diversity					
Shannon H (loge)	1.537				
Shannon H (log2)	2.217		1		
Margalef D	1.895				
Simpson D	0.209				
Evenness	0.171				
Function					
Predator Richness	0		0		
Predator Percent	0.00%	1			
Filterer Richness	0				
Filterer Percent	0.00%			3	
Collector Percent	28.57%		3		3
Scraper+Shredder Percent	28.57%		2		1
Scraper/Filterer	0.000				
Scraper/Scraper+Filterer	0.000				
Habit					
Burrower Richness	0				
Burrower Percent	0.00%				
Swimmer Richness	1				
Swimmer Percent	42.86%				
Clinger Richness	1	1			
Clinger Percent	14.29%				
Characteristics					
Cold Stenotherm Richness	0				
Cold Stenotherm Percent	0.00%				
Hemoglobin Bearer Richness	1				
Hemoglobin Bearer Percent	14.29%				
Air Breather Richness	0				
Air Breather Percent	0.00%				
Voltinism					
Univoltine Richness	2				
Semivoltine Richness	1	1			
Multivoltine Percent	42.86%		2		
Tolerance					
Sediment Tolerant Richness	0				
Sediment Tolerant Percent	0.00%				
Sediment Sensitive Richness	0				
Sediment Sensitive Percent	0.00%				
Metals Tolerance Index	4.500				
Pollution Sensitive Richness	0	1		0	
Pollution Tolerant Percent	28.57%	3		1	
Hilsenhoff Biotic Index	8.538		0		0
Intolerant Percent	0.00%				
Supertolerant Percent	71.43%				
CTQa	107.200				

Bioassessment Indices

BioIndex	Description	Score	Pct	Rating
BIBI	B-IBI (Karr et al.)	12	24.00%	
MTP	Montana DEQ Plains (Bukantis 1998)	10	33.33%	Moderate
MTV	Montana Revised Valleys/Foothills (Bollman 1998)	4	22.22%	Moderate
MTM	Montana DEQ Mountains (Bukantis 1998)	5	23.81%	Moderate



Taxa Listing

Project ID: MDT06PBSJ
RAI No.: MDT06PBSJ007

RAI No.: MDT06PBSJ007 **Sta. Name:** Alkali Lake Sample 2
Client ID:
Date Coll.: 8/22/2006 **No. Jars:** 1 **STORET ID:**

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Non-Insect							
Copepoda	2	9.52%	Yes	Unknown		8	CG
Heteroptera							
Corixidae							
Corisella sp.	1	4.76%	Yes	Adult		11	PR
Corixidae	11	52.38%	No	Larva		10	PH
Diptera							
Ceratopogonidae							
Ceratopogoninae	1	4.76%	Yes	Pupa		6	PR
Dolichopodidae							
Dolichopodidae	6	28.57%	Yes	Larva		4	PR
Sample Count	**21**						

Metrics Report

Project ID: MDT06PBSJ
RAI No.: MDT06PBSJ007
Sta. Name: Alkali Lake Sample 2
Client ID:
STORET ID:
Coll. Date: 8/22/2006

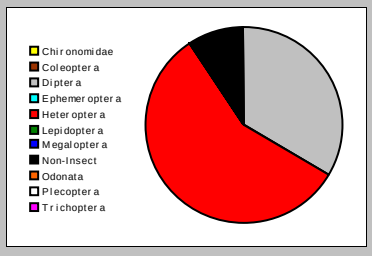
Abundance Measures

Sample Count: 21
Sample Abundance: 21.00 100.00% of sample used

Coll. Procedure:
Sample Notes:

Taxonomic Composition

Category	R	A	PRA
Non-Insect	1	2	9.52%
Odonata			
Ephemeroptera			
Plecoptera			
Heteroptera	1	12	57.14%
Megaloptera			
Trichoptera			
Lepidoptera			
Coleoptera			
Diptera	2	7	33.33%
Chironomidae			

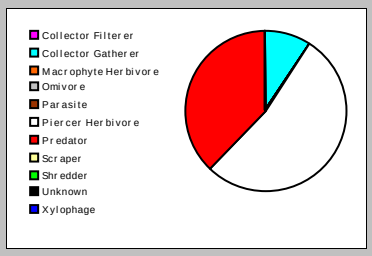


Dominant Taxa

Category	A	PRA
Corixidae	11	52.38%
Dolichopodidae	6	28.57%
Copepoda	2	9.52%
Corisella	1	4.76%
Ceratopogoninae	1	4.76%

Functional Composition

Category	R	A	PRA
Predator	3	8	38.10%
Parasite			
Collector Gatherer	1	2	9.52%
Collector Filterer			
Macrophyte Herbivore			
Piercer Herbivore	0	11	52.38%
Xylophage			
Scraper			
Shredder			
Omivore			
Unknown			

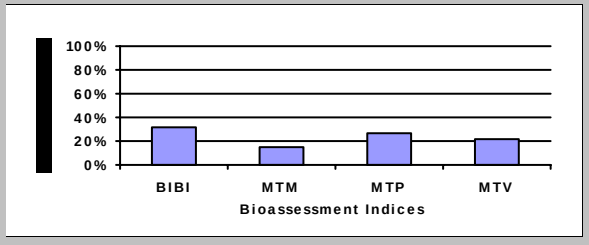


Metric Values and Scores

Metric	Value	BIBI	MTP	MTV	MTM
Composition					
Taxa Richness	4	1	0		0
Non-Insect Percent	9.52%				
E Richness	0	1		0	
P Richness	0	1		0	
T Richness	0	1		0	
EPT Richness	0		0		0
EPT Percent	0.00%		0		0
Oligochaeta+Hirudinea Percent					
Baetidae/Ephemeroptera	0.000				
Hydropsychidae/Trichoptera	0.000				
Dominance					
Dominant Taxon Percent	52.38%		1		0
Dominant Taxa (2) Percent	80.95%				
Dominant Taxa (3) Percent	90.48%	1			
Dominant Taxa (10) Percent	100.00%				
Diversity					
Shannon H (loge)	1.089				
Shannon H (log2)	1.571		0		
Margalef D	1.303				
Simpson D	0.356				
Evenness	0.212				
Function					
Predator Richness	3		1		
Predator Percent	38.10%	5			
Filterer Richness	0				
Filterer Percent	0.00%			3	
Collector Percent	9.52%		3		3
Scraper+Shredder Percent	0.00%		0		0
Scraper/Filterer	0.000				
Scraper/Scraper+Filterer	0.000				
Habit					
Burrower Richness	1				
Burrower Percent	4.76%				
Swimmer Richness	1				
Swimmer Percent	57.14%				
Clinger Richness	0	1			
Clinger Percent	0.00%				
Characteristics					
Cold Stenotherm Richness	0				
Cold Stenotherm Percent	0.00%				
Hemoglobin Bearer Richness					
Hemoglobin Bearer Percent					
Air Breather Richness	1				
Air Breather Percent	28.57%				
Voltinism					
Univoltine Richness	3				
Semivoltine Richness	0	1			
Multivoltine Percent	9.52%		3		
Tolerance					
Sediment Tolerant Richness	0				
Sediment Tolerant Percent	0.00%				
Sediment Sensitive Richness	0				
Sediment Sensitive Percent	0.00%				
Metals Tolerance Index	4.611				
Pollution Sensitive Richness	0	1		0	
Pollution Tolerant Percent	28.57%	3		1	
Hilsenhoff Biotic Index	7.800		0		0
Intolerant Percent	0.00%				
Supertolerant Percent	61.90%				
CTQa	108.000				

Bioassessment Indices

BioIndex	Description	Score	Pct	Rating
BIBI	B-IBI (Karr et al.)	16	32.00%	
MTP	Montana DEQ Plains (Bukantis 1998)	8	26.67%	Moderate
MTV	Montana Revised Valleys/Foothills (Bollman 1998)	4	22.22%	Moderate
MTM	Montana DEQ Mountains (Bukantis 1998)	3	14.29%	Severe

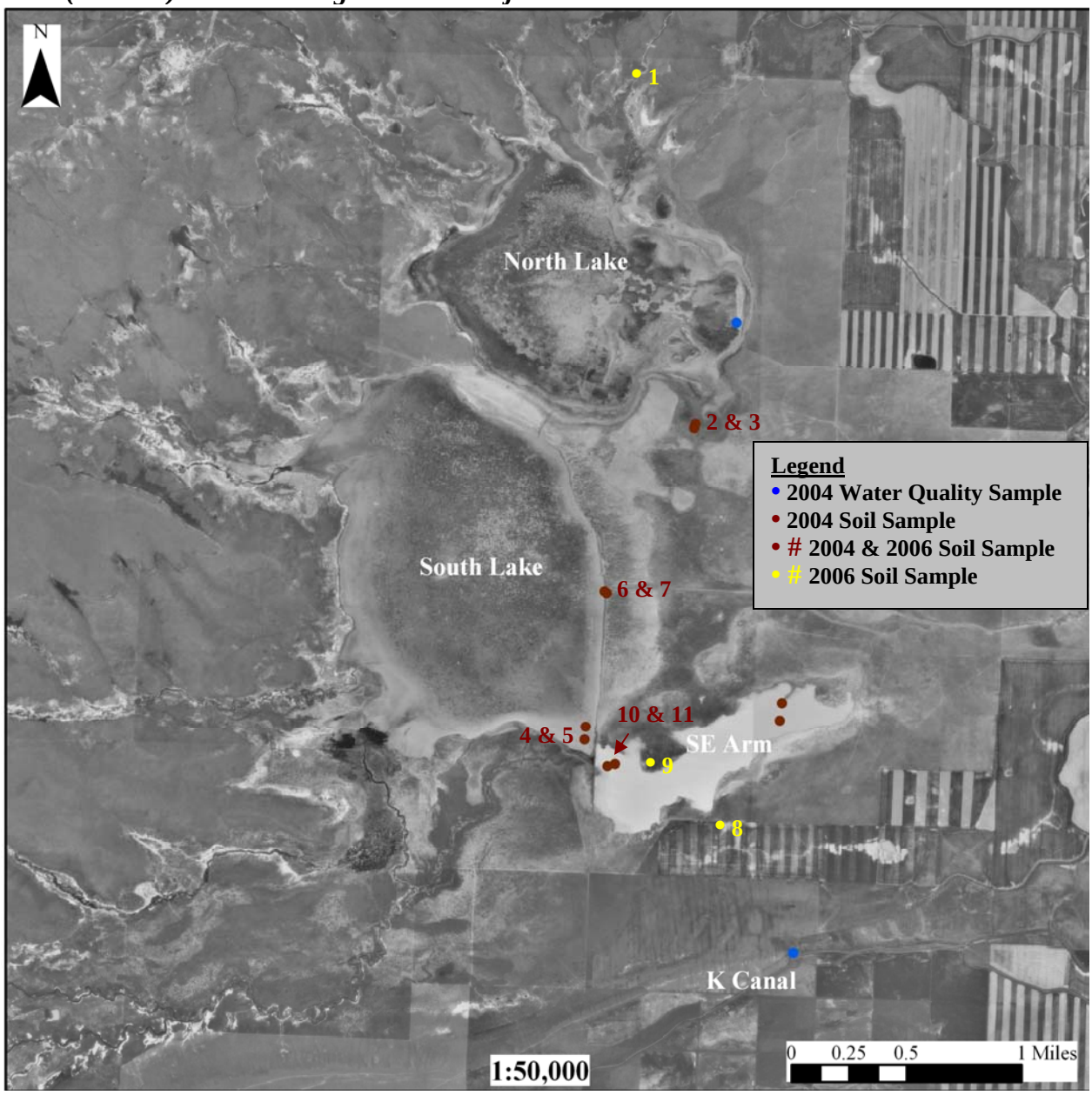


Appendix G

FIGURE 4
2006 SOILS METALS DATA

MDT Wetland Mitigation Monitoring
Alkali Lake
Pondera County, Montana

Figure 4: ***Locations of the 2004 water and soil sampling and 2006 soil sampling for the Alkali Lake (SE Arm) Wetland Mitigation Site Project.***



ENERGY LABORATORIES 877-472-0711 • 406-442-0711 • 406-442-0712 fax • helena@energylab.com

LABORATORY ANALYTICAL REPORT

Client: PBS and J
Project: Alkali Lake Wetland Mitigation B43054.00-0308
Workorder: H06050297

Report Date: 06/13/06
Date Received: 05/25/06

		Analysis		As-T	Cd-T	Ni-T	Se-T
		Units		mg/kg	mg/kg	mg/kg	mg/kg
Sample ID	Client Sample ID	Up	Low	Results	Results	Results	Results
H06050297-001	SEArm, VEG 3 (inlet)	0	0	4.50	< 0.50	10.2	< 0.30
H06050297-003	SE Arm, VEG5			5.36	< 0.50	9.5	< 0.30
H06050297-004	SE Arm, VEG6			6.54	< 0.50	13.9	< 0.30
H06050297-005	SE Arm, VEG7			6.86	< 0.50	14.5	< 0.30
H06050297-006	S Lake, VEG3			5.20	< 0.50	9.6	< 0.30
H06050297-007	S Lake, VEG4			5.85	< 0.50	9.9	< 0.30
H06050297-008	S Lake, VEG5			7.69	< 0.50	12.8	< 0.30
H06050297-009	S Lake, VEG6			8.00	< 0.50	11.7	< 0.30
H06050297-010	N Lake, VEG2			5.59	< 0.50	10.9	< 0.30
H06050297-011	N Lake, VEG2			3.27	< 0.50	11.3	< 0.30

ENERGY LABORATORIES, INC. • P.O. Box 5688 • 3161 East Lyndale Ave. • Helena, MT 59604
877-472-0711 • 406-442-0711 • 406-442-0712 fax • helena@energylab.com

LABORATORY ANALYTICAL REPORT

Client: PBS and J
Project: Alkali Lake Wetland Mitigation B43054.00-0308
Workorder: H06080237

Report Date: 09/06/06
Date Received: 08/24/06

		Analysis		As-T	Cd-T	Ni-T	Se-T
		Units		mg/kg	mg/kg	mg/kg	mg/kg
Sample ID	Client Sample ID	Up	Low	Results	Results	Results	Results
H06080237-001	N Lake, NVEG3 (inlet)	0	0	< 5.0	< 1.0	8.8	< 5.0

ENERGY LABORATORIES, INC. • P.O. Box 5688 • 3161 East Lyndale Ave. • Helena, MT 59604
877-472-0711 • 406-442-0711 • 406-442-0712 fax • helena@energylab.com

QA/QC Summary Report

Client: PBS and J
Project: Alkali Lake Wetland Mitigation B43054.00-0308

Report Date: 06/13/06
Work Order: H06050297

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6010B									Batch: B_21450
Sample ID: MB-21450	Method Blank				Run: SUB-B76876				06/06/06 13:27
Cadmium	ND	mg/kg	0.02						
Nickel	0.2	mg/kg	0.1						
Sample ID: LCS-21450	Laboratory Control Sample				Run: SUB-B76876				06/06/06 13:30
Cadmium	202	mg/kg	1.0	87	70	130			
Nickel	43.5	mg/kg	5.0	87	70	130			
Sample ID: B06060234-021AMSD3	Sample Matrix Spike Duplicate				Run: SUB-B76876				06/06/06 14:41
Cadmium	83.0	mg/kg	1.0	83	75	125	1.5	20	
Nickel	175	mg/kg	5.0	83	75	125	3.9	20	
Sample ID: B06060234-021AMS3	Sample Matrix Spike				Run: SUB-B76876				06/06/06 14:37
Cadmium	84.2	mg/kg	1.0	84	75	125			
Nickel	182	mg/kg	5.0	86	75	125			
Method: SW6020									Batch: B_21450
Sample ID: B06060234-021AMS3	Sample Matrix Spike				Run: SUB-B77017				06/08/06 21:59
Arsenic	205	mg/kg	5.0	100	75	125			
Selenium	184	mg/kg	5.0	92	75	125			
Sample ID: B06060234-021AMSD3	Sample Matrix Spike Duplicate				Run: SUB-B77017				06/08/06 22:04
Arsenic	210	mg/kg	5.0	103	75	125	2.3	20	
Selenium	189	mg/kg	5.0	94	75	125	2.5	20	
Sample ID: MB-21450	Method Blank				Run: SUB-B77017				06/08/06 20:06
Arsenic	ND	mg/kg	0.1						
Selenium	ND	mg/kg	0.02						
Sample ID: LCS-21450	Laboratory Control Sample				Run: SUB-B77017				06/08/06 20:10
Arsenic	105	mg/kg	5.0	130	70	130			
Selenium	102	mg/kg	5.0	123	70	130			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

ENERGY LABORATORIES, INC. • P.O. Box 5688 • 3161 East Lyndale Ave. • Helena, MT 59604
877-472-0711 • 406-442-0711 • 406-442-0712 fax • helena@energylab.com

QA/QC Summary Report

Client: PBS and J
Project: Alkali Lake Wetland Mitigation B43054.00-0308

Report Date: 09/06/06
Work Order: H06080237

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.7								Analytical Run: SUB-B81265	
Sample ID: QCS	Initial Calibration Verification Standard							08/29/06 14:06	
Arsenic	0.987	mg/L	0.10	99	90	110			
Cadmium	0.491	mg/L	0.010	98	90	110			
Nickel	0.972	mg/L	0.050	97	90	110			
Selenium	1.03	mg/L	0.10	103	90	110			
Sample ID: CRI	CRDL Standard for ICP							08/29/06 14:17	
Arsenic	0.0858	mg/L	0.10	86	50	150			
Cadmium	0.00271	mg/L	0.010	90	50	150			
Nickel	0.0217	mg/L	0.050	109	50	150			
Selenium	0.102	mg/L	0.10	102	50	150			
Sample ID: ICSA	Interference Check Sample A							08/29/06 14:20	
Arsenic	0.00731	mg/L	0.10		-0.1	0.1			
Cadmium	-0.00494	mg/L	0.010		-0.001	0.001			
Nickel	0.00160	mg/L	0.050		-0.05	0.05			
Selenium	-0.0445	mg/L	0.10		-0.1	0.1			
Sample ID: ICSAB	Interference Check Sample AB							08/29/06 14:24	
Arsenic	1.05	mg/L	0.10	105	80	120			
Cadmium	0.973	mg/L	0.010	97	80	120			
Nickel	0.994	mg/L	0.050	99	80	120			
Selenium	0.970	mg/L	0.10	97	80	120			
Method: SW6010B								Batch: B_22818	
Sample ID: MB-22818	Method Blank				Run: SUB-B81265			08/29/06 17:00	
Arsenic	ND	mg/kg	0.4						
Cadmium	ND	mg/kg	0.02						
Nickel	ND	mg/kg	0.1						
Selenium	ND	mg/kg	1						
Sample ID: B06082082-001AMS3	Sample Matrix Spike				Run: SUB-B81265			08/29/06 17:16	
Arsenic	45.3	mg/kg	5.0	86	75	125			
Cadmium	21.9	mg/kg	1.0	88	75	125			
Nickel	51.0	mg/kg	5.0	94	75	125			
Selenium	34.0	mg/kg	5.0	68	75	125			S
Sample ID: B06082082-001AMSD3	Sample Matrix Spike Duplicate				Run: SUB-B81265			08/29/06 17:28	
Arsenic	44.5	mg/kg	5.0	84	75	125	1.7	20	
Cadmium	21.4	mg/kg	1.0	86	75	125	2.3	20	
Nickel	49.7	mg/kg	5.0	91	75	125	2.7	20	
Selenium	34.4	mg/kg	5.0	69	75	125	1.3	20	S

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

S - Spike recovery outside of advisory limits.