MONTANA DEPARTMENT OF TRANSPORTATION
WETLAND MITIGATION MONITORING REPORT: YEAR 2011

Alkali Lake
Pondera County, Montana

Prepared for:

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December 2011

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MDT Project Number STPX-NH 37(26)
Control Number 5000

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CONFLUENCE

TABLE OF CONTENTS

TABLES

CHARTS

FIGURES

APPENDICES

Cover: View of Alkali Lake from east along boundary between vegetation communities 1 and 3.
*Inserts: Adult Marbled Godwit and Piping Plover chick
*Photo inserts courtesy of Lawrence Urban, MDT Wetland Mitigation Specialist

1. INTRODUCTION

The Alkali Lake Wetland Mitigation 2011 Monitoring Report presents the results of the fifth year of monitoring at the Alkali Lake mitigation site (Appendix A). The Montana Department of Transportation (MDT) in conjunction with the Bureau of Indian Affairs (BIA) and the Blackfeet Nation's Environmental Office and Fish and Wildlife Department designed and constructed the wetland restoration project in 2005 within the area that encompasses Southeast Alkali Lake, a historic lake bed located on the Blackfeet Indian Reservation in Pondera County, Montana (Figure 1).

Figures 2 and 3 (Appendix A) of the monitoring report show the Mapped Site Features and Monitoring Activity Locations, respectively. Appendix B contains the MDT Mitigation Site Monitoring Forms, the US Army Corps of Engineers (USACE) Routine Wetland Determination Data Forms (Environmental Laboratory 1987), and the MDT Montana Wetland Assessment Forms (Berglund and McEldowney 2008). Appendix C contains representative site photographs and Appendix D includes the project plan sheet. Appendix E presents the laboratory results of the metals analysis for soil samples collected within the Alkali Lake Mitigation Area.

The Blackfeet Nation Fish and Wildlife program and the US Fish and Wildlife Service (USFWS) initially proposed the Alkali Lake restoration project in 1996 with the goal of re-establishing shorebird and wetland habitat to the southeastern arm of Alkali Lake. The project was delayed as a result of prohibitive costs at that time. The Blackfeet Tribal Fish and Game and Environmental Offices approached MDT in 2002 with a request to re-examine the project. A 2003 feasibility study conducted by MDT determined that Alkali Lake would be a suitable area for wetland restoration.

The Alkali Lake Wetland Mitigation project encompasses approximately 175 acres of lake bed within the 284 acre project area. The mitigation site was constructed and flooded in late summer through early fall of 2005 (Appendix D). Hydrology was restored to the lakebed through the construction of a pipeline to divert water from the Birch Creek Main Canal to Blacktail Creek. Surface water was then diverted from Blacktail Creek to the Badger Fisher Main Canal, K Canal, and 19K Canal where a second pipeline was built to deliver water directly to Alkali Lake. Project goals were the restoration/re-establishment of approximately 101.4 acres of open water/lake bed, wetland enhancement, and protection of an upland buffer. The project credit ratios approved by the USACE and the Blackfeet Tribe are shown in Table 1.

Wetland mitigation at this site was intended to offset wetland impacts associated with the MDT Meriwether-East highway construction project on the Blackfeet Reservation. Excess wetland credits were to be held in reserve for application against future highway project-related wetland impacts on the Blackfeet Reservation, in Watershed 8 – Marias River. The performance standards approved by the USACE and Blackfeet Tribe are listed below.

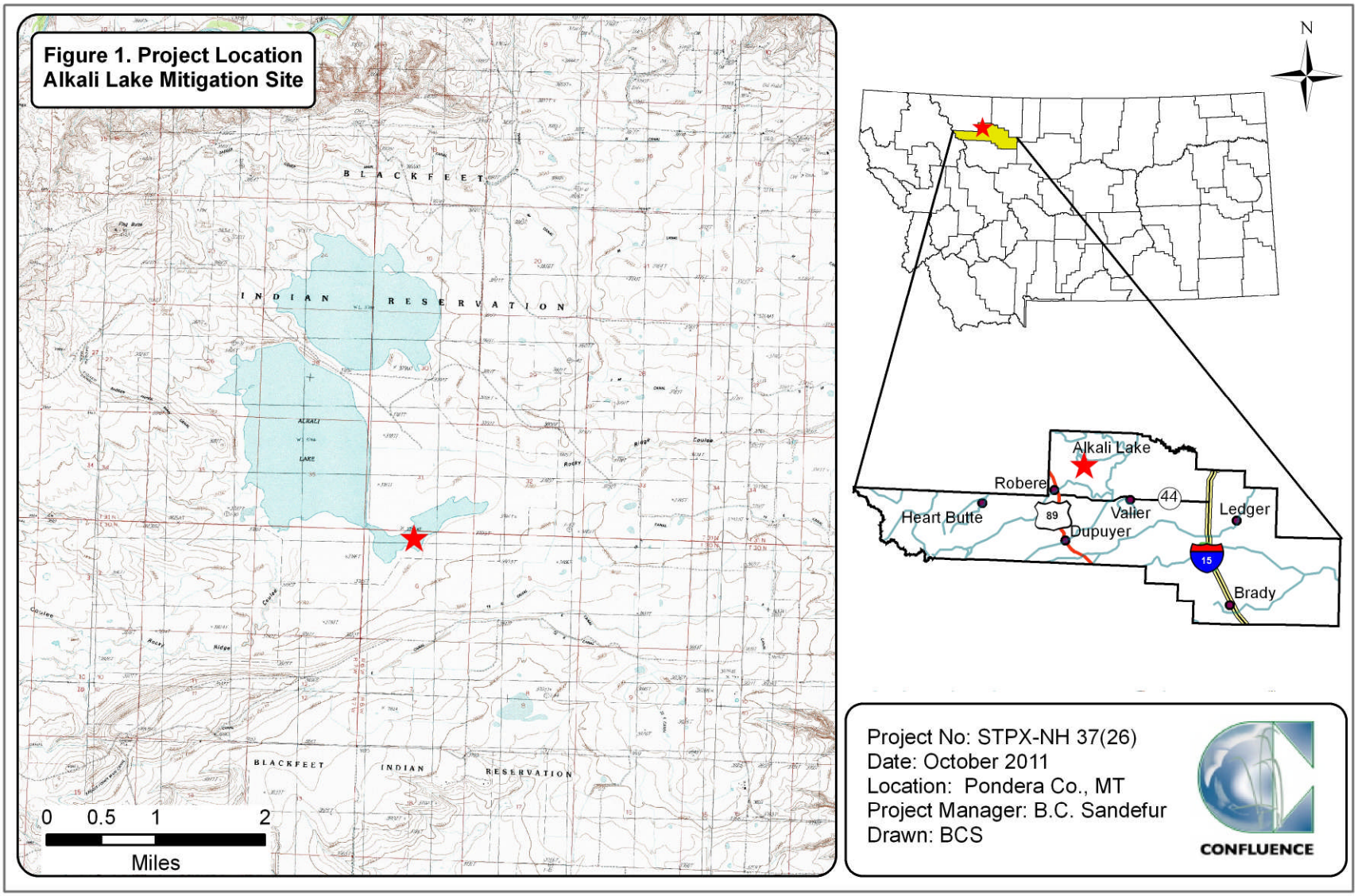

Figure 1. Project Location Alkali Lake Mitigation Site.

- **Wetland Hydrology Success** will be achieved where wetland hydrology is present per the technical guidelines in the 1987 *Corps of Engineers Wetland Delineation Manual* (Environmental Laboratory 1987).
- **Hydric Soil Success** will be achieved where hydric soil conditions are present (per the most recent Natural Resource Conservation Service 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 definitive 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 Wetland Delineation Manual, canopy cover of facultative or wetter species is greater than or equal to 50 percent, and noxious weeds do not exceed 10 percent cover.

Table 1. Credit ratios approved by the USACE and Blackfeet tribe.

Proposed Mitigation Feature	Form of Mitigation Using Tribal Definitions[1]	Form of Mitigation Using USACE Definitions	Mitigation Site Established Prior to Impacts	
			Tribal Credit Ratio / Credit Acres[1]	USACE Credit Ratio / Credit Acres
Primary wetland restoration area consisting of approximately 74.42 acres between elevations 3,785 and 3,786 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 3,784 and 3,785 that would flood to depths between 1 and 2 feet (48.77 acres at 1 to1.5 feet, 49.55 acres at 1.5 to 2 feet, 3.08 acres at 2 feet). This may result in additional wetland restoration, although 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[2]
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[2]**

[1] Blackfeet Tribe's Mitigation Policy.

[2] Credit could exceed this amount depending on whether any of the 1- to 2-foot deep areas develop into wetlands, rather than open water, up to a maximum of 181.46 acres if the entire lakebed is restored as wetland.

2. METHODS

The site was monitored on August 21, 2011. Information contained on the Mitigation Monitoring Form and Wetland Data Form was entered electronically in the field on a personal digital assistant (PDA) palmtop computer during the field investigation (Appendix B). Monitoring activity sites were located with a global positioning system (GPS) (Figure 2, Appendix A). Information collected included a wetland delineation; vegetation community mapping; vegetation transect, soils and hydrology data; bird and wildlife use documentation; photograph documentation; and a non-engineering examination of the infrastructure established within the mitigation project area.

2.1. Hydrology

Technical criteria for wetland hydrology guidelines have been established as "permanent or periodic inundation, or soil saturation within 12 inches of the ground surface for a significant period (usually 14 days or more or 12.5 percent) during the growing season" (Environmental Laboratory 1987). Systems with continuous inundation or saturation for greater than 12.5 percent of the growing season are considered wetlands. The growing season is defined for purposes of this report as the number of days where there is a 50 percent probability that the minimum daily temperature is greater than or equal to 28 degrees Fahrenheit (Environmental Laboratory 1987). The growing season recorded for the area characterized by the Vanda clay map unit is 90 to 110 days (USDA 2010). Areas defined as wetlands would require a minimum of 11 days of inundation or saturation within 12 inches of the ground surface to meet the hydrology criteria and performance standards.

The presence of hydrological indicators as outlined on the Wetland Data form was assessed at six data points within the project area. Hydrologic indicators were evaluated according to features observed during the site visit. The data were recorded on the electronic Wetland Data Form (Appendix B). Hydrologic assessments allow evaluation of mitigation goals addressing inundation/saturation requirements.

No groundwater monitoring wells were present on the site. Soil pits excavated during the wetland delineation were used to evaluate groundwater levels within 18 inches of the ground surface. The data were recorded electronically on the Wetland Data Form (Appendix B).

2.2. Vegetation

The boundaries of dominant species-based vegetation communities were determined in the field during the active growing season and subsequently delineated on the 2011 aerial photograph. The percent cover of dominant species within a community type was estimated and recorded using the following values: 0 (less than 1 percent), 1 (1 to 5 percent), 2 (6 to 10 percent), 3 (11 to 20 percent), 4 (21 to 50 percent), and 5 (greater than 50 percent) (Appendix B).

Community types were named based on the predominant vegetation species that characterized each mapped polygon (Figure 3, Appendix).

Temporal changes in vegetation were evaluated through annual assessments of static belt transects established in fall 2004 and spring 2006 (Figure 2, Appendix A). Vegetation composition was assessed and recorded along three vegetation belt transects approximately 10 feet wide and 412 (T-1), 300 (T-2), and 173 (T-3) feet long (Figure 2, Appendix A). The transect endpoints were recorded with a GPS unit. Spatial changes in the dominant vegetation communities were recorded along the stationed transect. The percent cover of each vegetation species within the belt transect was estimated using the same cover ranges listed for the community polygon data on the aerial photograph (Appendix B). Photographs were taken at the endpoints of each transect during the monitoring event (Appendix C). No woody species were planted at the site.

2.3. Soil

Soil information was obtained from the *Soil Survey for Glacier County Area and part of Pondera County* and *in situ* soil descriptions (USDA 2010). Soil cores were excavated using a hand auger and evaluated according to procedures outlined in the USACE 1987 wetland manual. A description of the soil profile, including hydric indicators when present, was recorded on the Wetland Data Form for each profile (Appendix B).

The US Environmental Protection Agency's (EPA) conditional 401 certification for this project required MDT to monitor soils for metals, particularly for selenium enrichment. Soil samples were collected at seven locations within South Alkali Lake, North Alkali Lake, and Alkali Lake (project area) from 2009 to 2011. The South and North Alkali Lake soil samples provided a baseline comparison for the Alkali Lake soil samples. Soil was collected using a covered shovel blade. Soil in the upper six inches of a one-foot radius was removed, bagged, and labeled at each sample site. Samples were analyzed (EPA 6020 method) for arsenic, cadmium, nickel, and selenium (laboratory results in Appendix E).

2.4. Wetland Delineation

Waters of the US including jurisdictional wetlands and other special aquatic sites were delineated throughout the project area in accordance with criteria established in the USACE 1987 wetland manual. In order to delineate a representative area as wetland, the technical criteria for hydrophytic vegetation, hydric soil, and wetland hydrology, as described in the 1987 manual, must be satisfied. The indicator status of vegetation was derived from the National List of Plant Species that Occur in Wetlands: Northwest Region 9 (Reed 1988). A Routine Level-2 On-site Determination Method (Environmental Laboratory 1987) was used to delineate jurisdictional areas within the project boundaries. The information was recorded electronically on the Wetland Data Form (Appendix B).

Consultation with the USACE determined that the 1987 manual should continue to be used at MDT mitigation sites where baseline wetland conditions had been

established prior to 2008. Consequently, the use of the 2010 *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region* (USACE 2010) was not required.

The wetland boundary was determined in the field based on changes in plant communities and/or hydrology, and changes in soil characteristics. Topographic relief boundaries within the project area were also examined and cross referenced with soil and vegetation communities as supportive information for this delineation. Vegetation composition, soil characteristics, and hydrology were assessed at likely wetland and adjacent upland locations. If all three parameters met the criteria, the area was designated as wetland and mapped by vegetation community type. When any one of the parameters did not exhibit positive wetland indicators, the area was determined to be upland unless the site was classified as an atypical situation, potential problem area, or special aquatic site, i.e. mud flat. The wetland boundaries were identified on the 2011 aerial photograph. Wetland areas were estimated using geographic information system (GIS) methodology.

2.5. Wildlife

Observations and other positive indicators of use of mammal, reptile, amphibian, and bird species were recorded on the wetland monitoring form during the site visit. Indirect use indicators, including tracks, scat, burrow, eggshells, skins, and bones, were also recorded. Direct sampling methods, such as snap traps, live traps, and pitfall traps, were not used. A comprehensive list of wildlife species observed since 2006 was compiled.

2.6. Functional Assessment

The 1999 MDT Montana Wetland Assessment Method (MWAM) (Berglund 1999) was employed to complete functional assessments of the site in 2006 and 2007. The 2008 MDT MWAM (Berglund and McEldowney 2008) was used to evaluate functions and values at the site from 2008 to 2011. This method provides an objective means of assigning wetlands an overall rating and a means of assessing mitigation success based on wetland functions. Functions are self-sustaining properties of a wetland ecosystem that exist in the absence of society and relate to ecological significance without regard to subjective human values (Berglund and McEldowney 2008). The 2008 revision refines ratings for some wetland functions, land management, and fish and wildlife habitat.

Field data for this assessment were collected during the site visit. A single Wetland Assessment Form was completed for the entire project area (Appendix B).

2.7. Photo Documentation

Monitoring at photo points provides supplemental information documenting wetland, upland, and vegetation transect conditions; site trends, and current land use surrounding the site. Photographs were taken at established photo points throughout the mitigation site during the site visit (Appendix C). Photo point locations were recorded with a resource grade GPS unit (Figure 2, Appendix A).

Photographs of the vegetation transect end points and wetland data points are included in Appendix C.

2.8. GPS Data

Site features and survey points were collected with a resource grade Thales Pro Mark III GPS unit. Points were collected using WAAS-enabled differential correction satellites, typically improving resolution to sub-meter accuracy. The collected data were then transferred to a personal computer, exported into GIS, and drawn in Montana State Plane Single Zone NAD 83 meters. In addition to GPS, some site features within the site were hand-mapped onto the 2011 aerial photograph, then digitized. Site features and survey points that were mapped included fence boundaries, photograph points, transect beginnings and endings, wetland boundaries, and vegetation community boundaries.

2.9. Maintenance Needs

Channels, engineered structures, fencing, and other features were examined during the site visit for obvious signs of breaching, damage, or other problems. This was a cursory examination and did not constitute an engineering-level structural inspection.

3. RESULTS

3.1. Hydrology

Hydrology was restored to the lakebed through the construction of a pipeline to divert water from the Birch Creek Main Canal to Blacktail Creek. Surface water was then diverted from Blacktail Creek to the Badger Fisher Main Canal, K Canal, and 19K Canal where a second pipeline was built to deliver water directly to Alkali Lake. The Blackfeet Tribe was to supply 200-acre feet of water between the dates of April 15th and May 15th. Upon filling of the 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. The inlet channel was not conveying water to the lake during the August 21, 2011, monitoring event. The extent of open water increased by approximately 25 acres in 2011, likely a reflection of the above average snowpack and surface water recharge during spring runoff.

The open water habitat increased by approximately 25 acres between 2010 and 2011. These additional acres of open water were vegetated with trace amounts of rooted vegetation and green algae and had been dominated by annual plants in 2010. Approximately 50 percent of the assessment area was inundated with surface water ranging in depth from 0 to 2 feet in 2011. The depth at the emergent vegetation and open water boundary was approximately one foot.

Precipitation rates influence wetland development at the site although the primary hydrological source is diversion from local canals. The total average annual precipitation recorded at the Valier Weather Station, Montana (248501), was 12.48 inches from January 1911 to December 2010 (WRCC 2011). The average precipitation in 2010 was 14.63 inches, 2.15 inches above the 99 year average. The long-term precipitation average (1911-2007) from January to June

was 7.12 inches. Monthly totals from January to June were 8.27 inches in 2010 and 10.62 inches in 2011(NCDC) for the same time period, indicating wetter than normal conditions.

Six data points, Alk-1 to Alk-6 were sampled in 2011 to determine the wetland and upland boundaries (Figure 2 in Appendix A and Wetland Forms in Appendix B). Data points Alk-2, -3, and -5 were located in areas that met the three wetland criteria. The primary wetland indicator at Alk-2 was saturation within 12 inches of the ground surface. Saturation at 11 inches below the ground surface (bgs), drainage patterns in wetlands and the FAC-Neutral Test (secondary indicator) were positive indicators for wetland hydrology at Alk-3. Data point Alk-5 was saturated at 6 inches bgs and exhibited two secondary indicators, oxidized rhizospheres along living roots and the FAC-Neutral test. No primary hydrological indicators were observed at the remaining data points.

3.2. Vegetation

Vegetation community types were identified based on plant composition and dominance, and site topography and hydrology. The vegetation community types and associated species are identified on the Monitoring Forms in Appendix B. The vegetation community polygons are identified on Figure 3 of Appendix A. The seventy-five plant species identified at the site from 2006 to 2011 are listed in Table 2. The four vegetation communities identified in 2011 remained consistent with those identified in 2010, Type 1 – *Agropyron smithii/Iva axillaris* Upland, Type 3 – *Hordeum* spp. Wetland, Type 4 – *Scirpus* spp./*Eleocharis* spp. Wetland, and Type 7 – *Eleocharis* spp. Wetland. The open water/mud flat area associated with Alkali Lake was identified as number 8 on Figure 3 (Appendix A).

Upland Type 1 – *Agropyron smithii/Iva axillaris* was found in the 80 acres of upland that border the wetland fringe surrounding the lake. The species were dominated by Western wheatgrass (*Agropyron smithii*), small-flower sumpweed (*Iva axillaris),* alkali bluegrass (*Poa juncifolia*), and Mexican summer-cypress (Kochia scoparia). More than 38 additional species were identified within the community at low cover percentages.

Wetland Type 3 – *Hordeum* spp. was identified in 68 acres of the wetland fringe that formed around the lake perimeter. Meadow barley (*Hordeum brachyantherum*), foxtail barley (*Hordeum jubatum*), small-flower sumpweed, and Nuttall's alkali grass (*Puccinellia nuttalliana*) dominated the vegetation species. Approximately 21 to 50 percent of the total community cover was bare ground. The community was called *Suaeda* (seepweed spp.) wetland in 2009. The species was no longer dominant in 2010 or 2011, potentially the result of periodic submersion.

Table 2. Vegetation species observed from 2006 to 2011 at the Alkali Lake Wetland Mitigation Site.

SCIENTIFIC NAME	COMMON NAME	REGION 9 INDICATOR STATUS[1]
Achillea millefolium	**yarrow,common**	**FACU**
Achnatherum nelsonii	**Columbia needlegrass**	**NI**
Agropyron smithii	wheatgrass,western	FACU
Agrostis stolonifera	bentgrass,spreading	FAC+
Algae, green	algae, green	NL
Alisma gramineum	water-plantain,narrow-leaf	OBL
Allium cernuum	nodding onion	NL
Alopecurus arundinaceus	foxtail,creeping	NI
Alopecurus pratensis	**foxtail,meadow**	**FACW**
Alopercurus spp.		NL
Artemisia frigida	prairie sagewort	NL
Aster campestris	western meadow aster	NL
Aster falcatus	aster,white prairie	FACU-
Astragalus bisulcatus	two-grooved milkvetch	NL
Astragalus vexilliflexus	bent-flowered milk-vetch	NL
Atriplex argentea	**saltbush,silver-scale**	**FAC-**
Atriplex nuttallii	Nuttall's saltbush	NL
Atriplex patula	saltbush,halberd-leaf	FACW
Avena fatua	**wild oat**	**NL**
Beckmannia syzigachne	sloughgrass,American	OBL
Bouteloua gracilis	blue grama	NL
Bromus commutata	bald brome	NL
Carex microptera	sedge,small-wing	FAC
Carex sp.	**sedge**	**NI**
Ceratophyllum demersum	**hornwort,common**	**OBL**
Chenopodium album	**goosefoot,white**	**FAC**
Chenopodium glaucum	goosefoot,oakleaf	FAC
Cirsium arvense	thistle,creeping	FACU+
Distichlis spicata	saltgrass,seashore	FAC+
Eleocharis acicularis	spikerush,least	OBL
Eleocharis palustris	spikerush,creeping	OBL
Elymus cinereus	**wild-rye,basin**	**NI**
Elymus trachycaulus	**slender wheatgrass**	**NL**
Grindelia squarrosa	gumweed,curly-cup	FACU
Gutierrezia sarothrae	broom snakeweed	NL
Helianthus nuttallii	sunflower,Nuttall's	FACW-
Hippuris vulgaris	mare's-tail,common	OBL
Hordeum brachyantherum	barley,meadow	FACW
Hordeum jubatum	barley,fox-tail	FAC+
Iva axillaris	sumpweed,small-flower	FAC
Juncus balticus	rush,Baltic	OBL
Juncus spp.		NL
Juncus torreyi	rush,Torrey's	FACW

[1]Region 9 Northwest (Reed 1988).

Species first identified in 2011 are listed in **bold** type.

Table 2 (Continued). Vegetation species observed from 2006 to 2011 at the Alkali Lake Wetland Mitigation Site.

SCIENTIFIC NAME	COMMON NAME	REGION 9 INDICATOR STATUS[1]
Kochia scoparia	**summer-cypress,Mexican**	**FAC**
Koeleria macrantha	prairie junegrass	NL
Lactuca serriola	lettuce,prickly	FAC-
Lappula myosotis	stickseed	NL
Lepidium ramossissimim	manybranched pepperweed	NL
Lomatium macrocarpum	**bigseed biscuitroot**	**NI**
Lomatium spp.		NL
Melilotus officinalis	sweetclover,yellow	FACU
Melilotus spp.		NL
Monolepis nuttalliana	poverty-weed,Nuttall's	FAC-
Najas guadalupensis	naiad,southern	OBL
Phlox hoodii	carpet phlox	NL
Poa juncifolia	bluegrass,alkali	FACU+
Polygonum amphibium	smartweed,water	OBL
Polygonum douglasii	knotweed,Douglas'	FACU
Polygonum ramosissimum	knotweed,bushy	FAC-
Potamogeton spp.		NL
Puccinellia nuttalliana	grass,Nuttall's alkali	OBL
Rumex crispus	dock,curly	FACW
Salicornia rubra	saltwort,red	OBL
Sarcobatus vermiculatus	greasewood,black	FACU+
Scirpus acutus	bulrush,hard-stem	OBL
Scirpus maritimus	**bulrush,saltmarsh**	**OBL**
Scirpus microcarpus	**bulrush,small-fruit**	**OBL**
Scirpus pungens	bulrush,three-square	OBL
Scirpus validus	bulrush,soft-stem	OBL
Sphaeralcea coccinea	scarlet globemallow	NL
Suaeda depressa	seepweed,pursh	FACW-
Taraxacum officinale	dandelion,common	FACU
Thlaspi arvense	penny-cress,field	NI
Tragopogon dubius	**yellow salsify**	**NL**
Triglochin maritimum	arrow-grass,seaside	OBL
Typha latifolia	cattail,broad-leaf	OBL
Vicia americana	vetch,American purple	NI

[1]Region 9 Northwest (Reed 1988).
Species first identified in 2011 are listed in **bold** type.

Wetland Type 4 – *Scirpus* spp./*Eleocharis* spp. was found in small (1.21 acres), isolated areas in the southwest portion of the site. Hard-stem bulrush (*Scirpus acutus*), saltmarsh bulrush (*Scirpus maritimus*), three-square bulrush (*Scirpus pungens*), creeping spikerush (*Eleocharis palustris*), least spikerush (*Eleocharis acicularis*), and creeping foxtail (*Alopecurus arundinaceus*) dominated the vegetation species.

Wetland Type 7 – *Eleocharis* spp. characterized the irrigation ditches located in the southwest portion of the site. The community was dominated by creeping spikerush, least spikerush, Southern naiad (*Najas guadalupensis*), creeping foxtail, foxtail barley, and Nuttall's alkali grass.

The open water area in Alkali Lake was vegetated with trace amounts of Western wheatgrass, seashore saltgrass (*Distichlis spicata*), meadow barley, small-flower sumpweed, least spikerush and green algae. An additional 25 acres of open water were mapped in 2011 due to increased extent of inundation. These areas were primarily dominated by annual vegetation in 2010 that may have been overly-wet in 2011 to promote continued vegetation development.

Seeded species included creeping spikerush, Baltic rush (*Juncus balticus*), Torrey's rush (*Juncus torreyi*), Nuttall's alkaligrass, hard-stem bulrush, saltmarsh bulrush, three-square bulrush, and seaside arrowgrass (*Triglochin maritimum*). The species have been observed on the site during the five-year monitoring period. Saltmarsh bulrush was identified for the first time in 2011. No volunteer woody species were observed at the site.

Three vegetation transects were monitored at Alkali Lake in 2011 (Figure 2, Appendix A). The plant communities and species are listed on the Monitoring Form (Appendix B) and photographs of the transect endpoints taken in 2009 to 2011 are included on pages C-2 through C-4 of Appendix C. The data collected on Transect 1 are summarized in Table 3 and graphed in Charts 1 and 2. Transect 1, located near the center of the south boundary, intersected upland Type 1 and wetland Types 3, 4, and 7, and open water. Hydrophytic vegetation communities were identified on approximately 27.9 percent of the transect, a decrease of 61.9 percent from 2010. The extent of open water intersecting the transect increased from 10.2 percent in 2010 to 69.2 percent in 2011 and was likely the result of surface water recharge from the runoff of above average snowpacks within the surrounding mountains and spring precipitation. Upland vegetation accounted for 2.9 percent of the vegetation cover.

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

Monitoring Year	2006	2007	2008	2009	2010	2011
Transect Length (feet)	175	412	412	412	412	412
Vegetation Community Transitions along Transect	1	3	2	6	4	5
Vegetation Communities along Transect	1	4	3	3	3	4
Hydrophytic Vegetation Communities along Transect	1	3	3	3	3	3
Total Vegetative Species	5	9	7	12	15	12
Total Hydrophytic Species	4	5	6	10	11	9
Total Upland Species	1	4	1	2	4	3
Estimated % Total Vegetative Cover	70	50	50	50	55	30
% Transect Length Comprising Hydrophytic Vegetation Communities	100	62	63	85	89.8	27.9
% Transect Length Comprising Upland Vegetation Communities	0	2	0	0	0.0	2.9
% Transect Length Comprising Unvegetated Open Water	0	0	37	15	10.2	69.2
% Transect Length Comprising Bare Substrate	0	36	0	0	0.0	0.0

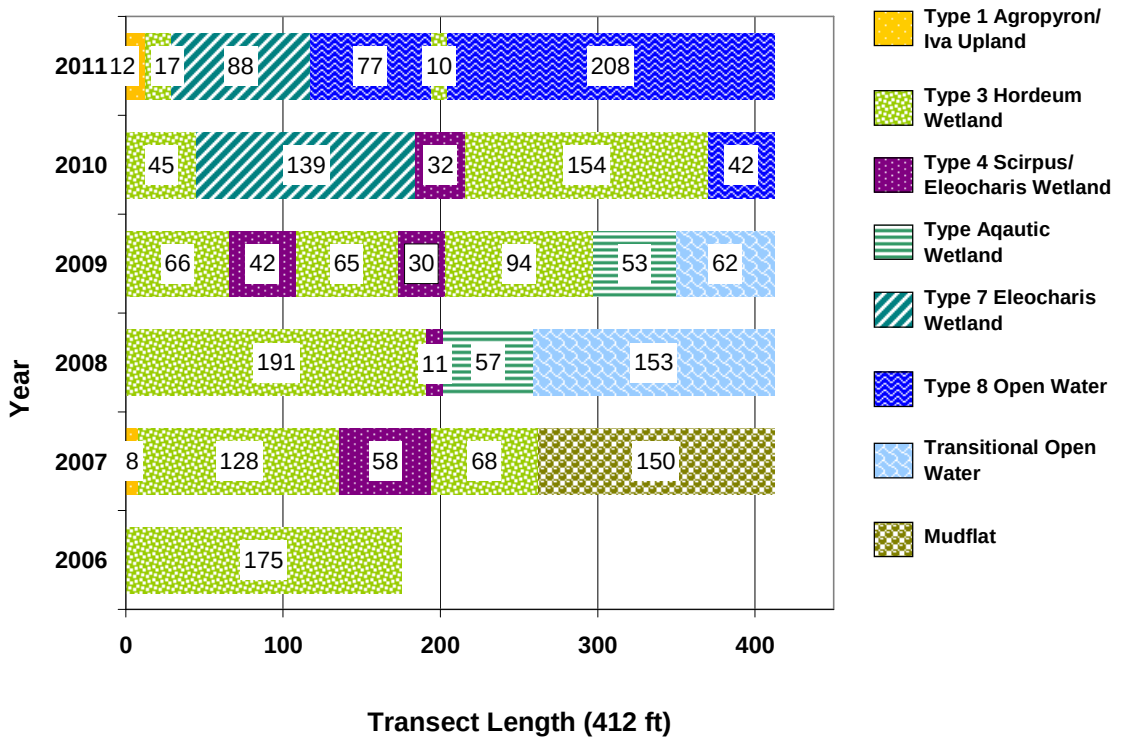

Chart 1. Transect maps showing vegetation communities on Transect 1 from start (0 feet) to finish (175 feet in 2006 and 412 feet in 2007 to 2011).

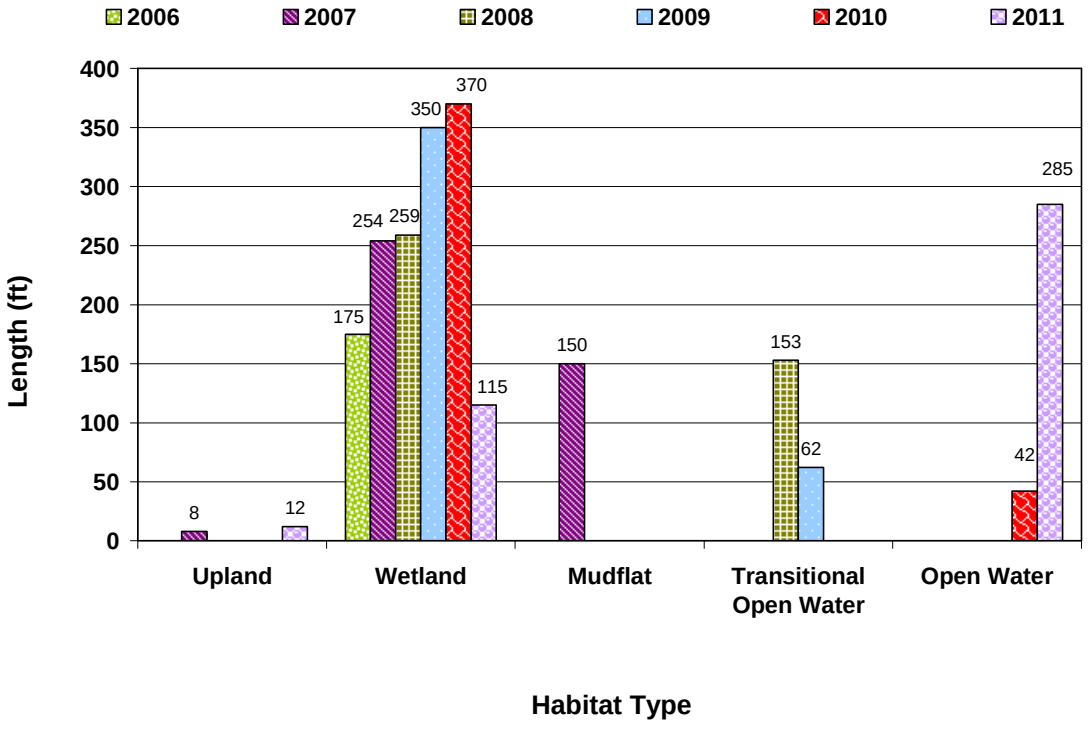

Chart 2. Length of habitat types within Transect 1 from 2006 to 2011.

Data recorded for Transect 2 (Monitoring Form, Appendix B) were summarized in tabular and graphic formats (Table 4; Charts 3 and 4, respectively). Transect 2 was lengthened in 2007 to encompass the diversity of developing habitats. Type 1 – *Agropyron smithii/Iva axillaris* Upland, Type 3 – Hordeum spp. Wetland, and open water were identified on the transect. The percent of open water on T-2 increased from 42 percent in 2010 to 69 percent in 2011. The cover of hydrophytic vegetation on the transect was 25 percent.

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

Monitoring Year	2006	2007	2008	2009	2010	2011
Transect Length (feet)	175	297	297	297	297	300
Vegetation Community Transitions along Transect	1	2	2	2	2	2
Vegetation Communities along Transect	2	3	3	3	2	2
Hydrophytic Vegetation Communities along Transect	1	2	2	2	1	1
Total Vegetative Species	8	10	7	8	11	7
Total Hydrophytic Species	3	5	5	6	6	5
Total Upland Species	5	5	2	2	5	2
Estimated % Total Vegetative Cover	70	57	57	70	70	50
% Transect Length Comprising Hydrophytic Vegetation Communities	74	72	43	89	52	25
% Transect Length Comprising Upland Vegetation Communities	3	20	2	2	6	6
% Transect Length Comprising Unvegetated Open Water	23	0	55	9	42	69
% Transect Length Comprising Bare Substrate	0	8	0	0	0	0

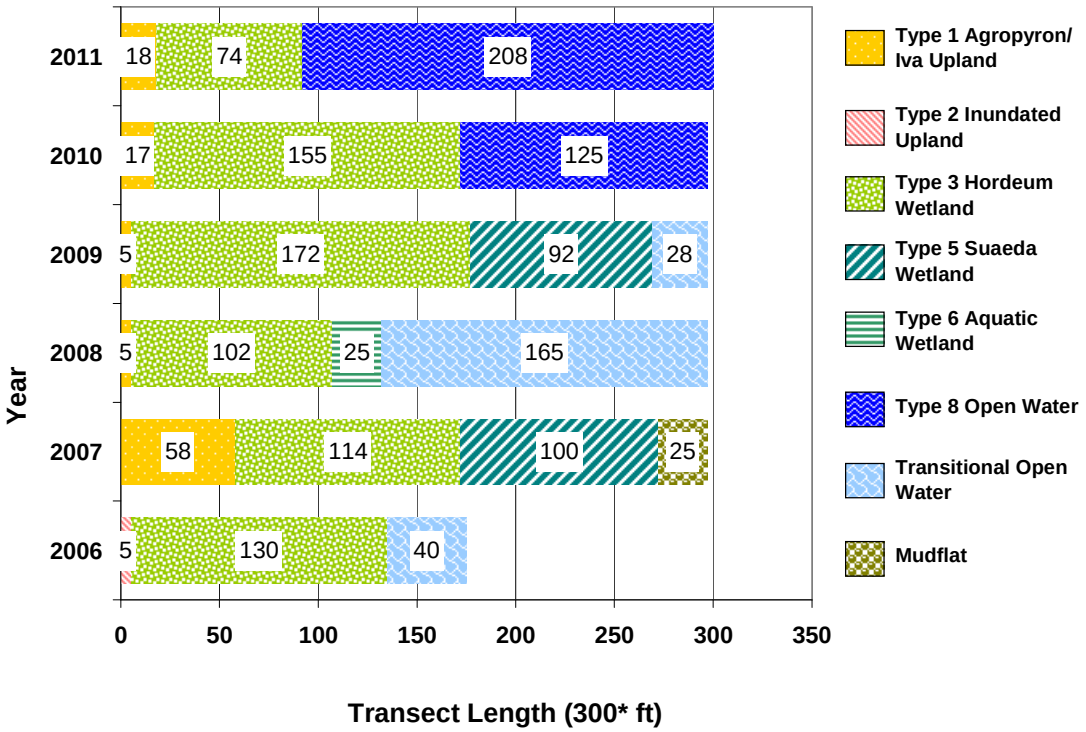

Chart 3. Transect maps showing vegetation communities on Transect 2 from start (0 feet) to finish (175 feet in 2006, 297 feet in 2007 to 2010, and 300 feet in 2011).

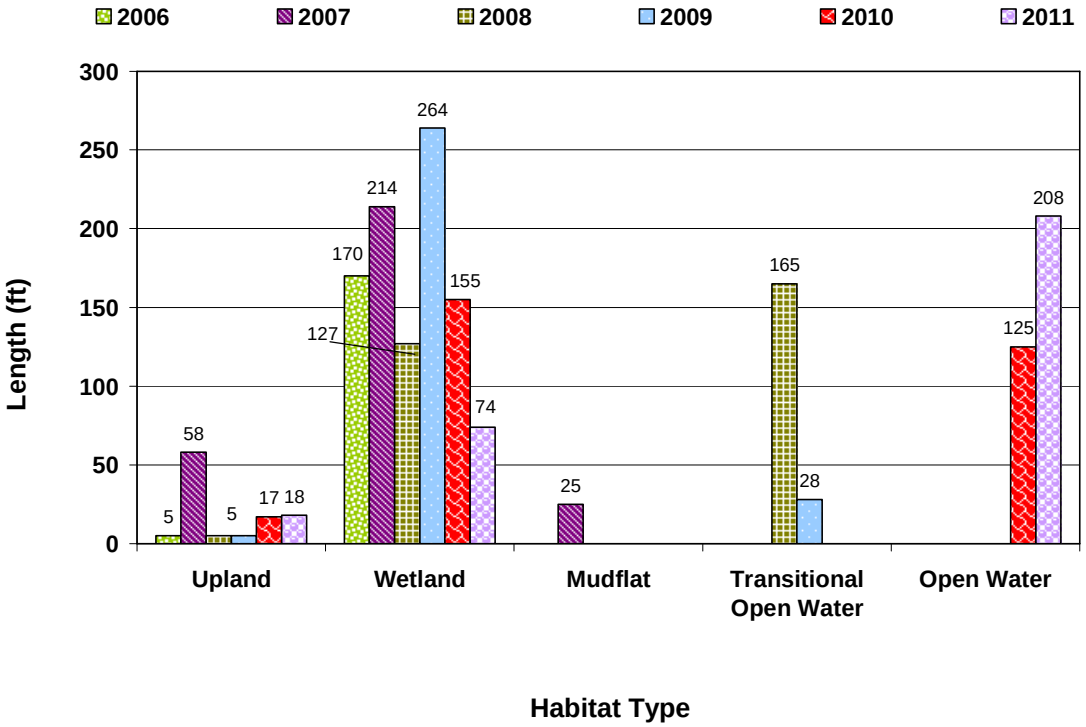

Chart 4. Length of habitat types within Transect 2 from 2006 to 2011.

Data recorded for Transect 3 (Monitoring Form, Appendix B) were summarized in tabular and graphic formats (Table 5; Charts 5 and 6, respectively). The transect length measured in 2007 through 2009 was 173 feet. The length measured from pin to pin in 2010 was 227 feet, attributed to movement of the pin by wildlife. Wetland Type 3 – *Hordeum* spp. has dominated the transect since 2006. The percent of open water within the belt transect increased notably in 2011, from 10 percent last year to 63 percent this year. Hydrophytic species dominated 37 percent of the transect. The entire length of the transect is located in aquatic and wetland habitat.

Canada thistle, a Priority 2B weed, was observed near the inlet at less than 0.1 acre in area and at 1 to 5 percent cover (Figure 3, Appendix A). The weed was also observed at trace cover levels within Community 7. The MDT has an ongoing weed management plan that includes an annual assessment of site weeds. The site was not sprayed in 2011.

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

Monitoring Year	2006	2007	2008	2009	2010	2011
Transect Length (feet)	100	173	173	173	227	227
Vegetation Community Transitions along Transect	1	2	0	1	1	1
Vegetation Communities along Transect	2	3	1	2	1	1
Hydrophytic Vegetation Communities along Transect	1	2	1	2	1	1
Total Vegetative Species	8	10	7	8	9	6
Total Hydrophytic Species	5	6	5	6	5	5
Total Upland Species	3	4	2	2	4	1
Estimated % Total Vegetative Cover	55	53	50	75	75	37
% Transect Length Comprising Hydrophytic Vegetation Communities	63	52	95	100	90	37
% Transect Length Comprising Upland Vegetation Communities	37	19	0	0	0	0
% Transect Length Comprising Unvegetated Open Water	0	0	5	0	10	63
% Transect Length Comprising Bare Substrate	0	0	0	0	0	0

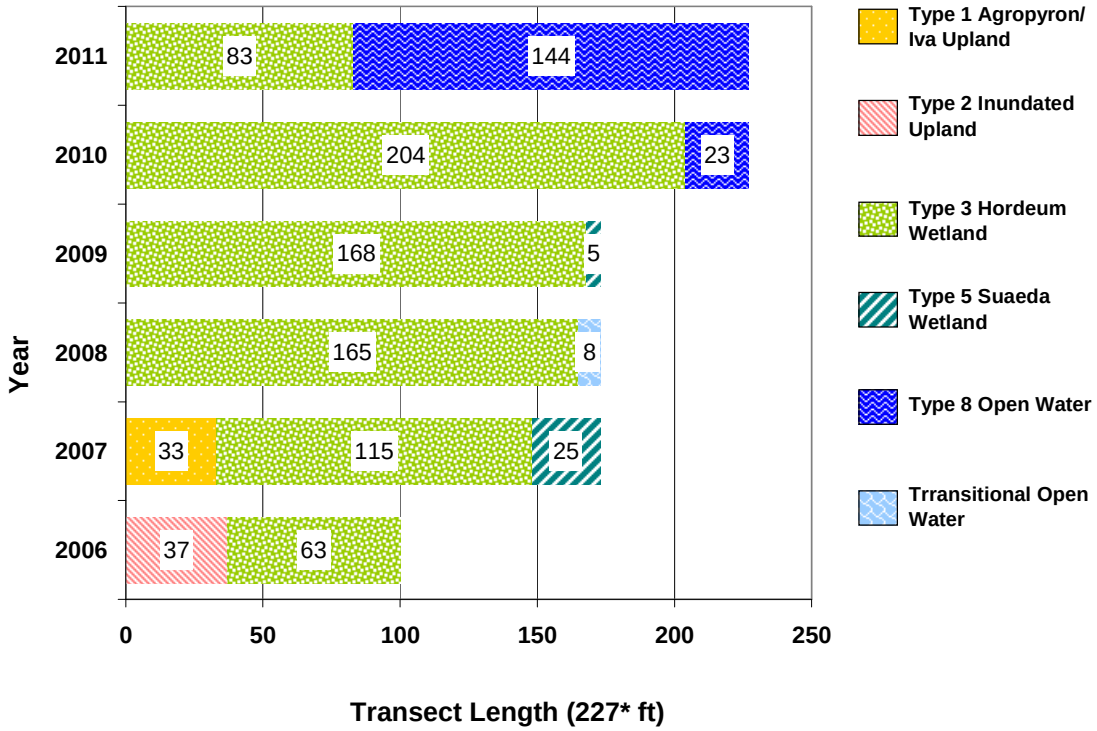

Chart 5. Length of habitat types within Transect 3 from start to finish from 2006 to 2011 (*Transect length from 2007 to 2009 was recorded at 173 feet. Length measured in 2010 and 2011 was 227 feet).

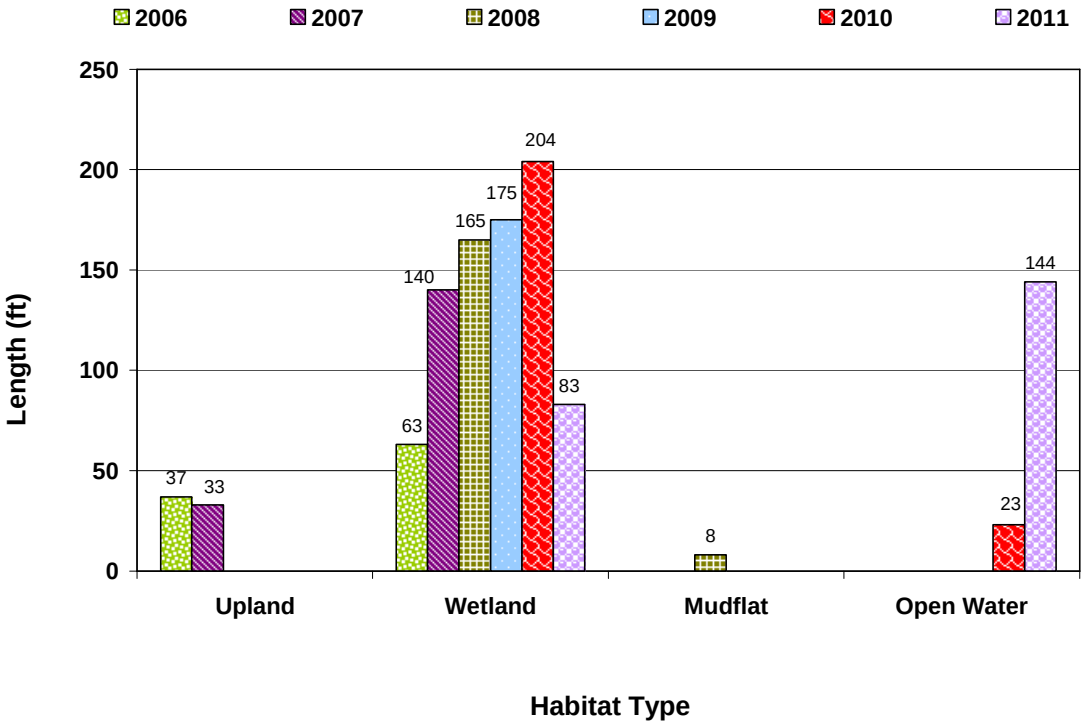

Chart 6. Length of habitat types from 2006 to 2011.

3.3. Soil

The project area was mapped as 'lake bed' prior to construction of the wetland mitigation site. The taxonomy was listed as a frigid Typic Fluvaquent. Data points Alk-2, Alk-3, and Alk-5 were located within areas defined as wetlands (Figure 2, Appendix A). The soil at Alk-2 was clay (10 YR 5/1) with redoximorphic concentrations in the matrix (10 YR 5/6). The low-chroma color coupled with redox features and listing on the local soil list were positive indicators of hydric soil. The profile at Alk-3 revealed a clay soil (2.5 YR 4/1) with redox concentrations in the matrix (10 YR 4/3), which is an indication of hydric soil. The profile at Alk-5 exhibited a silty clay soil (2.5 YR 4/2) with redox concentrations (10 YR 4/3) in the matrix. The low chroma color and redox concentrations and listing on local soil list were positive indicators of hydric soil. Soil profile Alk-4 located in upland met the hydric soil criteria with a dark gray clay soil (10 YR 4/1). The mapped type generally applied to all the data points, although the map unit was not confirmed at data points Alk-1 and Alk-6.

Baseline soil data from 10 sites collected in June 2004 were analyzed for arsenic, cadmium, nickel, and selenium. Soils collected from the North Alkali and South Alkali Lakes provided a baseline comparison for the Alkali Lake (project area) samples. It is important to note that the water source for the existing North and South Alkali Lakes differs from that of Alkali Lake and that there is no surface water connection between the North and South Alkali Lakes and Alkali

Lake (project area). Aquatic health guidelines were assembled from a number of sources (Table 6) to evaluate metal levels from the 10 sites (PBS&J 2009).

A value of 9.7 mg/kg of arsenic was reported in 2004 for the M1 soil sample collected from the east side of Alkali Lake. The value was within the low end of the concern range based on the National Irrigation Water Quality Program guideline. Paired soil samples were collected in 2004 to determine whether vegetated and barren patches differed in metal content. The 2004 data showed that metal levels in vegetated and barren soils occurring within 100 feet of each other were similar. The agencies decided that collecting paired soil samples was not necessary. Soil samples have been collected and analyzed for the metals listed above from 2006 to 2011. Seven sites have been sampled since 2008. The 2011 laboratory analytical results are included in Appendix E.

Soil samples were collected at seven locations within the Alkali Lake project area in 2011. Soil samples were analyzed for arsenic (As), cadmium (Cd), nickel (Ni), and selenium (Se) by Pace Analytical of Billings, Montana. The 2009 to 2011 results were reported on a weight-weight basis (Table 7) for consistency between sampling events. Sample locations are shown on Figure 2 (Appendix A). The analytical results show increasing trends for As and Ni from 2009 to 2011 at sample sites L1, M1, O, K, and N. Selenium levels at sample sites L1 and M1 also increased from 2009 to 2011.

Table 6. Guidelines for metals in sediment for the protection of aquatic life.

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, probable 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 US and includes the Rocky Mountains.

[3] National Environment Protection Measure.

Table 7. Levels of As, Cd, Ni, and Se measured in soil sediment samples at Alkali Lake in 2009, 2010, and 2011.

LAKE LOCATION	SAMPLE YEAR	SOIL SAMPLE MAP LOCATION	ARSENIC (As) mg/kg	CADMIUM (Cd) mg/kg	NICKEL (Ni) mg/kg	SELENIUM (Se) mg/kg
North Alkali	2009	B2	4.24	0.25	11.90	0.18
South Alkali	2009	D	7.83	0.49	24.00	0.17
South Alkali	2009	F	7.25	0.50	20.90	0.24
South Alkali	2010	F	8.50	0.24	24.70	0.85
South Alkali	2011	F	4.70	0.13	10.00	0.67
Alkali	2009	J	4.85	0.37	15.20	0.12
Alkali	2010	J	7.30	0.25	8.80	0.49
Alkali	2011	J	5.00	0.19	12.40	0.47
Alkali	2009	L1	3.44	0.24	10.30	0.06
Alkali	2010	L1	11.40	0.27	21.10	0.67
Alkali	2011	L1	13.90	0.30	24.70	1.40
Alkali	2009	M1	5.03	0.34	14.20	0.15
Alkali	2010	M1	5.90	0.21	18.00	0.65
Alkali	2011	M1	8.30	0.26	20.10	1.10
Alkali	2009	O	5.12	0.38	15.20	0.41
Alkali	2010	O	7.80	0.34	16.40	0.95
Alkali	2011	O	9.70	0.35	19.60	0.58
Alkali	2010	K	6.30	0.20	18.70	0.65
Alkali	2011	K	8.40	0.27	19.20	0.51
Alkali	2010	N	5.10	0.17	15.70	0.61
Alkali	2011	N	6.70	0.21	17.10	0.45

Arsenic concentrations at South Alkali Lake, sample location F, decreased from 8.50 mg/kg in 2010 to 4.70 mg/kg in 2011. The 2011 value is within the NIWQP toxicity thresholds for constituents in sediments for arsenic. The NIWQP guideline denoting concern for arsenic is 8.2 to 70 mg/kg. Sample locations L1, M1, O, and K were within this range in 2011. The highest concentration of arsenic (13.90 mg/kg) was measured in sample L1. Arsenic concentrations in samples L1, M1, O, K, and N increased by approximately 2 mg/kg from 2010 to 2011. The concentrations were below the Canadian Interim (CAN), NIWQP Toxicity, and National Environmental Protection Measure (NEPC) guidelines for the protection of aquatic life (Table 6). The mean arsenic concentration for samples collected within the Alkali Lake site (J, L1, M1, O, K, and N) was 8.67 mg/kg. The increase in concentrations at some sample sites may be attributed to site-specific geologic and environmental conditions that exist within the project area and watershed, high seasonal precipitation levels, and/or off-site irrigation sources. The upper six inches of the soil surface where the samples were taken is affected by evaporation and accumulation of salts and other dissolved constituents within the interstitial pore water and high water table.

Cadmium concentrations increased slightly in five of the seven soil samples in 2011 when compared to 2010 analytical results. Two samples, F and J, showed a slight decrease from 0.24 mg/kg in 2010 to 0.13 mg/kg in 2011 and 0.25 mg/kg

in 2010 to 0.19 mg/kg in 2011, respectively. The mean was 0.26 mg/kg for samples collected within the site boundaries. Concentration differences year to year may be the result of actual increases in heavy metal concentrations, sample collection at different micro-landscape positions near each sample point (concave/convex), or slight variations in the way samples were processed. None of the toxicity guidelines for the protection of aquatic life were exceeded for cadmium concentrations. The mean cadmium concentration within the soils sampled in 2011 were an order of magnitude under the NEPC ecological investigation level and currently do not indicate a threat to indigenous wildlife populations within the site.

Nickel concentrations generally increased from 2010 to 2011 with only one sample, F, decreasing from 24.70 mg/kg in 2010 to 10.00 mg/kg in 2011. The average nickel concentration measured in the 2011 samples was 18.85 mg/kg. The highest nickel concentration measured within the site was 24.70 mg/kg reported in sample L1. None of the sample results were above the NEPC guidelines for nickel and were not present in concentrations warranting ecological investigation.

Selenium concentrations reported at most locations were lower in 2011 than in 2010. Selenium levels measured in 2011 ranged from 0.45 (sample N) to 1.40 mg/kg (sample L1), respectively. The mean selenium concentration for the 2011 samples was 0.75 mg/kg, a slight increase from the 0.70 mg/kg found in 2010. The MIWQP guideline denoting concern is 1 to 4 mg/kg of selenium. Two sample locations, L1 and M1, fell within the low range of concern in 2011 with concentration levels at 1.40 and 1.0mg/kg, respectively.

Overall, two of the sampled parameters, As and Se, are producing results which warrant particular scrutiny in the future. All but one (J) of the sampling locations within the project area (J, L1, M1, O, K, N) exhibit a rising As trend over the last three years, and at four of the five sites with a rising trend the As value is now slightly above the lower bound of the most conservative of the guidelines used for interpreting the results for this project. That guideline, the NIQW “concern” level, encompasses the range of values between a Threshold Effect Concentration (TEC, the concentration below which adverse effects are unlikely or unknown to occur) and a Probable Effects Concentration (PEC, the concentration at which adverse effects are likely to occur). As such, there is no immediate expectation of adverse effects on the biota from current levels of As, but they have crossed into an area of concern, and if the current rising trends persist As concentrations may reach levels where adverse effects are probable.

Similarly, Se concentrations at three of the sampling locations (J, L1, M1) demonstrate a recent rising trend, and two of those (L1, M1) have risen to exceed the lower bound of the NIQW “concern” range. Again, this does indicate an expectation of adverse effects at current levels, but the rising trend may result in Se concentrations at which adverse effects become likely.

The current analysis methods are intended to serve as a "detection" oriented sampling. Given the results are beginning to exceed the lower bound of the identified range of "concern" for some of the analytes, more rigorous methods may be in order. For example, determining trend by simple comparison of annual values should probably be replaced with statistical methods of trend determination. Such methods would allow one to demonstrate whether or not the apparent current trend or the increase against baseline values is statistically significant, or merely the result of the variability of the data.

3.4. Wetland Delineation

The lakebed exhibited ephemeral wetland vegetation, hydric soils, and a lack of wetland hydrology prior to project implementation, precluding the need for a wetland delineation before construction. Alkali Lake has been filled periodically with hydrology from irrigation diversions and precipitation events from 2006 to 2011. The extent of wetland habitat varies year to year based on the duration and timing of inundation.

Approximately 70.25 acres met the three wetland criteria for vegetation, soil and hydrology (Table 8). The area of shallow open water vegetated with trace cover levels of emergent, submergent, and floating vegetation and algae increased to 133.24 acres in 2011, an increase of approximately 25 acres from 2010 to 2011. The total acres of aquatic habitat increased from 192.62 acres in 2010 to 203.49 acres in 2011.

Table 8. Aquatic and wetland habitat types acreages from 2006 to 2011 at the Alkali Lake Wetland Mitigation Site.

WETLAND AND AQUATIC HABITATS	2006	2007	2008	2009	2010	2011
Wetland (acres)	38.70	84.77	56.76	96.43	84.34	70.25
Open Water/Aquatic Bed (acres)	118.69	81.79	130.18	85.59	108.28	133.24
Total (acres)	157.39	166.56	186.94	182.02	192.62	203.49

*Open water in 2010 and 2011 was called transitional open water from 2006 to 2009.

3.5. Wildlife

Fifty-one bird species have been identified at the Alkali Mitigation Site from 2006 to 2011. A bald eagle (*Haliaeetus leucocephalus*) and a common garter snake (*Thamnophis radix)* were observed for the first time in 2010. Birds observed in 2011 included American avocet, American white pelican, California gull, cinnamon teal, common tern, northern harrier, and the Western sandpiper.

A plains gartersnake, white-tailed jack rabbit, 20 fish, and a frog were observed in 2011. Tracks of a coyote, deer mouse, and deer sp. were also identified. Additional passive wildlife signs included deer scat and rabbit droppings.

Piping plovers (*Charadrius melodus*) were observed at the mitigation site from 2007 to the present. Two piping plovers, presumably a pair, were sighted during the May 2007 surveys. One piping plover was seen foraging at the site and eight

piping plovers were observed in 2008. Spring sampling did not occur in 2010 to confirm continued nesting, although one piping plover was observed during mid-summer sampling. A birding survey conducted by MDT personnel in 2011 documented two adult piping plovers and a chick, suggesting breeding success of the threatened bird at this site. The piping plover has been federally listed as a threatened species since 1985. Montana was designated as containing critical habitat in 2002. Alkali Lake provides habitat for the piping plover, although the area was not designated specifically as critical habitat. The Alkali Lake area represents the western-most location in which Piping Plovers have been known to nest in the United States. Nesting was documented along North Alkali Lake in 1990 and 1992. According to the USFWS, Southeast Alkali Lake may contain the best potential plover habitat of the Alkali Lake complex. A secondary objective of this mitigation project was to manage water levels with the aim of creating habitat for the piping plover. Nesting piping plovers require unvegetated or sparsely-vegetated gravel and sand beaches located adjacent to alkaline wetlands. Piping plovers were documented for three consecutive springs potentially as a result of managing the habitat and the water levels.

Table 9. Wildlife species observed from 2006 to 2011 at the Alkali Lake Wetland Mitigation Site.

COMMON NAME	SCIENTIFIC NAME
AMPHIBIAN	
Frog sp.	
Pacific Treefrog	*Pseudacris regilla*
FISH	
Fish spp.	
MAMMAL	
Badger	*Taxidea taxus*
Black Bear	*Ursus americanus*
Coyote*	***Canis latrans***
Deer Mouse	***Peromyscus maniculatus***
Deer sp.*	
Domestic horse	
Meadow Vole*	*Microtus pennsylvanicus*
Porcupine	*Erethizon dorsatum*
Pronghorn*	*Antilocapra americana*
Raccoon	*Procyon lotor*
Red Fox*	*Vulpes vulpes*
Richardson's Ground Squirrel*	*Spermophilus richardsonii*
Striped Skunk	*Mephitis mephitis*
White-tailed Deer	*Odocoileus virginianus*
White-tailed Jack Rabbit	***Lepus townsendii***

Species identified in 2011 are listed in **bold** type.

*Denotes species identified by MDT in 2011.

Table 9 (Continued). Fish and wildlife species observed from 2006 to 2011 at the Alkali Lake Wetland Mitigation Site.

COMMON NAME	SCIENTIFIC NAME
BIRD	
American Avocet*	***Recurvirostra americana***
American Coot	*Fulica americana*
American White Pelican	***Pelecanus erythrorhynchos***
American Wigeon*	*Anas americana*
Black-billed Magpie*	*Pica hudsonia*
Blue-winged Teal*	*Anas discors*
Brewer's Blackbird	*Euphagus cyanocephalus*
Bufflehead	*Bucephala albeola*
California Gull	***Larus californicus***
Canada Goose*	*Branta canadensis*
Canvasback	*Aythya valisineria*
Cinnamon Teal	***Anas cyanoptera***
Common Goldeneye	*Bucephala clangula*
Common Raven	*Corvus corax*
Common Tern	***Sterna hirundo***
Forster's Tern*	*Sterna forsteri*
Franklin's Gull	*Leucophaeus pipixcan*
Gadwall	*Anas strepera*
Grasshopper Sparrow*	*Ammodramus savannarum*
Greater Yellowlegs	*Tringa melanoleuca*
Green-winged Teal	*Anas crecca*
Horned Lark*	*Eremophila alpestris*
Killdeer*	*Charadrius vociferus*
Lesser Yellowlegs	*Tringa flavipes*
Long-billed Curlew*	*Numenius americanus*
Long-billed Dowitcher	*Limnodromus scolopaceus*
Mallard*	*Anas platyrhynchos*
Marbled Godwit*	*Limosa fedoa*
Mourning Dove*	*Zenaida macroura*
Northern Harrier	***Circus cyaneus***
Northern Pintail	*Anas acuta*
Northern Shoveler*	*Anas clypeata*
Osprey	*Pandion haliaetus*
Piping Plover*	***Charadrius melodus***
Prairie Falcon	*Falco mexicanus*
Red-winged Blackbird	*Agelaius phoeniceus*
Ring-necked Duck	*Aythya collaris*

Species identified in 2011 are listed in **bold** type.

*Denotes species identified by MDT in 2011.

Table 9 (Continued). Fish and wildlife species observed from 2006 to 2011 at the Alkali Lake Wetland Mitigation Site.

COMMON NAME	SCIENTIFIC NAME
BIRD	
Ring-necked Pheasant	*Phasianus colchicus*
Ruddy Duck	*Oxyura jamaicensis*
Sanderling	*Calidris alba*
Sandhill Crane	*Grus canadensis*
Savannah Sparrow	*Passerculus sandwichensis*
Short-billed Dowitcher	*Limnodromus griseus*
Snow Bunting	*Plectrophenax nivalis*
Sparrow sp.	
Spotted sandpiper*	*Actitis macularius*
Swallow sp	
Tundra Swan	*Cygnus columbianus*
Vesper Sparrow*	*Pooecetes gramineus*
Western Meadowlark*	*Sturnella neglecta*
Western Sandpiper*	***Calidris mauri***
Willet*	*Tringa semipalmata*
Wilson's Phalarope*	*Phalaropus tricolor*
Wilson's Snipe	*Gallinago delicata*
Yellow-headed Blackbird	*Xanthocephalus xanthocephalus*
REPTILE	
Common Gartersnake	*Thamnophis sirtalis*
Plains Gartersnake	***Thamnophis radix***

Species identified in 2011 are listed in **bold** type.

*Denotes species identified by MDT in 2011.

3.6. Functional Assessment

Functional assessment results from 2006 to 2011 are presented in Table 10. The AA encompassed 203.49 acres of wetland habitat and open water associated with Alkali Lake in 2011. There were increases in functional points from 2010 to 2011 in the functions of short and long term surface water storage sediment/shoreline stabilization, and MTNHP species habitat with the documented breeding of long-billed curlew on site in 2011. The AA received a Category I rating with 74 percent of the total possible points, an increase of seven points since 2010. Functional ratings were high for listed/proposed threatened and endangered (T&E) species habitat for the piping plover, high for MTNHP species habitat with the documented breeding of the long-billed curlew, excellent for general wildlife habitat, high for short and long term surface water storage, and high for production export/food chain support. The functional units increased from 1155.72 in 2010 to 1302.34 in 2011, largely the result of the increase in open water habitat.

Table 10. Summary of 2006 to 2011 wetland function/value ratings and functional points assessed for the Alkali Lake Wetland Mitigation Site.

Function and Value Parameters from the Montana Wetland Assessment Method	2006 [1]	2007 [1]	2008 [2]	2009 [2]	2010 [2]	2011
Listed/Proposed T&E Species Habitat	Low (0.3)	Mod (0.8)	Mod (0.8)	Mod (0.8)	High (1.0)	High (1.0)
MTNHP Species Habitat	Mod (0.6)	Mod (0.6)	Mod (0.5)	Mod (0.5)	Mod (0.6)	High (0.9)
General Wildlife Habitat	High (0.9)	Exc (1.0)	Exc (1.0)	Exc (1.0)	Exc (1.0)	Exc. (1.0)
General Fish/Aquatic Habitat	N/A	N/A	N/A	N/A	N/A	NA
Flood Attenuation	N/A	N/A	N/A	N/A	N/A	NA
Short and Long Term Surface Water Storage	High (0.9)	High (0.9)	High (0.9)	High (0.9)	High (0.9)	High (1.0)
Sediment/Nutrient/Toxicant Removal	Mod (0.7)	Mod (0.7)	Mod (0.7)	Mod (0.7)	Mod (0.7)	Mod (0.7)
Sediment/Shoreline Stabilization	Low (0.2)	Low (0.3)	Low (0.2)	Low (0.2)	Low (0.3)	Mod (0.6)
Production Export/Food Chain Support	Mod (0.6)	Mod (0.7)	Mod (0.7)	High (0.8)	High (0.8)	High (0.8)
Groundwater Discharge/Recharge	Low (0.1)	Low (0.1)	Low (0.1)	Low (0.1)	Low (0.1)	Low (0.1)
Uniqueness	Mod (0.5)	Mod (0.5)	Mod (0.5)	Mod (0.5)	Mod (0.5)	Mod (0.5)
Recreation/Education Potential (bonus points[3])	Mod (0.7)	Mod (0.7)	Low (0.05)	Low (0.1)	Mod (0.1)	Mod (0.1)
Actual Points/Possible Points	**5/5/2010**	**6.3 / 10.0**	**5.45 / 9.0**	**5.6 / 9.0**	**6.0 / 9.0**	**6.7/9.0**
% of Possible Score Achieved	**55%**	**63%**	**61%**	**62%**	**67%**	**74%**
Overall Category	**II**	**II**	**II**	**II**	**II**	**I**
Total Acreage of Assessed Wetlands and Other Aquatic Habitats within Site Boundaries	**157.31**	**166.43**	**186.94**	**182.01**	**192.62**	**203.49**
Functional Units (acreage x actual points)	**865.2**	**1048.50**	**1037.52**	**1019.25**	**1155.72**	**1363.38**

[1]Berglund 1999.

[2]Berglund and McEldowney 2008.

[3]Calculated as bonus points on 2008 MWAM.

3.7. Photo Documentation

The base photograph for the aerial photograph was taken on August 16, 2011 (Figures 2 and 3, Appendix A). Panoramas of photo points PP1 to PP3 taken from 2009 to 2011 are shown on pages C-1 to C-3 of Appendix C. Photographs of the end points of transects one to three taken from 2009 to 2011 are shown on pages C-4 to C-6 of Appendix C. The data points are shown on page C-7.

3.8. Maintenance Needs

Canada thistle, a Priority 2B noxious weed, was observed near the inlet at less than 0.1 acre in area and at 1 to 5 percent cover within the infestation (Figure 3, Appendix A). The weed was also observed at less than one percent cover in Community 7. The MDT will coordinate with the Blackfeet Nation to discuss a weed control program at the site. The weed infestation at Alkali Lake did not expand notably from 2010 to 2011. The site was not sprayed in 2011.

The excavated inlet channel was stable and in good condition in 2011. Fencing, control structures, and the west berm were also in good condition. The access road into the site was washed out at SE corner of project area and needs to be filled in and repaired to maintain site access. Water management at Alkali Lake is dependent upon availability. Water levels increased from 2010 to 2011 and were sufficient to maintain foraging habitat for a variety of shorebirds and waterfowl.

3.9. Current Credit Summary

The credit summary for wetland and shallow open water acreages identified in 2011 are summarized in Table 11. Approximately 70.3 acres of emergent wetlands and 133.2 acres of open water were delineated at the mitigation site in 2011. The credit acres developed to date for wetland habitat based on the Tribal

credit ratios is 28.1 acres, which is slightly less than the Tribal credit target of 29.8 acres. Tribal credit acres for shallow open water were calculated to be 53.3 acres in 2011, which is greater than the target of 40.6 acres. As discussed previously in this report, the increased area of inundation observed at the site in 2011 was likely the result of above average snow packs and spring precipitation. During years with average surface water recharge, the credits will likely reflect values calculated in 2010. The upland buffer credit acreage of 11.28 was met. The Tribal credit calculations totaled 101.5 acres in 2011.

The total USACE estimated credits attained in 2011 equals 160.7 acres. The targeted credit acres based on USACE credit ratios were 74.4 acres for both wetland and open water restoration at a 1:1 ratio and 5.6 acres for upland buffer using a 4:1 ratio, totaling 154.5 acres. The 2011 wetland acreages and corresponding credit acres exceeded both the wetland and open water targets. The MDT agreement with the USACE stipulated that a maximum of 181.46 acres would be credited if the entire lake bed was restored as wetland. Full upland credits were assigned to this site.

The performance standards for hydrophytic vegetation, hydric soil, and wetland hydrology have been achieved within the delineated emergent wetlands and the majority of open water areas. The percent cover of the aquatic bed vegetation class is dependent on the annual frequency and duration of surface water levels site-wide. Hydrophytic vegetation dominates greater than 50 percent of the vegetation cover and weeds contribute less than 10 percent to total vegetation cover across the site.

Table 11. Tribal and USACE credit summary in 2011 at the Alkali Lake Wetland Mitigation Site.

Proposed Feature	2010 Delineated Acres	2011 Delineated Acres	Tribal Credit Ratio	Tribal 2010 Calculated Credit Acres	Tribal 2011 Calculated Credit Acres	Tribal Credit Target (Credit Acres)	USACE Credit Ratio	USACE 2010 Calculated Credit Acres	USACE 2011 Calculated Credit Acres	USACE 2010 Credit Target (Credit Acres)
Primary emergent wetland restoration	84.3	70.3	1:2.5	33.7	28.1	29.8	1:1	84.3	70.3	74.4
Shallow open water restoration	108.3	133.2	1:2.5	43.3	53.3	40.6	1:1*	108.3	70.3*	74.4
100-ft-wide upland buffer	91.2	80.3	1:4	22.8	20.1	11.3	1:4**	22.8	20.1	5.6
TOTALS	**283.8**	**283.8**		**99.8**	**101.5**	**81.6**		**215.4**	**160.7**	**154.5**

*Up to a maximum matching wetland acres.
**Based on a maximum o 50-foot width.

4. REFERENCES

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Appendix A

Figure 2 – Monitoring Activity Locations
Figure 3 – Mapped Site Features

MDT Wetland Mitigation Monitoring
Alkali Lake
Pondera County, Montana

Figure 2: 2011 Monitoring Activity Locations

Legend

- Vegetation Transect
- Monitoring Limits
- Data Points
- Photo Points
- Soil Samples

Base Photography Date: August 16, 2011

M1
Alk-1
Alk-2
N
PP2
T-2 start
T-2 finish
L1
F
J
PP3
K
T-3 finish
T-3 start
Alk-5
Alk-6
T-1 finish
T-1 start
O
PP1
Alk-3
Alk-4

N

0 250 500 1,000

Feet

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

LOCATION: Pondera Co., MT

PROJ NO: STPX NH37(26)

FILE: Alkali/Monitor2011.mxd

Project Name
Alkali Lake Wetland Mitigation Site

Drawing Title
2011 Monitoring Activity Locations

DRAWN	CHECKED	APPROVED
BCS	BV	JU

SCALE: Noted

Drawn: September 26, 2011

PROJ MGR: B Sandefur

CONFLUENCE consulting incorporated

Figure 2

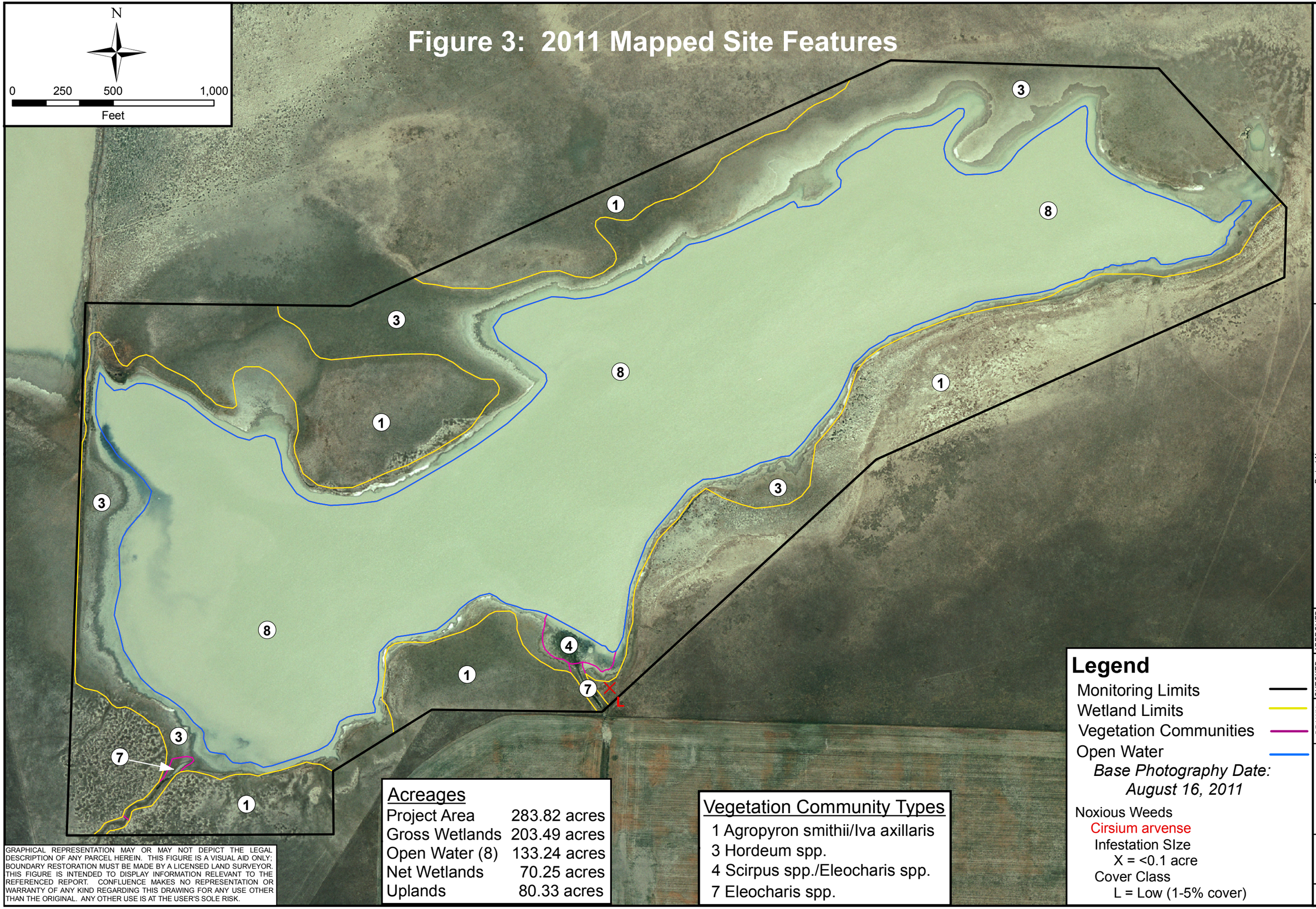
REV -

Figure 3: 2011 Mapped Site Features

N

0 250 500 1,000

Feet



Acreages

Project Area	283.82 acres
Gross Wetlands	203.49 acres
Open Water (8)	133.24 acres
Net Wetlands	70.25 acres
Uplands	80.33 acres

Vegetation Community Types

1 Agropyron smithii/Iva axillaris
3 Hordeum spp.
4 Scirpus spp./Eleocharis spp.
7 Eleocharis spp.

Legend

Monitoring Limits
Wetland Limits
Vegetation Communities
Open Water

Base Photography Date: August 16, 2011

Noxious Weeds
Cirsium arvense
Infestation SIze
X = <0.1 acre
Cover Class
L = Low (1-5% cover)

LOCATION: Pondera Co., MT
PROJ NO: STPX NH37(26)
FILE: Alkali/Veg2011.mxd

Project Name: Alkali Lake Wetland and Mitigation Site
Drawing Title: 2011 Mapped Site Features

DRAWN BCS | CHECKED BV | APPROVED JJ
SCALE: Noted
Drawn: September 20, 2011
PROJ MGR: B Sandefur

CONFLUENCE consulting Incorporated

Figure 3

REV -

Appendix B

2011 MDT Wetland Mitigation Site Monitoring Form
2011 USACE Wetland Determination Data Form
2011 MDT Montana Wetland Assessment Form

MDT Wetland Mitigation Monitoring
Alkali Lake
Pondera County, Montana

MDT WETLAND MITIGATION SITE MONITORING FORM

Project Site: Alkali Lake Assessment Date/Time 8/21/2011

Person(s) conducting the assessment: J. Asebrook, J. Hintz

Weather: Warm, sunny, mid-80's Location: 14 miles NW of Valier

MDT District: Great Falls Milepost: NA

Legal Description: T 31N R 6W Section(s) 31

Initial Evaluation Date: 8/22/2006 Monitoring Year: 6 #Visits in Year: 1

Size of Evaluation Area: 284 (acres)

Land use surrounding wetland:

HYDROLOGY

Surface Water Source: Birch Creek Canal

Inundation: ☑ Average Depth: 1.5 **(ft)** Range of Depths: 0-2 **(ft)**

Percent of assessment area under inundation: 50 %

Depth at emergent vegetation-open water boundary: 1 **(ft)**

If assessment area is not inundated then are the soils saturated within 12 inches of surface: Yes

Other evidence of hydrology on the site (ex. – drift lines, erosion, stained vegetation, etc**:**

Saturation within 12 inches of the ground surface, drainage patterns, many drift lines along eastern shore, FAC-Neutral test, and oxidized rhizospheres.

Groundwater Monitoring Wells

Record depth of water surface below ground surface, in feet.

Well ID	Water Surface Depth (ft)
No wells	

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.

Hydrology Notes:

Higher than normal water levels were observed across the site in 2011, likely due to above average snowpack/precip. No water was flowing into site from irrigation system during August site visit.

VEGETATION COMMUNITIES

Site Alkali Lake

(Cover Class Codes **0** = < 1%, **1** = 1-5%, **2** = 6-10%, **3** = 11-20%, **4** = 21-50% , **5** = >50%)

* Indicates accepted spp name not on '88 list.

Community # 1 **Community Type:** Agropyron smithii / Iva axillaris **Acres** 80.33

Species	Cover class	Species	Cover class
Achillea millefolium	0	Achnatherum nelsonii	0
Agropyron smithii	4	Algae, green	1
Allium cernuum	1	Artemisia frigida	0
Aster falcatus	0	Astragalus bisulcatus	1
Atriplex argentea	1	Atriplex nuttallii	0
Avena fatua	0	Bromus commutata	0
Carex sp.	0	Chenopodium album	0
Chenopodium glaucum	0	Distichlis spicata	0
Elymus cinereus	0	Elymus trachycaulus	1
Grindelia squarrosa	0	Gutierrezia sarothrae	0
Helianthus nuttallii	0	Hordeum brachyantherum	0
Hordeum jubatum	0	Iva axillaris	4
Juncus balticus	0	Kochia scoparia	2
Koeleria macrantha	1	Lactuca serriola	0
Lepidium ramossissimim	0	Lomatium macrocarpum	0
Melilotus officinalis	0	Phlox hoodii	0
Poa juncifolia	3	Puccinellia nuttalliana	0
Rumex crispus	0	Sarcobatus vermiculatus	1
Sphaeralcea coccinea	0	Suaeda depressa	0
Thlaspi arvense	0	Tragopogon dubius	0

Comments:

Includes all uplands within the Alkali Mitigation conservation easement.

Community # 3 **Community Type:** Hordeum spp. / **Acres** 68.19

Species	Cover class	Species	Cover class
Agropyron smithii	2	Algae, green	0
Alisma gramineum	0	Alopecurus pratensis	0
Aster falcatus	0	Atriplex nuttallii	0
Bare ground	4	Chenopodium glaucum	0
Distichlis spicata	1	Eleocharis acicularis	0
Eleocharis palustris	0	Grindelia squarrosa	0
Hordeum brachyantherum	4	Hordeum jubatum	2
Iva axillaris	4	Kochia scoparia	1
Lepidium ramossissimim	0	Poa juncifolia	0
Puccinellia nuttalliana	2	Sarcobatus vermiculatus	0
Scirpus pungens	0	Suaeda depressa	0

Comments:

Much more Iva axillaris and less grass overall than in 2010. This community typically includes the transition between open water and upland habitat.

Community # 4 **Community Type:** Scirpus spp. / Eleocharis spp. **Acres** 1.21

Species	Cover class	Species	Cover class
Agrostis stolonifera	0	Alopecurus arundinaceus	4
Eleocharis acicularis	0	Eleocharis palustris	4
Hippuris vulgaris	0	Hordeum jubatum	0
Juncus torreyi	0	Najas guadalupensis	1
Puccinellia nuttalliana	0	Rumex crispus	0
Scirpus acutus	3	Scirpus maritimus	0
Scirpus pungens	0	Triglochin maritimum	0

Comments:

Community # 7 **Community Type:** Eleocharis spp. / **Acres** 0.85

Species	Cover class	Species	Cover class
Agrostis stolonifera	0	Algae, green	1
Alopecurus arundinaceus	3	Ceratophyllum demersum	0
Cirsium arvense	0	Eleocharis acicularis	0
Eleocharis palustris	3	Hordeum brachyantherum	0
Hordeum jubatum	3	Iva axillaris	0
Juncus torreyi	0	Najas guadalupensis	4
Puccinellia nuttalliana	2	Rumex crispus	0
Scirpus acutus	1	Scirpus microcarpus	0
Scirpus pungens	0	Suaeda depressa	0
Triglochin maritimum	0		

Comments:

Community # 8 **Community Type:** Open water / **Acres** 133.2

Species	Cover class	Species	Cover class
Agropyron smithii	0	Algae, green	0
Distichlis spicata	0	Eleocharis acicularis	0
Hordeum brachyantherum	0	Iva axillaris	0
Open water	5		

Comments:

Some vegetation growing within open water. Some of the area identified as open water in 2011 was identified as wetland in 2010. Average depth of inundation approximately 2ft.

Total Vegetation Community Acreage **283.82**

(Note: some area within the project bounds may be open water or other non-vegetative ground cover.)

VEGETATION TRANSECTS

Site: Alkali Lake Date: 8/21/2011

Transect Number: 1 **Compass Direction from Start:** 311

Interval Data:

Ending Station 12 **Community Type:** Agropyron smithii / Iva axillaris

Species	Cover class	Species	Cover class
Agropyron smithii	2	Atriplex argentea	1
Hordeum jubatum	0	Iva axillaris	2
Puccinellia nuttalliana	4	Suaeda depressa	0

Ending Station 29 **Community Type:** Hordeum spp. /

Species	Cover class	Species	Cover class
Agropyron smithii	1	Alisma gramineum	0
Bare ground	4	Hordeum brachyantherum	4
Hordeum jubatum	0	Iva axillaris	2
Puccinellia nuttalliana	0	Scirpus pungens	0

Ending Station 117 **Community Type:** Eleocharis spp. /

Species	Cover class	Species	Cover class
Algae, green	0	Bare ground	5
Eleocharis palustris	3	Hordeum brachyantherum	1
Hordeum jubatum	1	Open water	4
Puccinellia nuttalliana	0	Scirpus pungens	1

Ending Station 194 **Community Type:** Open water /

Species	Cover class	Species	Cover class
Algae, green	1	Eleocharis acicularis	1
Open water	5		

Ending Station 204 **Community Type:** Scirpus spp. / Eleocharis spp.

Species	Cover class	Species	Cover class
Algae, green	0	Eleocharis acicularis	0
Eleocharis palustris	0	Open water	5
Scirpus pungens	0		

Ending Station 412 **Community Type:** Open water /

Species	Cover class	Species	Cover class
Open water	5		

Transect Notes:

Compass at 0 declination

Transect Number: 2 **Compass Direction from Start:** 136

Interval Data:

Ending Station 18 **Community Type:** Agropyron smithii / Iva axillaris

Species	Cover class	Species	Cover class
Agropyron smithii	4	Bare ground	3
Hordeum brachyantherum	3	Hordeum jubatum	0
Iva axillaris	3		

Ending Station 92 **Community Type:** Hordeum spp. /

Species	Cover class	Species	Cover class
Agropyron smithii	1	Bare ground	3
Distichlis spicata	0	Hordeum brachyantherum	4
Hordeum jubatum	0	Iva axillaris	3
Puccinellia nuttalliana	0		

Ending Station 300 **Community Type:** Open water /

Species	Cover class	Species	Cover class
Agropyron smithii	0	Algae, green	0
Hordeum brachyantherum	0	Iva axillaris	0
Open water	5		

Transect Notes:

Compass at 0 declination

Transect Number: 3 **Compass Direction from Start:** 46

Interval Data:

Ending Station 83 **Community Type:** Hordeum spp. /

Species	Cover class	Species	Cover class
Agropyron smithii	2	Bare ground	3
Eleocharis palustris	0	Hordeum brachyantherum	4
Hordeum jubatum	2	Iva axillaris	1
Scirpus maritimus	0		

Ending Station 227 **Community Type:** Open water /

Species	Cover class	Species	Cover class
Eleocharis palustris	0	Hordeum brachyantherum	0
Hordeum jubatum	0	Open water	5

Transect Notes:

Compass at 0 declineation

PLANTED WOODY VEGETATION SURVIVAL

Alkali Lake

Planting Type	#Planted	#Alive	Notes
None planted			

Comments

Seeded species included Eleocharis palustris, Juncus balticus, Juncus torreyi, Puccinellia nuttalliana, Scirpus acutus, Scirpus americanus (syn. S. pungens), Scirpus maritimus, and Triglochin maritimum. No volunteer woody species identified.

Alkali Lake

WILDLIFE

Birds

Were man-made nesting structures installed? No

If yes, type of structure: _____

How many? _____

Are the nesting structures being used? No

Do the nesting structures need repairs? No

Nesting Structure Comments:

Species	#Observed	Behavior	Habitat
American Avocet	20	F	MF, OW
American White Pelican	5	FO	
California Gull	5	FO	
Cinnamon Teal	1	N	UP
Common Tern	60	FO	
Northern Harrier	1	FO	
Sparrow sp.	2	F	UP
Swallow sp.	3	FO	
Western Sandpiper	20	F	MF

Bird Comments

BEHAVIOR CODES

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

HABITAT CODES

AB = Aquatic bed **SS** = Scrub/Shrub **FO** = Forested **UP** = Upland buffer **I** = Island

WM = Wet meadow **MA** = Marsh **US** = Unconsolidated shore **MF** = Mud Flat **OW** = Open Water

Mammals and Herptiles

Species	# Observed	Tracks	Scat	Burrows	Comments
Coyote	2	Yes	Yes	No	
Deer Mouse	1	Yes	No	No	
Deer sp.	2	Yes	No	No	Deer bed also observed
Domestic horse	10	Yes	Yes	No	
Fish spp.	20	No	No	No	In inlet
Frog sp.	1	No	No	No	
Plains Gartersnake	1	No	No	No	In mud flat near water
White-tailed Jack Rabbit	1	No	Yes	No	

Wildlife Comments:

Alkali Lake

PHOTOGRAPHS

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.

Photo #	Latitude	Longitude	Bearing	Description
750-753				PP1 - panorama
759			311	Transect 1 - Start
761				Wetland delineation plot: Alk-6 Wetland delineation plot: Alk-1
762				Wetland delineation plot: Alk-5 Wetland delineation plot: Alk-1
766-769				PP2 - panorama
770				Wetland delineation plot: Alk-1 Wetland delineation plot: Alk-1
771				Wetland delineation plot: Alk-2 Wetland delineation plot: Alk-1
772			297	Transect 2 - Start
773			316	Transect 2 - End
774-777				PP3 - panorama
780			45	Transect 3 - Start
781			225	Transect 3 - End
782				Wetland delineation plot: Alk-3 Wetland delineation plot: Alk-1
783				Wetland delineation plot: Alk-4 Wetland delineation plot: Alk-1
787			0	Soil Pit 1
788			131	Transect 1 - End

Comments:

Alkali Lake

ADDITIONAL ITEMS CHECKLIST

Hydrology

☑ Map emergent vegetation/open water boundary on aerial photos.
☑ Observe extent of surface water. Look for evidence of past surface water elevations (e.g. drift lines, vegetation staining, erosion, etc).

Photos

☑ One photo from the wetland toward each of the four cardinal directions
☑ One photo showing upland use surrounding the wetland.
☑ One photo showing the buffer around the wetland
☑ One photo from each end of each vegetation transect, toward the transect

Vegetation

☑ Map vegetation community boundaries

☑ Complete Vegetation Transects

Soils

☑ Assess soils

Wetland Delineations

☑ Delineate wetlands according to applicable USACE protocol (1987 form or Supplement)
☑ Delineate wetland – upland boundary onto aerial photograph.

Wetland Delineation Comments

Functional Assessments

☑ Complete and attach full MDT Montana Wetland Assessment Method field forms.

Functional Assessment Comments:

Maintenance

Were man-made nesting structure installed at this site? No

If yes, do they need to be repaired?

If yes, describe the problems below and indicate if any actions were taken to remedy the problems

Were man-made structures built or installed to impound water or control water flow into or out of the wetland? Yes

If yes, are the structures in need of repair? No

If yes, describe the problems below.

WETLAND DETERMINATION DATA FORM – Routine Weltand Delineation, 1987 COE Protocol

Project/Site: Alkali Lake | City/County: Pondera | Sampling Date: 8/21/2011

Applicant/Owner: MDT | State: MT | Sampling Point: Alk-1

Investigator(s): J. Asebrook, J. Hintz | Section, Township, Range: S 31 T 31N R 6W

Landform (hillslope, terrace, etc.): Lowland | Local relief (concave, convex, none): flat | Slope (%): 0

Subregion (LRR): LRR E | Lat: 48.40123147 | Long: -112.43313764 | Datum: NAD 83

Soil Map Unit Name: Wetland

Do Normal Circumstances Exist on this site? Yes ☑

Is the site significantly disturbed (Atypical Situation)? Yes ☐

Is the area a potential Problem Area? Yes ☐

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☐	No ☑	**Is the Sampled Area within a Wetland?** Yes ☐ No ☑
Hydric Soil Present?	Yes ☐	No ☑	
Wetland Hydrology Present?	Yes ☐	No ☑	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.	0	☐	
2.	0	☐	
3.	0	☐	
4.	0	☐	
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size:)			
1.	0	☐	
2.	0	☐	
3.	0	☐	
4.	0	☐	
5.	0	☐	
	0 = Total Cover		
Herb Stratum (Plot size:)			
1. Agropyron smithii	20	☑	FACU
2. Iva axillaris	20	☑	FAC
3. Hordeum brachyantherum	10	☐	FACW
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
8.	0	☐	
9.	0	☐	
10.	0	☐	
11.	0	☐	
	50 = Total Cover		
Woody Vine Stratum (Plot size:)			
1.	0	☐	
2.	0	☐	
	0 = Total Cover		

% Bare Ground in Herb Stratum 50

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Dominance Test is >50% ☐

Hydrophytic Vegetation Present? Yes ☐ No ☑

Remarks:

Does not pass dominance test (= 50; not > 50%), prevalence test (3.2; not < 3.0), or FAC-neutral test (0; not > 50% of non-FAC dominant species are FACW or wetter).

SOIL

Sampling Point: Alk-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 4/2	100					Clay	Very consolidated soil

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☐ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Soils List
- ☐ Listed on National Soils List
- ☐ Other (explain in remarks)

Taxonomy Subgroup: Fine-loamy, mixed, frigid Typic Fluvaquents

Confirm Mapped Type?: ☐

Hydric Soil Present? Yes ☐ No ☑

Remarks:

Does not meet hydric soils criteria as depeleted matrix; 4/2 matrix requires redox concentrations within the matrix. Mapped type not confirmed in soil profile although unit is listed on local hydric soils list.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators

- ☐ Innundated
- ☐ Saturated in upper 12 inches
- ☐ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☐ Drainage patterns in wetlands

Secondary Indicators (2 or more required)

- ☐ Oxidized Rhizospheres along Living Roots
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☑ Other (Explain in Remarks)

Field Observations:

Surface Water Present? Yes ☐ No ☑ Depth (inches): _____

Water Table Present? Yes ☐ No ☑ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ☐ No ☑ Depth (inches): _____

Wetland Hydrology Present? Yes ☐ No ☑

Remarks: Soil cracking at surface.

WETLAND DETERMINATION DATA FORM – Routine Weltand Delineation, 1987 COE Protocol

Project/Site: Alkali Lake | City/County: Pondera | Sampling Date: 8/21/2011

Applicant/Owner: MDT | State: MT | Sampling Point: Alk-2

Investigator(s): J. Asebrook, J. Hintz | Section, Township, Range: S 31 T 31N R 6W

Landform (hillslope, terrace, etc.): Lowland | Local relief (concave, convex, none): flat | Slope (%): 0

Subregion (LRR): LRR E | Lat: 48.40103424 | Long: -112.43303111 | Datum: NAD 83

Soil Map Unit Name: Wetland

Do Normal Circumstances Exist on this site? Yes ☑

Is the site significantly disturbed (Atypical Situation)? Yes ☐

Is the area a potential Problem Area? Yes ☐

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☑	No ☐	**Is the Sampled Area within a Wetland?** Yes ☑ No ☐
Hydric Soil Present?	Yes ☑	No ☐	
Wetland Hydrology Present?	Yes ☑	No ☐	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.	0	☐	
2.	0	☐	
3.	0	☐	
4.	0	☐	
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size:)			
1.	0	☐	
2.	0	☐	
3.	0	☐	
4.	0	☐	
5.	0	☐	
	0 = Total Cover		
Herb Stratum (Plot size:)			
1. Hordeum brachyantherum	30	☑	FACW
2. Iva axillaris	30	☑	FAC
3. Agropyron smithii	5	☐	FACU
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
8.	0	☐	
9.	0	☐	
10.	0	☐	
11.	0	☐	
	65 = Total Cover		
Woody Vine Stratum (Plot size:)			
1.	0	☐	
2.	0	☐	
	0 = Total Cover		

% Bare Ground in Herb Stratum

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Dominance Test is >50% ☑

Hydrophytic Vegetation Present? Yes ☑ No ☐

Remarks:

Passes dominance test (= 100; > 50%) and passes prevalence test (2.61, < 3.0)

SOIL

Sampling Point: Alk-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-7	10YR 4/1	100	10YR 6/1	2	C	M	Clay	
7-15	10YR 5/1	93	10YR 5/6	5	C	M	Clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☑ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☑ Listed on Local Soils List
- ☐ Listed on National Soils List
- ☐ Other (explain in remarks)

Taxonomy Subgroup: Fine-loamy, mixed, frigid Typic Fluvaquents

Confirm Mapped Type?: ☐

Hydric Soil Present? Yes ☑ No ☐

Remarks:

Depleted matrix (5/1 with redox concentrations) of > 6 inches thick starting within 10 inches of soil surface.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators

- ☐ Innundated
- ☑ Saturated in upper 12 inches
- ☐ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☐ Drainage patterns in wetlands

Secondary Indicators (2 or more required)

- ☐ Oxidized Rhizospheres along Living Roots
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Field Observations:

Surface Water Present? Yes ☐ No ☑ Depth (inches): _____

Water Table Present? Yes ☐ No ☑ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ☑ No ☐ Depth (inches): 12

Wetland Hydrology Present? Yes ☑ No ☐

Remarks:

WETLAND DETERMINATION DATA FORM – Routine Weltand Delineation, 1987 COE Protocol

Project/Site: Alkali Lake | City/County: Pondera | Sampling Date: 8/21/2011

Applicant/Owner: MDT | State: MT | Sampling Point: Alk-3

Investigator(s): J. Asebrook, J. Hintz | Section, Township, Range: S 31 T 31N R 6W

Landform (hillslope, terrace, etc.): Lowland | Local relief (concave, convex, none): flat | Slope (%): 0

Subregion (LRR): LRR E | Lat: 48.39325634 | Long: -112.44627066 | Datum: NAD 83

Soil Map Unit Name: Vanda Clay

Do Normal Circumstances Exist on this site? Yes ☑

Is the site significantly disturbed (Atypical Situation)? Yes ☐

Is the area a potential Problem Area? Yes ☐

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☑	No ☐	**Is the Sampled Area within a Wetland?** Yes ☑ No ☐
Hydric Soil Present?	Yes ☑	No ☐	
Wetland Hydrology Present?	Yes ☑	No ☐	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.	0	☐	
2.	0	☐	
3.	0	☐	
4.	0	☐	
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size:)			
1.	0	☐	
2.	0	☐	
3.	0	☐	
4.	0	☐	
5.	0	☐	
	0 = Total Cover		
Herb Stratum (Plot size:)			
1. Hordeum brachyantherum	40	☑	FACW
2. Iva axillaris	20	☑	FAC
3. Hordeum jubatum	5	☐	FAC+
4. Agropyron smithii	3	☐	FACU
5.	0	☐	
6.	0	☐	
7.	0	☐	
8.	0	☐	
9.	0	☐	
10.	0	☐	
11.	0	☐	
	68 = Total Cover		
Woody Vine Stratum (Plot size:)			
1.	0	☐	
2.	0	☐	
	0 = Total Cover		

% Bare Ground in Herb Stratum

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Dominance Test is >50% ☑

Hydrophytic Vegetation Present? Yes ☑ No ☐

Remarks:

Passes dominance test (= 100; > 50%), passes prevalence test (2.45, < 3.0), and passes FAC-neutral test (1:0; > 50% of non-FAC dominant species are FACW or wetter).

SOIL

Sampling Point: Alk-3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-5	2.5YR 4/1	100					Clay	
5-12	2.5YR 4/1	90	10YR 4/3	10	C	M	Clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☑ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☑ Listed on Local Soils List
- ☐ Listed on National Soils List
- ☐ Other (explain in remarks)

Taxonomy Subgroup: Fine, calcareous, frigid Ustic Torriorthents

Confirm Mapped Type?: ☐

Hydric Soil Present? Yes ☑ No ☐

Remarks:

Depeted matrix (4/1 with redox concentrations) of > 6 inches thick starting within 10 inches of soil surface.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators

- ☐ Innundated
- ☑ Saturated in upper 12 inches
- ☐ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☑ Drainage patterns in wetlands

Secondary Indicators (2 or more required)

- ☐ Oxidized Rhizospheres along Living Roots
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☑ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Field Observations:

Surface Water Present? Yes ☐ No ☑ Depth (inches): _____

Water Table Present? Yes ☐ No ☑ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ☑ No ☐ Depth (inches): 11

Wetland Hydrology Present? Yes ☑ No ☐

Remarks:

WETLAND DETERMINATION DATA FORM – Routine Weltand Delineation, 1987 COE Protocol

Project/Site: Alkali Lake | City/County: Pondera | Sampling Date: 8/21/2011

Applicant/Owner: MDT | State: MT | Sampling Point: Alk-4

Investigator(s): J. Asebrook, J. Hintz | Section, Township, Range: S 31 T 31N R 6W

Landform (hillslope, terrace, etc.): Lowland | Local relief (concave, convex, none): flat | Slope (%): 0

Subregion (LRR): LRR E | Lat: 48.3931695 | Long: -112.44639815 | Datum: NAD 83

Soil Map Unit Name: Vanda Clay

Do Normal Circumstances Exist on this site? Yes ☑

Is the site significantly disturbed (Atypical Situation)? Yes ☐

Is the area a potential Problem Area? Yes ☐

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☐	No ☑	**Is the Sampled Area within a Wetland?** Yes ☐ No ☑
Hydric Soil Present?	Yes ☑	No ☐	
Wetland Hydrology Present?	Yes ☐	No ☑	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.	0	☐	
2.	0	☐	
3.	0	☐	
4.	0	☐	
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size:)			
1.	0	☐	
2.	0	☐	
3.	0	☐	
4.	0	☐	
5.	0	☐	
	0 = Total Cover		
Herb Stratum (Plot size:)			
1. Agropyron smithii	60	☑	FACU
2. Iva axillaris	30	☑	FAC
3. Hordeum brachyantherum	5	☐	FACW
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
8.	0	☐	
9.	0	☐	
10.	0	☐	
11.	0	☐	
	95 = Total Cover		
Woody Vine Stratum (Plot size:)			
1.	0	☐	
2.	0	☐	
	0 = Total Cover		

% Bare Ground in Herb Stratum

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Dominance Test is >50% ☐

Hydrophytic Vegetation Present? Yes ☐ No ☑

Remarks:

Does not pass dominance test (= 50; not > 50%), prevalence test (3.26; not < 3.0), or FAC-neutral test (1:1; not > 50% of non-FAC dominant species are FACW or wetter).

SOIL

Sampling Point: Alk-4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 4/1	100					Clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☑ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☑ Listed on Local Soils List
- ☐ Listed on National Soils List
- ☐ Other (explain in remarks)

Taxonomy Subgroup: Fine, calcareous, frigid Ustic Torriorthents

Confirm Mapped Type?: ☐

Hydric Soil Present? Yes ☑ No ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators

- ☐ Innundated
- ☐ Saturated in upper 12 inches
- ☐ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☐ Drainage patterns in wetlands

Secondary Indicators (2 or more required)

- ☐ Oxidized Rhizospheres along Living Roots
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Field Observations:

Surface Water Present? Yes ☐ No ☑ Depth (inches): _____

Water Table Present? Yes ☐ No ☑ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ☐ No ☑ Depth (inches): _____

Wetland Hydrology Present? Yes ☐ No ☑

Remarks:

WETLAND DETERMINATION DATA FORM – Routine Weltand Delineation, 1987 COE Protocol

Project/Site: Alkali Lake | City/County: Pondera | Sampling Date: 8/21/2011

Applicant/Owner: MDT | State: MT | Sampling Point: Alk-5

Investigator(s): J. Asebrook, J. Hintz | Section, Township, Range: S 31 T 31N R 6W

Landform (hillslope, terrace, etc.): Lowland | Local relief (concave, convex, none): flat | Slope (%): 0

Subregion (LRR): LRR E | Lat: 48.39654448 | Long: -112.43307905 | Datum: NAD 83

Soil Map Unit Name: Wet land

Do Normal Circumstances Exist on this site? Yes ☑

Is the site significantly disturbed (Atypical Situation)? Yes ☐

Is the area a potential Problem Area? Yes ☐

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☑	No ☐	**Is the Sampled Area within a Wetland?** Yes ☑ No ☐
Hydric Soil Present?	Yes ☑	No ☐	
Wetland Hydrology Present?	Yes ☑	No ☐	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.	0	☐	
2.	0	☐	
3.	0	☐	
4.	0	☐	
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size:)			
1.	0	☐	
2.	0	☐	
3.	0	☐	
4.	0	☐	
5.	0	☐	
	0 = Total Cover		
Herb Stratum (Plot size:)			
1. Iva axillaris	30	☑	FAC
2. Hordeum jubatum	10	☑	FAC+
3. Hordeum brachyantherum	2	☐	FACW
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
8.	0	☐	
9.	0	☐	
10.	0	☐	
11.	0	☐	
	42 = Total Cover		
Woody Vine Stratum (Plot size:)			
1.	0	☐	
2.	0	☐	
	0 = Total Cover		

% Bare Ground in Herb Stratum 50

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Dominance Test is >50% ☑

Hydrophytic Vegetation Present? Yes ☑ No ☐

Remarks:

Passes dominance test (= 100; > 50%), passes prevalence test (2.95, < 3.0), and passes FAC-neutral test (1:0; > 50% of non-FAC dominant species are FACW or wetter).

SOIL

Sampling Point: Alk-5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-7	2.5Y 4/1	95	10YR 4/2	5		M	Silty Clay	
7-15	2.5Y 4/2	95	10YR 4/3	3	C	M	Silty Clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☑ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☑ Listed on Local Soils List
- ☐ Listed on National Soils List
- ☐ Other (explain in remarks)

Taxonomy Subgroup: Fine-loamy, mixed, frigid Typic Fluvaquents

Confirm Mapped Type?: ☐

Hydric Soil Present? Yes ☑ No ☐

Remarks:

Depleted matrix (4/1 and 4/2 with redox concentrations) of > 6 inches thick starting within 10 inches of soil surface.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators

- ☐ Innundated
- ☑ Saturated in upper 12 inches
- ☐ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☐ Drainage patterns in wetlands

Secondary Indicators (2 or more required)

- ☑ Oxidized Rhizospheres along Living Roots
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☑ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Field Observations:

Surface Water Present? Yes ☐ No ☑ Depth (inches): _____

Water Table Present? Yes ☐ No ☑ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ☑ No ☐ Depth (inches): 6

Wetland Hydrology Present? Yes ☑ No ☐

Remarks:

WETLAND DETERMINATION DATA FORM – Routine Weltand Delineation, 1987 COE Protocol

Project/Site: Alkali Lake | City/County: Pondera | Sampling Date: 8/21/2011

Applicant/Owner: MDT | State: MT | Sampling Point: Alk-6

Investigator(s): J. Asebrook, J. Hintz | Section, Township, Range: S 31 T 31N R 6W

Landform (hillslope, terrace, etc.): Lowland | Local relief (concave, convex, none): Flat | Slope (%): 0

Subregion (LRR): LRR E | Lat: 48.39647625 | Long: -112.43297805 | Datum: NAD 83

Soil Map Unit Name: Wetland

Do Normal Circumstances Exist on this site? Yes ☑

Is the site significantly disturbed (Atypical Situation)? Yes ☐

Is the area a potential Problem Area? Yes ☐

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☑	No ☐	**Is the Sampled Area within a Wetland?** Yes ☐ No ☑
Hydric Soil Present?	Yes ☐	No ☑	
Wetland Hydrology Present?	Yes ☐	No ☑	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.	0	☐	
2.	0	☐	
3.	0	☐	
4.	0	☐	
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size:)			
1.	0	☐	
2.	0	☐	
3.	0	☐	
4.	0	☐	
5.	0	☐	
	0 = Total Cover		
Herb Stratum (Plot size:)			
1. Hordeum brachyantherum	20	☑	FACW
2. Iva axillaris	20	☑	FAC
3. Hordeum jubatum	5	☐	FAC+
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
8.	0	☐	
9.	0	☐	
10.	0	☐	
11.	0	☐	
	45 = Total Cover		
Woody Vine Stratum (Plot size:)			
1.	0	☐	
2.	0	☐	
	0 = Total Cover		

% Bare Ground in Herb Stratum 50

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Dominance Test is >50% ☑

Hydrophytic Vegetation Present? Yes ☑ No ☐

Remarks:

Passes dominance test (= 100; > 50%), passes prevalence test (2.56, < 3.0), and passes FAC-neutral test (1:0; > 50% of non-FAC dominant species are FACW or wetter).

SOIL

Sampling Point: _____

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-13	10YR 4/2	100					Silty Clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☐ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Soils List
- ☐ Listed on National Soils List
- ☐ Other (explain in remarks)

Taxonomy Subgroup: Fine-loamy, mixed, frigid Typic Fluvaquents

Confirm Mapped Type?: ☐

Hydric Soil Present? Yes ☐ **No** ☑

Remarks:

Does not qualify as depeleted matrix; 4/2 matrix requires redox concentrations within the matrix. Mapped type not confirmed in soil profile although unit listed on local hydric soils list.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators

- ☐ Innundated
- ☐ Saturated in upper 12 inches
- ☐ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☐ Drainage patterns in wetlands

Secondary Indicators (2 or more required)

- ☐ Oxidized Rhizospheres along Living Roots
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☑ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Field Observations:

Surface Water Present? Yes ☐ No ☑ Depth (inches): _____

Water Table Present? Yes ☐ No ☑ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ☐ No ☑ Depth (inches): _____

Wetland Hydrology Present? Yes ☐ **No** ☑

Remarks:

MDT Montana Wetland Assessment Form (revised March 2008)

1. Project name Alkali **2. MDT project#** STPX-NH 37(26) **Control#** 5000

3. Evaluation Date 8/21/2011 **4. Evaluators** J. Asebrook, J. Hintz **5. Wetland/Site# (s)** Alkali Lake - all site

6. Wetland Location(s): **T** 31N **R** 6W **Sec1** 31 **T** 30N **R** 6W **Sec2** 6

Approx Stationing or Mileposts

Watershed 10030201 **Watershed/County** Marias Watershed/Pondera County

7. Evaluating Agency Confluence for MDT

8. Wetland size acres 203.49

Purpose of Evaluation

How assessed: Measured e.g. by GPS

☐ **Wetlands potentially affected by MDT project**

9. Assesssment area (AA) size (acres) 203.49

☐ **Mitigation Wetlands: pre-construction**

How assessed: Measured e.g. by GPS

☑ **Mitigation Wetlands: post construction**

☐ **Other**

10. Classification of Wetland and Aquatic Habitats in AA

HGM Class (Brinson)	Class (Cowardin)	Modifier (Cowardin)	Water Regime	% of AA
Depressional	Emergent Wetland		Seasonal/Intermittant	34
Depressional	Aquatic Bed		Permanent/Perennial	1
Depressional	Unconsolidated Bottom		Permanent/Perennial	65

11. Estimated Relative Abundance Rare

12. General Condition of AA

i. Disturbance: (use matrix below to determine [circle] appropriate response – see instructions for Montana-listed noxious weed and aquatic nuisance vegetation species (**ANVS**) lists)

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

Comments: (types of disturbance, intensity, season, etc)

There is one area south of the mitigation area that is under cultivation but areas to the north, east and west are either in natural state or grazed. Predominant buffer condition not cultivated.

ii. Prominent noxious, aquatic nuisance, other exotic species:

One small patch of Cirsium arvense

iii. Provide brief descriptive summary of AA and surrounding land use/habitat

AA is a wetland mitigation site that was impounded and flooded. The surrounding land is rangeland that is grazed by cattle and agricultural fields where barley and wheat are cultivated.

13. Structural Diversity: (based on number of "Cowardin" ***vegetated*** classes present [do not include unvegetated classes], see #10 above)

Existing # of "Cowardin" Vegetated Classes in AA	Initial Rating	Is current management preventing (passive) existence of additional vegetated classes?		Modified Rating
>=3 (or 2 if 1 is forested) classes	H	NA	NA	NA
2 (or 1 if forested) classes	M	NA	NA	NA
1 class, but not a monoculture	M	<NO	YES>	L
1 class, monoculture (1 species comprises>=90% of total cover)	L	NA	NA	NA

Comments: Emergent and aquatic bed

SECTION PERTAINING to FUNCTIONS VALUES ASSESSMENT

14A. Habitat for Federally Listed or Proposed Threatened or Endangered Plants or Animals:

i. AA is Documented (D) or Suspected (S) to contain (check one based on definitions contained in instructions):

Primary or critical habitat (list species)	◉ D ○ S	piping plover
Secondary habitat (list Species)	○ D ○ S	
Incidental habitat (list species)	◉ D ◉ S	
No usable habitat	▣ S	

ii. Rating (use the conclusions from i above and the matrix below to arrive at [check] the functional points and rating)

Highest Habitat Level	doc/primary	sus/primary	doc/secondary	sus/secondary	doc/incidental	sus/incidental	None
Functional Points and Rating	1H	.9H	.8H	.7M	.3L	.1L	0L

Sources for documented use Piping plovers were observed in 2008, to 2011., documented breeding success on site in 2011.

14B. Habitat for plant or animals rated S1, S2, or S3 by the Montana Natural Heritage Program: (not including species listed in14A above)

i. AA is Documented (D) or Suspected (S) to contain (check one based on definitions contained in instructions):

Primary or critical habitat (list species)	◉ D ○ S	Long-billed curlew (S3B)
Secondary habitat (list Species)	◉ D ○ S	Trumpeter swan (S3)
Incidental habitat (list species)	◉ D ○ S	American white pelican (S3B)
No usable habitat	▣ S	

ii. Rating (use the conclusions from i above and the matrix below to arrive at [check] the functional points and rating)

Highest Habitat Level	doc/primary	sus/primary	doc/secondary	sus/secondary	doc/incidental	sus/incidental	None
S1 Species: *Functional Points and Rating*	1H	.8H	.7M	.6M	.2L	.1L	0L
S2 and S3 Species: *Functional Points and Rating*	.9H	.7M	.6M	.5M	.2L	.1L	0L

Sources for documented use Pelicans observed in 2006, 07, 09, 2011; Trumpeter swan observed in 2006

14C. General Wildlife Habitat Rating:

i. Evidence of overall wildlife use in the AA (check substantial, moderate, or low based on supporting evidence): Substantial

Substantial (based on any of the following [check]):

- [x] observations of abundant wildlife #s or high species diversity (during any period)
- [ ] abundant wildlife sign such as scat, tracks, nest structures, game trails, etc.
- [x] presence of extremely limiting habitat features not available in the surrounding area
- [ ] interviews with local biologists with knowledge of the AA

Minimal (based on any of the following [check]):

- [ ] few or no wildlife observations during peak use periods
- [ ] little to no wildlife sign
- [ ] sparse adjacent upland food sources
- [ ] interviews with local biologists with knowledge of the AA

Moderate (based on any of the following [check]):

- [ ] observations of scattered wildlife groups or individuals or relatively few species during peak periods
- [ ] common occurrence of wildlife sign such as scat, tracks, nest structures, game trails, etc.
- [ ] adequate adjacent upland food sources
- [ ] interviews with local biologists with knowledge of the AA

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

Structural diversity (see #13)	High								Moderate								Low			
Class cover distribution (all vegetated classes)	Even				Uneven				Even				Uneven				Even			
Duration of surface water in ≥ 10% of AA	P/P	S/I	T/E	A	P/P	S/I	T/E	A	P/P	S/I	T/E	A	P/P	S/I	T/E	A	P/P	S/I	T/E	A
Low disturbance at AA (see #12i)	E	E	E	H	E	E	H	H	E	H	H	M	E	H	M	M	E	H	M	M
Moderate disturbance at AA (see #12i)	H	H	H	H	H	H	H	M	H	H	M	M	H	M	M	L	H	M	L	L
High disturbance at AA (see #12i)	M	M	M	L	M	M	L	L	M	M	L	L	M	L	L	L	L	L	L	L

iii. Rating (use the conclusions from i and ii above and the matrix below to arrive at [check] the functional points and rating)

Evidence of wildlife use (i)	*Wildlife habitat features rating (ii)*			
	Exceptional	High	Moderate	Low
Substantial	1E	.9H	.8H	.7M
Moderate	.9H	.7M	.5M	.3L
Minimal	.6M	.4M	.2L	.1L

Comments Numerous shorebirds and waterfowl have been observed using this site from fall 2003 through summer 2011.

14D. General Fish Habitat Rating: (Assess this function if the AA is used by fish or the existing situation is "correctable" such that the AA could be used by fish [i.e., fish use is precluded by perched culvert or other barrier, etc.]. If the AA is not used by fish, fish use is not restorable due to habitat constraints, or is not desired from a management perspective [such as fish entrapped in a canal], then check [x] **NA** here and proceed to 14E.)

i. Habitat Quality and Known / Suspected Fish Species in AA (use matrix to arrive at [check the functional points and rating)

Duration of surface water in AA	Permanent / Perennial						Seasonal / Intermittent						Temporary / Ephemeral					
Aquatic hiding / resting / escape cover	Optimal		Adequate		Poor		Optimal		Adequate		Poor		Optimal		Adequate		Poor	
Thermal cover optimal / suboptimal	O	S	O	S	O	S	O	S	O	S	O	S	O	S	O	S	O	S
FWP Tier I fish species	1E	.9H	.8H	.7M	.6M	.5M	.9H	.8H	.7M	.6M	.5M	.4M	.7M	.6M	.5M	.4M	.3L	.3L
FWP Tier II or Native Game fish species	.9H	.8H	.7M	.6M	.5M	.5M	.8H	.7M	.6M	.5M	.4M	.4M	.6M	.5M	.4M	.3L	.2L	.2L
FWP Tier III or Introduced Game fish	.8H	.7M	.6M	.5M	.5M	.4M	.7M	.6M	.5M	.4M	.4M	.3L	.5M	.4M	.3L	.2L	.2L	.1L
FWP Non-Game Tier IV or No fish species	.5M	.5M	.5M	.4M	.4M	.3L	.4M	.4M	.4M	.3L	.3L	.2L	.2L	.2L	.2L	.1L	.1L	.1L

Sources used for identifying fish sp. potentially found in AA:

ii. Modified Rating (**NOTE:** Modified score cannot exceed 1 or be less than 0.1)
a) Is fish use of the AA significantly reduced by a culvert, dike, or other man-made structure or activity ***or*** *is the waterbody included on the current final MDEQ list of waterbodies in need of TMDL development with listed "Probable Impaired Uses" including cold or warm water fishery or aquatic life support,* ***or*** *do aquatic nuisance plant or animal species (see* ***Appendix E****) occur in fish habitat?* **Y** ◯ **N** ◉ *If yes, reduce score in* ***i*** *above by 0.1:* **Modified Rating**

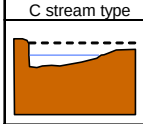
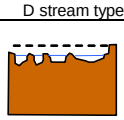
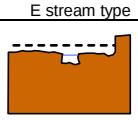
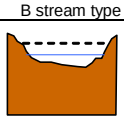
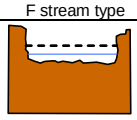
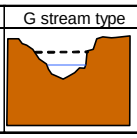
b) Does the AA contain a documented spawning area or other critical habitat feature (i.e., sanctuary pool, upwelling area, etc.- specify in comments) for native fish or introduced game fish? ◯ **Y** ◉ **N** *If yes, add 0.1 to the adjusted score in* ***i*** *or* ***iia*** *above:*
Modifed Rating

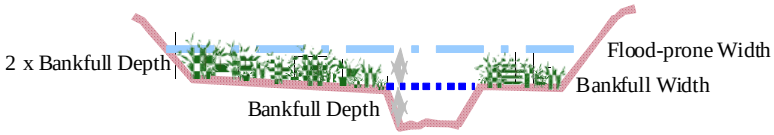
iii. Final Score and Rating: 0 NA **Comments:**

14E. Flood Attenuation: (Applies only to wetlands subject to flooding via in-channel or overbank flow. If wetlands in AA are not flooded from in-channel or overbank flow, click ☑ **NA** here and proceed to 14F.)

i. Rating (working from top to bottom, use the matrix below to arrive at [check] the functional points and rating)

Estimated or Calculated Entrenchment (Rosgen 1994, 1996)	Slightly entrenched - C, D, E stream types			Moderately entrenched – B stream type			Entrenched-A, F, G stream types		
% of flooded wetland classified as forested and/or scrub/shrub	75%	25-75%	<25%	75%	25-75%	<25%	75%	25-75%	<25%
AA contains **no outlet or restricted outlet**	1H	.9H	.6M	.8H	.7M	.5M	.4M	.3L	.2L
AA contains **unrestricted outlet**	.9H	.8H	.5M	.7M	.6M	.4M	.3L	.2L	.1L

Slightly Entrenched ER = >2.2			**Moderately Entrenched ER = 1.41 – 2.2**	**Entrenched ER = 1.0 – 1.4**		
C stream type	D stream type	E stream type	B stream type	A stream type	F stream type	G stream type
						



Floodrpone width / **Bankfull width** = **Entrenchment ratio**

ii. Are ≥10 acres of wetland in the AA subject to flooding **AND** are man-made features which may be significantly damaged by floods located within 0.5 mile downstream of the AA (check)? **Y** ◯ **N** ◉

Comments:

14F. Short and Long Term Surface Water Storage: (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, click ☐ **NA** here and proceed to 14G.)

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

Estimated maximum acre feet of water contained in wetlands within the AA that are subject to periodic flooding or ponding	>5 acre feet			1.1 to 5 acre feet			≤1 acre foot		
Duration of surface water at wetlands within the AA	P/P	S/I	T/E	P/P	S/I	T/E	P/P	S/I	T/E
Wetlands in AA flood or pond **≥ 5 out of 10 years**	1H	.9H	.8H	.8H	.6M	.5M	.4M	.3L	.2L
Wetlands in AA flood or pond **< 5 out of 10 years**	.9H	.8H	.7M	.7M	.5M	.4M	.3L	.2L	.1L

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

14G. Sediment/Nutrient/Toxicant Retention and Removal: (Applies to wetlands with potential to receive sediments, nutrients, or toxicants through influx of surface or ground water or direct input. If no wetlands in the AA are subject to such input, click ☐ **NA** here and proceed to 14H.)

i. Rating (working from top to bottom, use the matrix below to arrive at [check] the functional points and rating [H = high, M = moderate, or L = low])

Sediment, nutrient, and toxicant input levels within AA	AA receives or surrounding land use with potential to deliver levels of sediments, nutrients, or compounds at levels such that other functions are not substantially impaired. Minor sedimentation, sources of nutrients or toxicants, or signs of eutrophication present.				Waterbody 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 with potential to deliver high levels of sediments, nutrients, or compounds such that other functions are substantially impaired. Major sedimentation, sources of nutrients or toxicants, or signs of eutrophication present.			
% cover of wetland vegetation in AA	≥ 70%		< 70%		≥ 70%		< 70%	
Evidence of flooding / ponding in AA	Yes	No	Yes	No	Yes	No	Yes	No
AA contains **no or restricted outlet**	1H	.8H	.7M	.5M	.5M	.4M	.3L	.2L
AA contains **unrestricted outlet**	.9H	.7M	.6M	.4M	.4M	.3L	.2L	.1L

Comments: Wetland vegetation cover is less than 70%. The lake was inundated and there is no outlet.

14H Sediment/Shoreline Stabilization: (Applies only if AA occurs on or within the banks or a river, stream, or other natural or man-made drainage, or on the shoreline of a standing water body which is subject to wave action. If 14H does not apply, click ☐ **NA** here and proceed to 14I.)

i. Rating (working from top to bottom, use the matrix below to arrive at [check] the functional points and rating)

*% Cover of **wetland** streambank or shoreline by species with stability ratings of ≥6 (see **Appendix F**).*	*Duration of surface water adjacent to rooted vegetation*		
	Permanent / Perennial	Seasonal / Intermittent	Temporary / Ephemeral
≥ 65%	1H	.9H	.7M
35-64%	.7M	.6M	.5M
< 35%	.3L	.2L	.1L

Comments: The cover of Scirpus and Eleocharis spp. on the shoreline is 35 to 65%. The surface water duration on the shorelineis S/I.

14I. Production Export/Food Chain Support:

i. Level of Biological Activity (synthesis of wildlife and fish habitat ratings [check])

General Fish Habitat Rating (14D.iii.)	**General Wildlife Habitat Rating (14C.iii.)**		
	E/H	M	L
E/H	H	H	M
M	H	M	M
L	M	M	L
N/A	H	M	L

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

A	Vegetated component >5 acres						Vegetated component 1-5 acres						Vegetated component <1 acre					
B	High		Moderate		Low		High		Moderate		Low		High		Moderate		Low	
C	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
P/P	1E	.7H	.8H	.5M	.6M	.4M	.9H	.6M	.7H	.4M	.5M	.3L	.8H	.6M	.6M	.4M	.3L	.2L
S/I	.9	.6M	.7H	.4	.5M	.3L	.8H	.5M	.6M	.3L	.4M	.2L	.7H	.5M	.5M	.3L	.3L	.2L
T/E/A	.8	.5M	.6M	.3	.4M	.2L	.7H	.4M	.5M	.2L	.3L	.1L	.6M	.4M	.4M	.2L	.2L	.1L

iii. Modified Rating (**NOTE:** Modified score cannot exceed 1 or be less than 0.1.) **Vegetated Upland Buffer (VUB)**: Area with ≥ 30% plant cover, ≤ 15% noxious weed or ANVS cover, and that is not subjected to periodic mechanical mowing or clearing (unless for weed control).

a) Is there an average ≥ 50 foot-wide vegetated upland buffer around ≥ 75% of the AA circumference? **Y** ◉ **N** ○ *If yes, add 0.1 to the score in **ii** above and adjust rating accordingly:* **Modified Rating** .8H

Comments: The longest duration of surface water is PP. There is no surface outlet from the AA.

14J. Groundwater Discharge/Recharge: (check the appropriate indicators in i & ii below)

i. Discharge Indicators

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

ii. Recharge Indicators

- ☐ Permeable substrate present without underlying impeding layer
- ☐ Wetland contains inlet but no outlet
- ☐ Stream is a known 'losing' stream; discharge volume decreases
- ☐ Other:

iii. Rating (use the information from i and ii above and the table below to arrive at [check] the functional points and rating)

	Duration of saturation at AA Wetlands *FROM GROUNDWATER DISCHARGE OR WITH WATER THAT IS RECHARGING THE GROUNDWATER SYSTEM*			
Criteria	P/P	S/I	T	None
Groundwater Discharge or Recharge	1H	.7M	.4M	.1L
Insufficient Data/Information	NA			

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

14K. Uniqueness:

i. Rating (working from top to bottom, use the matrix below to arrive at [check] the functional points and rating)

Replacement potential	AA contains fen, bog, warm springs or mature (>80 yr-old) forested wetland **or** plant association listed as "S1" by the MTNHP			AA does not contain previously cited rare types **and** structural diversity (#13) is high **or** contains plant association listed as "S2" by the MTNHP			AA does not contain previously cited rare types or associations **and** structural diversity (#13) is low-moderate		
Estimated relative abundance (#11)	rare	common	abundant	rare	common	abundant	rare	common	abundant
Low disturbance at AA (#12i)	1H	.9H	.8H	.8H	.6M	.5M	.5M	.4M	.3L
Moderate disturbance at AA (#12i)	.9H	.8H	.7M	.7M	.5M	.4M	.4M	.3L	.2L
High disturbance at AA (#12i)	.8H	.7H	.6M	.6M	.4M	.3L	.3L	.2L	.1L

Comments:

14L. Recreation/Education Potential: (affords "bonus" points if AA provides recreation or education opportunity)

i. Is the AA a known or potential rec./ed. site: (check) **Y** ◉ **N** ○ (if 'Yes' continue with the evaluation; if 'No' then click ☐ **NA** here and proceed to the overall summary and rating page)

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

iii. Rating (use the matrix below to arrive at [check] the functional points and rating)

Known or Potential Recreation or Education Area	Known	Potential
Public ownership or public easement with general public access (no permission required)	.2H	.15H
Private ownership with general public access (no permission required)	.15H	.1M
Private or public ownership without general public access, or requiring permission for public access	.1M	.05L

Comments:

Mitigation site is on tribal property and could serve as an area for education/scientific study, bird hunting and birdwatching.

General Site Notes

This site does not support a fishery, however, juvenile fish have passed through the irrigation diversion and have been observed in the inlet.

FUNCTION & VALUE SUMMARY & OVERALL RATING FOR WETLAND/SITE #(S): Alkali Lake - all site

Function & Value Variables	Rating	Actual Functional Points	Possible Functional Points	Functional Units: (Actual Points x Estimated AA Acreage)	Indicate the four most prominent functions with an asterisk (*)
A. Listed/Proposed T&E Species Habitat	H	1	1	203.49	☑
B. MT Natural Heritage Program Species Habitat	H	.9	1	183.141	☑
C. General Wildlife Habitat	E	1	1	203.49	☑
D. General Fish Habitat	NA	0	0	0	☐
E. Flood Attenuation	NA	0	0	0	☐
F. Short and Long Term Surface Water Storage	H	1	1	203.49	☑
G. Sediment/Nutrient/Toxicant Removal	M	.7	1	142.443	☐
H. Sediment/Shoreline Stabilization	M	.6	1	122.094	☐
I. Production Export/Food Chain Support	H	.8	1	162.792	☐
J. Groundwater Discharge/Recharge	L	.1	1	20.349	☐
K. Uniqueness	M	.5	1	101.745	☐
L. Recreation/Education Potential (bonus points)	M	.1	NA	20.349	☐
Totals:		6.7	9	1363.383	
Percent of Possible Score			**74.44** %		

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

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

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

☐

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

OVERALL ANALYSIS AREA RATING:
(check appropriate category based on the criteria outlined

I	II	III	IV

Appendix C

Project Site Photographs

MDT Wetland Mitigation Monitoring
Alkali Lake
Pondera County, Montana

Photo Point 1 – *Photo 1*
Bearing: North

Location: Irrigation inlet
Taken in 2009

Photo Point 1 – *Photo 1*
Bearing: North

Location: Irrigation inlet
Taken in 2010

Photo Point 1 – *Photo 1*
Bearing: North

Location: Irrigation inlet
Taken in 2011

Photo Point 2 – *Photo 1*
Bearing: West

Location: Eastern boundary
Taken in 2009

Photo Point 2 – *Photo 1*
Bearing: West

Location: Eastern boundary
Taken in 2010

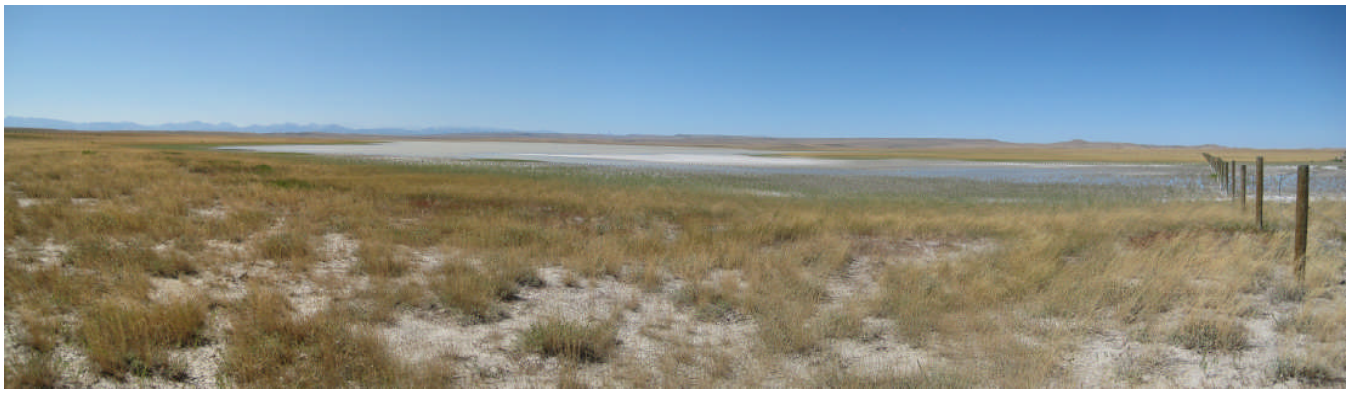


Photo Point 2 – *Photo 1*
Bearing: West

Location: Eastern boundary
Taken in 2011

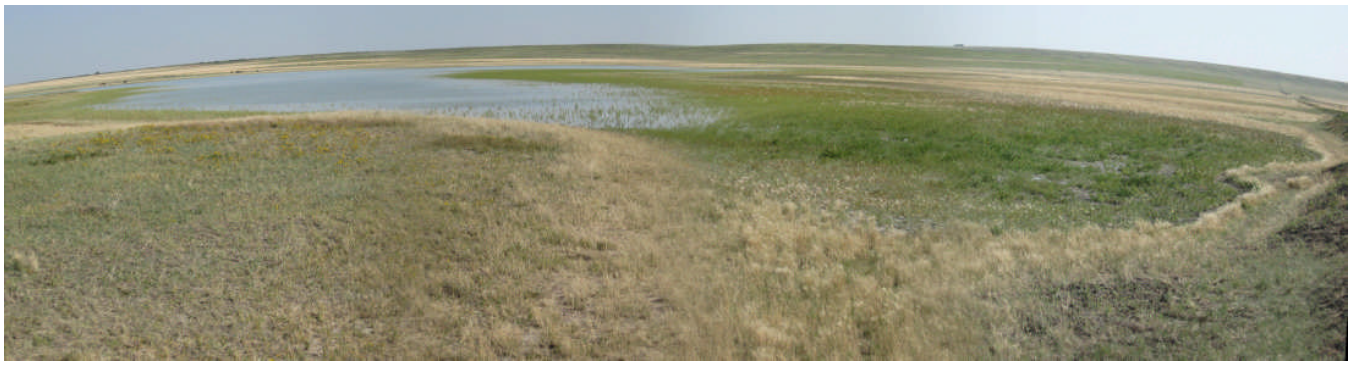


Photo Point 3 – *Photo 1*
Bearing: Southeast

Location: Northwest boundary
Taken in 2009

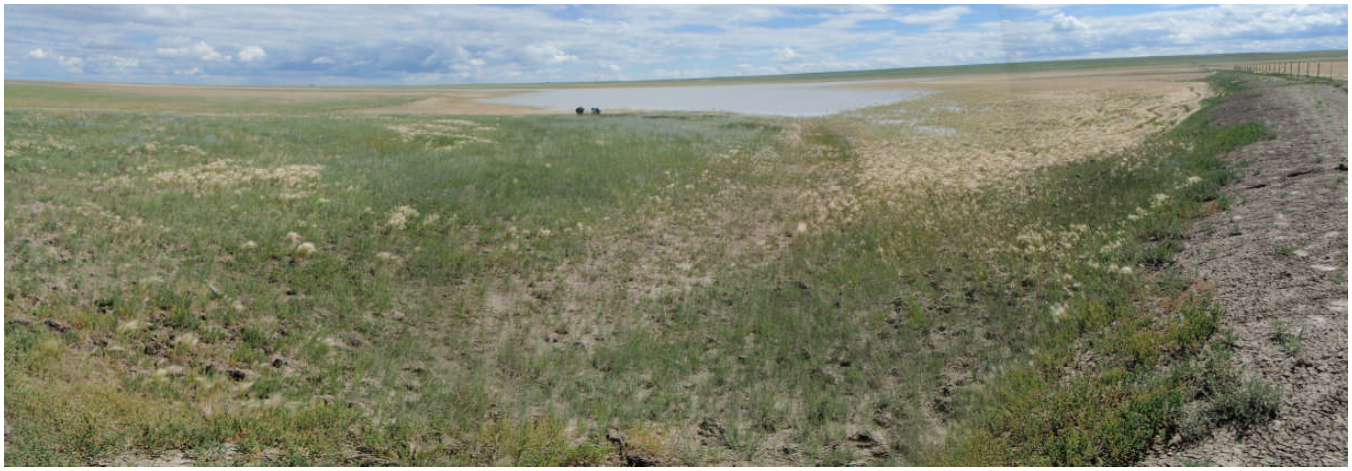


Photo Point 3 – *Photo 1*
Bearing: West

Location: Northwest boundary
Taken in 2010

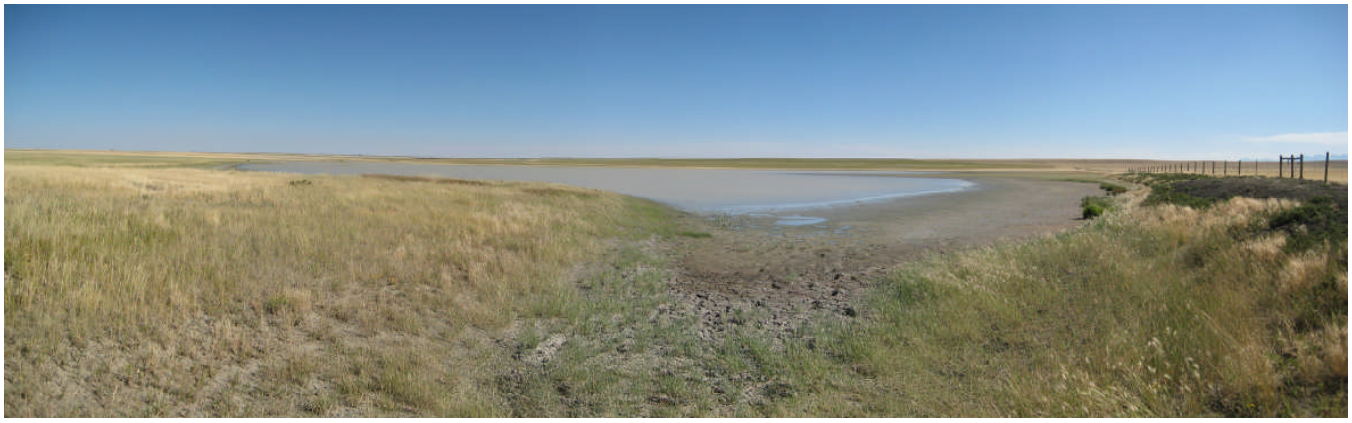
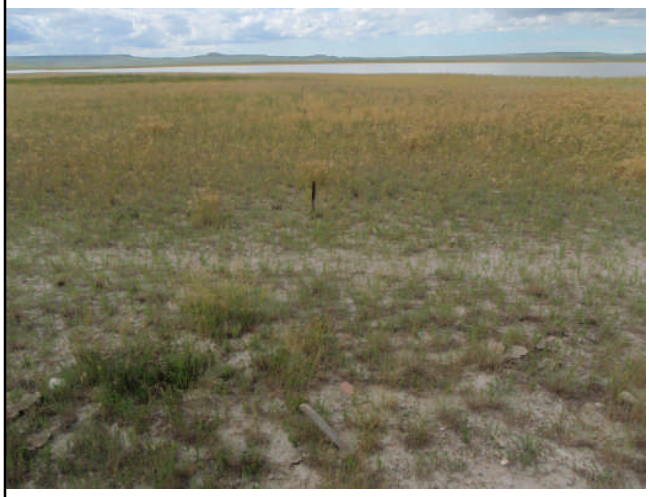


Photo Point 3 – *Photo 1*
Bearing: West

Location: Northwest boundary
Taken in 2011

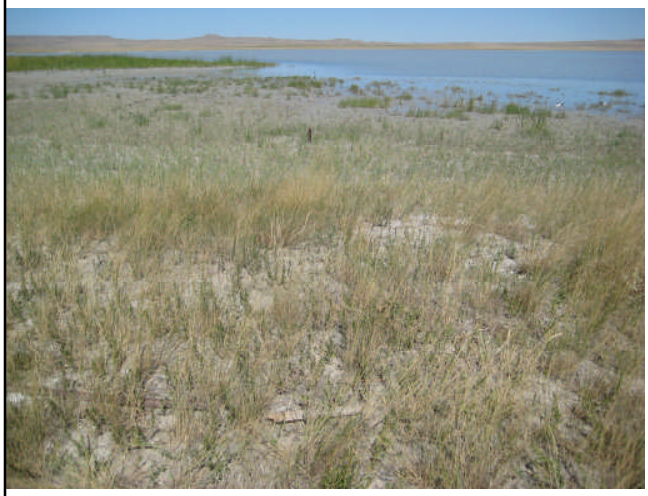
Transect 1 – *Start* **Location:** NA
Bearing: 311 Degrees **Taken in 2009**

Transect 1 – *Finish* **Location:** NA
Bearing: 131 Degrees **Taken in 2009**



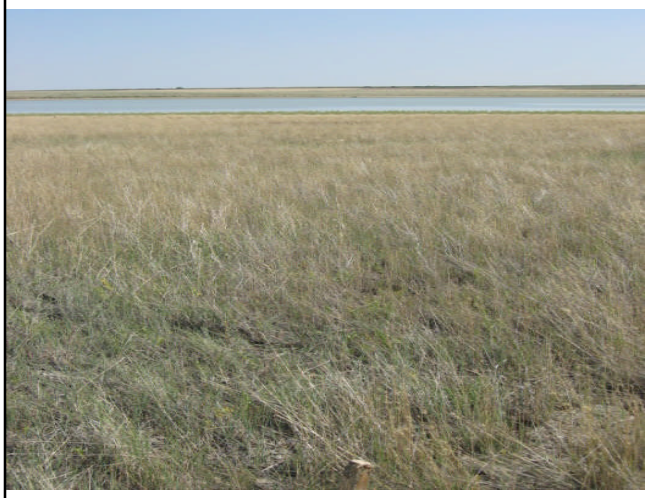
Transect 1 – *Start* **Location:** Veg Com 7
Bearing: 311 Degrees **Taken in 2010**

Transect 1 – *Finish* **Location:** Edge of open water
Bearing: 131 Degrees **Taken in 2010**



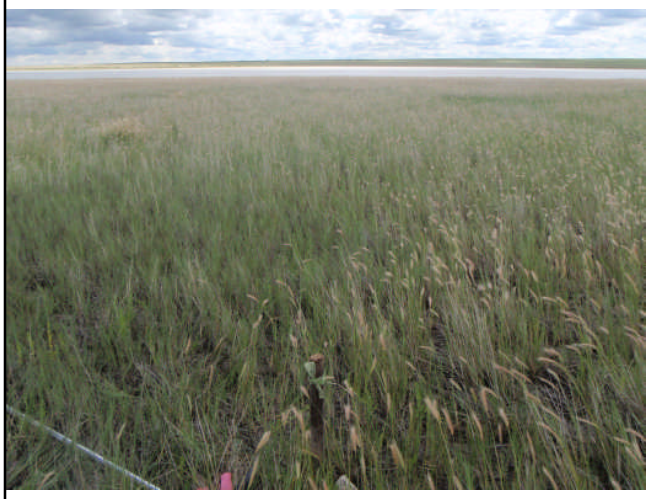
Transect 1 – *Start* **Location:** Veg Com 7
Bearing: 311 Degrees **Taken in 2011**

Transect 1 – *Finish* **Location:** Edge of open water
Bearing: 131 Degrees **Taken in 2011**



Transect 2 – *Start* **Location:** NA
Bearing: 297 Degrees **Taken in 2009**

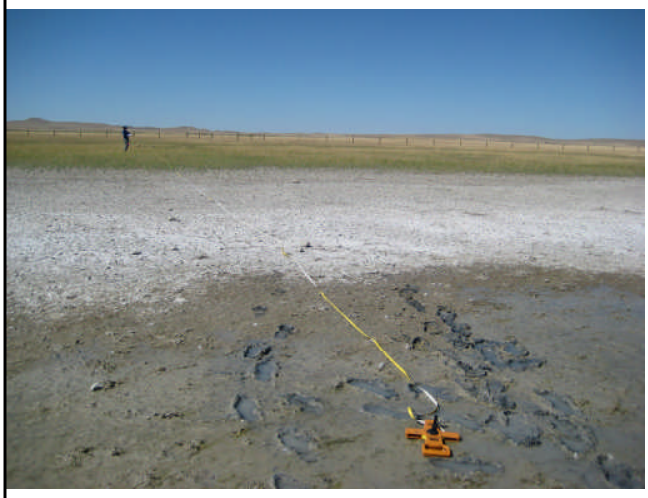
Transect 2 – *Finish* **Location:** NA
Bearing: 316 Degrees **Taken in 2009**



Transect 2 – *Start* **Location:** Veg Com 3
Bearing: 297 Degrees **Taken in 2010**

Transect 2 – *Finish* **Location:** Edge of open water
Bearing: 316 Degrees **Taken in 2010**

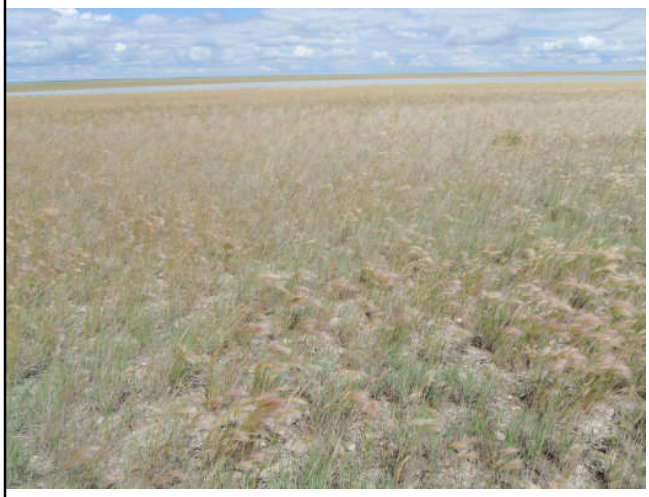
Transect 2 – *Start* **Location:** Veg Com 3
Bearing: 297 Degrees **Taken in 2011**



Transect 2 – *Finish* **Location:** Edge of open water
Bearing: 316 Degrees **Taken in 2011**

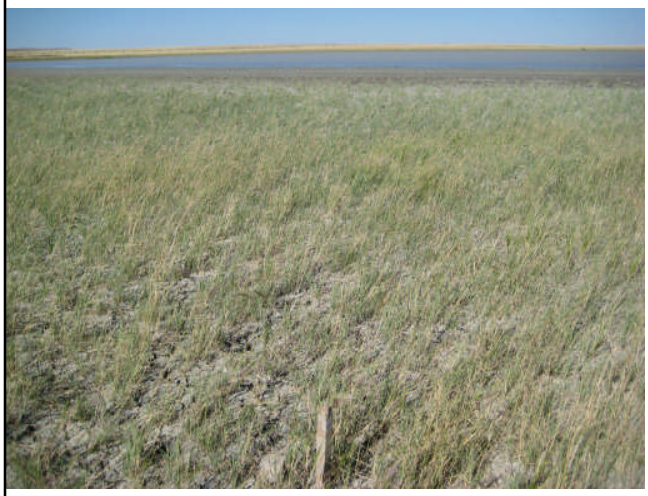
Transect 3 – *Start* **Location:** NA
Bearing: Northeast **Taken in 2009**

Transect 3 – *Finish* **Location:** NA
Bearing: Southwest **Taken in 2009**



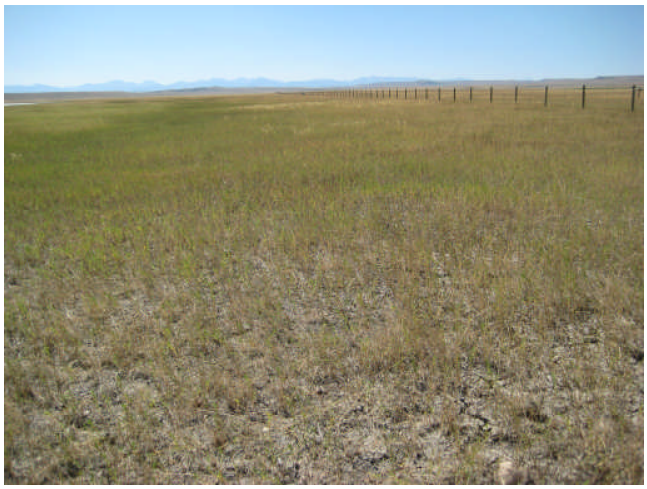
Transect 3 – *Start* **Location:** Veg Com 3
Bearing: Northeast **Taken in 2010**

Transect 3 – *Finish* **Location:** Open water
Bearing: Southwest **Taken in 2010**



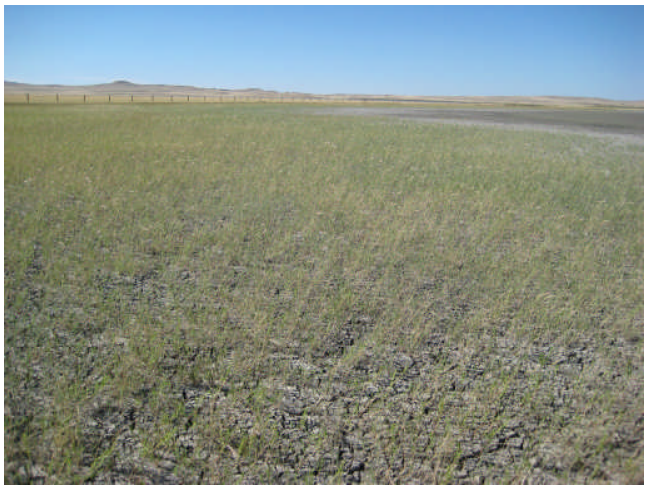
Transect 3 – *Start* **Location:** Veg Com 3
Bearing: Northeast **Taken in 2011**

Transect 3 – *Finish* **Location:** Open water
Bearing: Southwest **Taken in 2011**



Data Point: ALK-1
Bearing: West
Location: Veg Com 1
Taken in 2011

Data Point: ALK-2
Bearing: Southeast
Location: Veg Com 3
Taken in 2011



Data Point: ALK-3
Bearing: North
Location: Veg Com 3
Taken in 2011

Data Point: ALK-4
Bearing: Northwest
Location: Veg Com 1
Taken in 2011

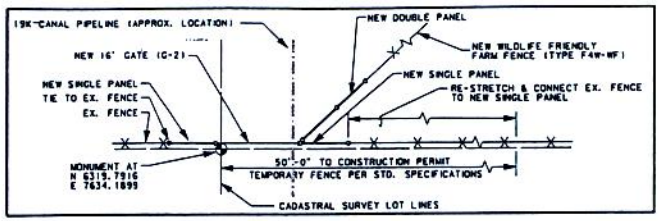
Data Point: ALK-5
Bearing: West
Location: Veg Com 3
Taken in 2011

Data Point: ALK-6
Bearing: West
Location: Veg Com 1
Taken in 2011

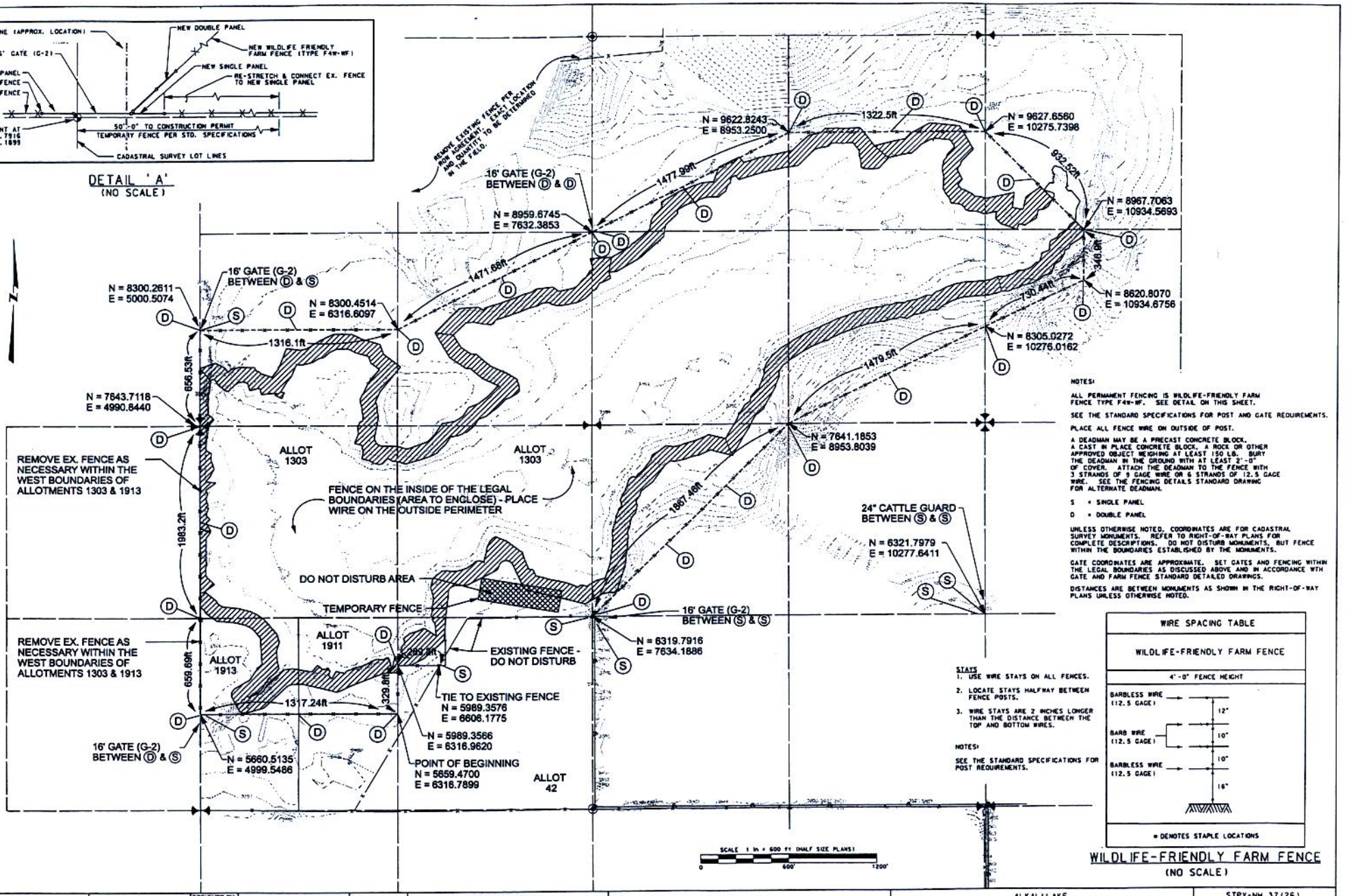
Appendix D

Project Plan Sheet

MDT Wetland Mitigation Monitoring
Alkali Lake
Pondera County, Montana



DETAIL 'A'
(NO SCALE)



NOTES:

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

SEE THE STANDARD SPECIFICATIONS FOR POST AND GATE REQUIREMENTS.

PLACE ALL FENCE WIRE ON OUTSIDE OF POST.

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

S = SINGLE PANEL

D = DOUBLE PANEL

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

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

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

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

NOTES:

SEE THE STANDARD SPECIFICATIONS FOR POST REQUIREMENTS.

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

WILDLIFE-FRIENDLY FARM FENCE
(NO SCALE)

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

Appendix E

Soil Metal Analytical Results

MDT Wetland Mitigation Monitoring
Alkali Lake
Pondera County, Montana

Pace Analytical Services, Inc.
602 S 25th Street
Billings, MT 591014549
(406)254-7226

September 12, 2011

Brian Sandefur
Confluence Inc.
PO Box 1133
Bozeman, MT 59771

RE: Project: REVISED: MDT Alkali Lake
Pace Project No.: 10167959

Dear Brian Sandefur:
Enclosed are the analytical results for sample(s) received by the laboratory on August 29, 2011. The results relate only to the samples included in this report.

REVISED: This report is revised to report all samples on a "wet-weight" basis.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Sally Heinje

sally.heinje@pacelabs.com
Project Manager

Enclosures

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, Inc.
602 S 25th Street
Billings, MT 591014549
(406)254-7226

CERTIFICATIONS

Project: REVISED: MDT Alkali Lake
Pace Project No.: 10167959

Minnesota Certification IDs

1700 Elm Street SE Suite 200, Minneapolis, MN 55414
A2LA Certification #: 2926.01
Alaska Certification #: UST-078
Alaska Certification #MN00064
Arizona Certification #: AZ-0014
Arkansas Certification #: 88-0680
California Certification #: 01155CA
EPA Region 8 Certification #: Pace
Florida/NELAP Certification #: E87605
Georgia Certification #: 959
Idaho Certification #: MN00064
Illinois Certification #: 200011
Iowa Certification #: 368
Kansas Certification #: E-10167
Louisiana Certification #: 03086
Louisiana Certification #: LA080009
Maine Certification #: 2007029
Maryland Certification #: 322
Michigan DEQ Certification #: 9909
Minnesota Certification #: 027-053-137
Mississippi Certification #: Pace
Montana Certification #: MT CERT0092
Nevada Certification #: MN_00064
Nebraska Certification #: Pace
New Jersey Certification #: MN-002
New Mexico Certification #: Pace
New York Certification #: 11647
North Carolina Certification #: 530
North Dakota Certification #: R-036
North Dakota Certification #: R-036A
Ohio VAP Certification #: CL101
Oklahoma Certification #: D9921
Oklahoma Certification #: 9507
Oregon Certification #: MN200001
Pennsylvania Certification #: 68-00563
Puerto Rico Certification
Tennessee Certification #: 02818
Texas Certification #: T104704192
Washington Certification #: C754
Wisconsin Certification #: 999407970

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Billings, MT 591014549
(406)254-7226

SAMPLE SUMMARY

Project: REVISED: MDT Alkali Lake
Pace Project No.: 10167959

Lab ID	Sample ID	Matrix	Date Collected	Date Received
10167959001	**L1**	Solid	08/21/11 00:00	08/29/11 12:25
10167959002	**F**	Solid	08/21/11 00:00	08/29/11 12:25
10167959003	**M1**	Solid	08/21/11 00:00	08/29/11 12:25
10167959004	**N**	Solid	08/21/11 00:00	08/29/11 12:25
10167959005	**K**	Solid	08/21/11 00:00	08/29/11 12:25
10167959006	**J**	Solid	08/21/11 00:00	08/29/11 12:25
10167959007	**O**	Solid	08/21/11 00:00	08/29/11 12:25

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(406)254-7226

SAMPLE ANALYTE COUNT

Project: REVISED: MDT Alkali Lake
Pace Project No.: 10167959

Lab ID	Sample ID	Method	Analysts	Analytes Reported
10167959001	**L1**	EPA 6020	TL1	4
		% Moisture	JDL	1
10167959002	**F**	EPA 6020	TL1	4
		% Moisture	JDL	1
10167959003	**M1**	EPA 6020	TL1	4
		% Moisture	JDL	1
10167959004	**N**	EPA 6020	TL1	4
		% Moisture	JDL	1
10167959005	**K**	EPA 6020	TL1	4
		% Moisture	JDL	1
10167959006	**J**	EPA 6020	TL1	4
		% Moisture	JDL	1
10167959007	**O**	EPA 6020	TL1	4
		% Moisture	JDL	1

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PROJECT NARRATIVE

Project: REVISED: MDT Alkali Lake
Pace Project No.: 10167959

Method: **EPA 6020**
Description: 6020 MET ICPMS
Client: Confluence, Inc
Date: September 12, 2011

General Information:
7 samples were analyzed for EPA 6020. All samples were received in acceptable condition with any exceptions noted below.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 3050 with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Internal Standards:
All internal standards were within QC limits with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: MPRP/28161

A matrix spike and matrix spike duplicate (MS/MSD) were performed on the following sample(s): 10167132001,10167959003

M6: Matrix spike and Matrix spike duplicate recovery not evaluated against control limits due to sample dilution.

- MS (Lab ID: 1046370)
  - Arsenic

Duplicate Sample:
All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

Pace Analytical Services, Inc.
602 S 25th Street
Billings, MT 591014549
(406)254-7226

ANALYTICAL RESULTS

Project: REVISED: MDT Alkali Lake
Pace Project No.: 10167959

Sample: L1 **Lab ID: 10167959001** Collected: 08/21/11 00:00 Received: 08/29/11 12:25 Matrix: Solid
Results reported on a "wet-weight" basis

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3050								
Arsenic	**13.9**	mg/kg	0.50	0.16	20	09/06/11 13:26	09/08/11 17:07	7440-38-2	
Cadmium	**0.30**	mg/kg	0.079	0.034	20	09/06/11 13:26	09/08/11 17:07	7440-43-9	
Nickel	**24.7**	mg/kg	0.50	0.055	20	09/06/11 13:26	09/08/11 17:07	7440-02-0	
Selenium	**1.4**	mg/kg	0.50	0.25	20	09/06/11 13:26	09/08/11 17:07	7782-49-2	
Dry Weight	Analytical Method: % Moisture								
Percent Moisture	**8.6**	%	0.10	0.10	1		09/06/11 00:00		

Sample: F **Lab ID: 10167959002** Collected: 08/21/11 00:00 Received: 08/29/11 12:25 Matrix: Solid
Results reported on a "wet-weight" basis

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3050								
Arsenic	**4.7**	mg/kg	0.43	0.14	20	09/06/11 13:26	09/08/11 17:11	7440-38-2	
Cadmium	**0.13**	mg/kg	0.069	0.029	20	09/06/11 13:26	09/08/11 17:11	7440-43-9	
Nickel	**10.0**	mg/kg	0.43	0.048	20	09/06/11 13:26	09/08/11 17:11	7440-02-0	
Selenium	**0.67**	mg/kg	0.43	0.22	20	09/06/11 13:26	09/08/11 17:11	7782-49-2	
Dry Weight	Analytical Method: % Moisture								
Percent Moisture	**28.0**	%	0.10	0.10	1		09/06/11 00:00		

Sample: M1 **Lab ID: 10167959003** Collected: 08/21/11 00:00 Received: 08/29/11 12:25 Matrix: Solid
Results reported on a "wet-weight" basis

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3050								
Arsenic	**8.3**	mg/kg	0.45	0.14	20	09/06/11 13:26	09/08/11 17:15	7440-38-2	
Cadmium	**0.26**	mg/kg	0.072	0.031	20	09/06/11 13:26	09/08/11 17:15	7440-43-9	
Nickel	**20.1**	mg/kg	0.45	0.050	20	09/06/11 13:26	09/08/11 17:15	7440-02-0	
Selenium	**1.1**	mg/kg	0.45	0.23	20	09/06/11 13:26	09/08/11 17:15	7782-49-2	
Dry Weight	Analytical Method: % Moisture								
Percent Moisture	**8.8**	%	0.10	0.10	1		09/06/11 00:00		

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ANALYTICAL RESULTS

Project: REVISED: MDT Alkali Lake
Pace Project No.: 10167959

Sample: N **Lab ID: 10167959004** Collected: 08/21/11 00:00 Received: 08/29/11 12:25 Matrix: Solid

Results reported on a "wet-weight" basis

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3050								
Arsenic	**6.7**	mg/kg	0.46	0.15	20	09/06/11 13:26	09/08/11 01:00	7440-38-2	
Cadmium	**0.21**	mg/kg	0.074	0.031	20	09/06/11 13:26	09/08/11 01:00	7440-43-9	
Nickel	**17.1**	mg/kg	0.46	0.052	20	09/06/11 13:26	09/08/11 01:00	7440-02-0	
Selenium	**0.45J**	mg/kg	0.46	0.23	20	09/06/11 13:26	09/08/11 01:00	7782-49-2	
Dry Weight	Analytical Method: % Moisture								
Percent Moisture	**19.6**	%	0.10	0.10	1		09/06/11 00:00		

Sample: K **Lab ID: 10167959005** Collected: 08/21/11 00:00 Received: 08/29/11 12:25 Matrix: Solid

Results reported on a "wet-weight" basis

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3050								
Arsenic	**8.4**	mg/kg	0.38	0.12	20	09/06/11 13:26	09/08/11 01:03	7440-38-2	
Cadmium	**0.27**	mg/kg	0.061	0.026	20	09/06/11 13:26	09/08/11 01:03	7440-43-9	
Nickel	**19.2**	mg/kg	0.38	0.042	20	09/06/11 13:26	09/08/11 01:03	7440-02-0	
Selenium	**0.51**	mg/kg	0.38	0.19	20	09/06/11 13:26	09/08/11 01:03	7782-49-2	
Dry Weight	Analytical Method: % Moisture								
Percent Moisture	**8.7**	%	0.10	0.10	1		09/06/11 00:00		

Sample: J **Lab ID: 10167959006** Collected: 08/21/11 00:00 Received: 08/29/11 12:25 Matrix: Solid

Results reported on a "wet-weight" basis

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3050								
Arsenic	**5.0**	mg/kg	0.46	0.15	20	09/06/11 13:26	09/08/11 01:07	7440-38-2	
Cadmium	**0.19**	mg/kg	0.073	0.031	20	09/06/11 13:26	09/08/11 01:07	7440-43-9	
Nickel	**12.4**	mg/kg	0.46	0.051	20	09/06/11 13:26	09/08/11 01:07	7440-02-0	
Selenium	**0.47**	mg/kg	0.46	0.23	20	09/06/11 13:26	09/08/11 01:07	7782-49-2	
Dry Weight	Analytical Method: % Moisture								
Percent Moisture	**3.8**	%	0.10	0.10	1		09/06/11 00:00		

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ANALYTICAL RESULTS

Project: REVISED: MDT Alkali Lake
Pace Project No.: 10167959

Sample: O **Lab ID: 10167959007** Collected: 08/21/11 00:00 Received: 08/29/11 12:25 Matrix: Solid

Results reported on a "wet-weight" basis

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3050								
Arsenic	**9.7**	mg/kg	0.36	0.12	20	09/06/11 13:26	09/08/11 01:11	7440-38-2	
Cadmium	**0.35**	mg/kg	0.058	0.024	20	09/06/11 13:26	09/08/11 01:11	7440-43-9	
Nickel	**19.6**	mg/kg	0.36	0.040	20	09/06/11 13:26	09/08/11 01:11	7440-02-0	
Selenium	**0.58**	mg/kg	0.36	0.18	20	09/06/11 13:26	09/08/11 01:11	7782-49-2	
Dry Weight	Analytical Method: % Moisture								
Percent Moisture	**3.9**	%	0.10	0.10	1		09/06/11 00:00		

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QUALITY CONTROL DATA

Project: REVISED: MDT Alkali Lake
Pace Project No.: 10167959

QC Batch: MPRP/28161 Analysis Method: EPA 6020
QC Batch Method: EPA 3050 Analysis Description: 6020 MET
Associated Lab Samples: 10167959001, 10167959002, 10167959003, 10167959004, 10167959005, 10167959006, 10167959007

METHOD BLANK: 1046368 Matrix: Solid
Associated Lab Samples: 10167959001, 10167959002, 10167959003, 10167959004, 10167959005, 10167959006, 10167959007

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Arsenic	mg/kg	<0.0079	0.025	09/07/11 21:12	
Cadmium	mg/kg	<0.0017	0.0040	09/07/11 21:12	
Nickel	mg/kg	<0.0028	0.025	09/07/11 21:12	
Selenium	mg/kg	<0.012	0.025	09/07/11 21:12	

LABORATORY CONTROL SAMPLE: 1046369

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Arsenic	mg/kg	18.2	18.5	102	75-125	
Cadmium	mg/kg	18.2	16.7	92	75-125	
Nickel	mg/kg	18.2	17.8	98	75-125	
Selenium	mg/kg	18.2	19.8	109	75-125	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1046370 1046371

Parameter	Units	10167132001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Arsenic	mg/kg	14.5	17.3	17	27.3	32.4	61	92	75-125	17	20	M6
Cadmium	mg/kg	0.86	17.3	17	15.3	16.8	83	93	75-125	9	20	
Nickel	mg/kg	3.2	17.3	17	18.5	19.7	85	94	75-125	6	20	
Selenium	mg/kg	<0.38	17.3	17	16.8	18.0	95	104	75-125	7	20	

MATRIX SPIKE SAMPLE: 1046372

Parameter	Units	10167959003 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Arsenic	mg/kg	8.3	21.3	30.0	98	75-125	
Cadmium	mg/kg	0.26	21.3	19.1	88	75-125	
Nickel	mg/kg	20.1	21.3	43.9	103	75-125	
Selenium	mg/kg	1.1	21.3	20.6	91	75-125	

Pace Analytical Services, Inc.
602 S 25th Street
Billings, MT 591014549
(406)254-7226

QUALITY CONTROL DATA

Project: REVISED: MDT Alkali Lake
Pace Project No.: 10167959

QC Batch: MPRP/28228 Analysis Method: % Moisture
QC Batch Method: % Moisture Analysis Description: Dry Weight/Percent Moisture
Associated Lab Samples: 10167959001, 10167959002, 10167959003, 10167959004, 10167959005, 10167959006, 10167959007

SAMPLE DUPLICATE: 1048563

Parameter	Units	10168341007 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	10.2	10.2	.05	30	

SAMPLE DUPLICATE: 1048596

Parameter	Units	10168186004 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	12.2	11.5	7	30	

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QUALIFIERS

Project: REVISED: MDT Alkali Lake
Pace Project No.: 10167959

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

ANALYTE QUALIFIERS

M6 Matrix spike and Matrix spike duplicate recovery not evaluated against control limits due to sample dilution.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: REVISED: MDT Alkali Lake
Pace Project No.: 10167959

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
10167959001	**L1**	EPA 3050	MPRP/28161	EPA 6020	ICPM/11420
10167959002	**F**	EPA 3050	MPRP/28161	EPA 6020	ICPM/11420
10167959003	**M1**	EPA 3050	MPRP/28161	EPA 6020	ICPM/11420
10167959004	**N**	EPA 3050	MPRP/28161	EPA 6020	ICPM/11420
10167959005	**K**	EPA 3050	MPRP/28161	EPA 6020	ICPM/11420
10167959006	**J**	EPA 3050	MPRP/28161	EPA 6020	ICPM/11420
10167959007	**O**	EPA 3050	MPRP/28161	EPA 6020	ICPM/11420
10167959001	**L1**	% Moisture	MPRP/28228		
10167959002	**F**	% Moisture	MPRP/28228		
10167959003	**M1**	% Moisture	MPRP/28228		
10167959004	**N**	% Moisture	MPRP/28228		
10167959005	**K**	% Moisture	MPRP/28228		
10167959006	**J**	% Moisture	MPRP/28228		
10167959007	**O**	% Moisture	MPRP/28228		

CHAIN OF CUSTODY FORM

Sheet 1 of 1

Investigator: Calypso, Jen Asebrook
Confluence Inc., PO Box 1133, Bozeman, MT 59715
Contact Person: **Brian Sandefur**, Confluence, 406.585.9500

Site: Alkali Lake

Laboratory
Pace Analytical, 602 S. 25th St, Billings, MT 59101
Contact Person: Denise Jensen, 406.254.7226

Courier
(name, address, ph & fax nos.)
Contact Person

Sample ID	Laboratory ID	Container	Sampling Date	Sampling Time	Sample Matrix: Water	Sample Matrix: Soil	Sample Preservation: Ice	Sample Preservation: None	Analysis: Arsenic	Analysis: Cadmium	Analysis: Nickel	Analysis: Selenium
L1		zip lock bag	8/21/2011			X		X	X	X	X	X
F		zip lock bag	8/21/2011			X		X	X	X	X	X
M1		zip lock bag	8/21/2011			X		X	X	X	X	X
N		zip lock bag	8/21/2011			X		X	X	X	X	X
K		zip lock bag	8/21/2011			X		X	X	X	X	X
J		zip lock bag	8/21/2011			X		X	X	X	X	X
O		zip lock bag	8/21/2011			X		X	X	X	X	X
		& garbage bag										
		due to hole										

10167959
001
002
003
004
005
006
007

Investigator: I attest that the proper field sampling procedures were used during the collection of these samples.

Sampler Name: *(print & signature)* Jen Asebrook Jennifer Asebrook *(Date)* 8.23.2011

Relinquished by: *(print & signature)*	Date	Time	Recieved by: *(print & signature)*	Date	Time
Jen Asebrook Jennifer Asebrook	8.23.2011	10:40am	Rory Nary PACE	8/29/11	1225
Relinquished by: *(print & signature)* USPS	Date 8/29/11	Time 1225	Recieved by: *(print & signature)*	Date	Time
Relinquished by: *(print & signature)*	Date	Time	Recieved by: *(print & signature)*	Date	Time
Relinquished by: *(print & signature)*	Date	Time	Recieved by: *(print & signature)*	Date	Time
Relinquished by: *(print & signature)*	Date	Time	Recieved by: *(print & signature)*	Date	Time

Analyte list for Alkali Lake soil analysis:

7 samples

Arsenic
Cadmium
Nickel
Selenium
*Results reported on a "wet-weight" basis

Invoice and samples results should be sent to:

Brian Sandefur
Confluence Inc
PO Box 1133
Boxeman, MT 59715
bsandefur@confluenceinc.com

Sample Condition Upon Receipt

Pace Analytical

Client Name: Calypso/Confluence Inc Project # 10167959

Courier: ☐ Fed Ex ☐ UPS ☒ USPS ☐ Client ☐ Commercial ☐ Pace Other _____

Tracking #: _____

Optional
Proj. Due Date:
Proj. Name:

Custody Seal on Cooler/Box Present: ☐ yes ☒ no Seals intact: ☐ yes ☒ no

Packing Material: ☐ Bubble Wrap ☐ Bubble Bags ☒ None ☐ Other _____ Temp Blank: Yes ____ No X

Thermometer Used 1383045 or 135 **Type of Ice:** Wet Blue (None) ☐ Samples on ice, cooling process has begun

Cooler Temperature NA **Biological Tissue is Frozen:** Yes No

Temp should be above freezing to 6°C **Comments:**

Date and Initials of person examining contents: RW 8/30/11

Chain of Custody Present:	☒Yes	☐No	☐N/A
Chain of Custody Filled Out:	☒Yes	☐No	☐N/A
Chain of Custody Relinquished:	☒Yes	☐No	☐N/A
Sampler Name & Signature on COC:	☐Yes	☒No	☐N/A
Samples Arrived within Hold Time:	☒Yes	☐No	☐N/A
Short Hold Time Analysis (<72hr):	☐Yes	☒No	☐N/A
Rush Turn Around Time Requested:	☐Yes	☒No	☐N/A
Sufficient Volume:	☒Yes	☐No	☐N/A
Correct Containers Used:	☒Yes	☐No	☐N/A
-Pace Containers Used:	☐Yes	☒No	☐N/A
Containers Intact:	☒Yes	☐No	☐N/A
Filtered volume received for Dissolved tests	☐Yes	☐No	☒N/A
Sample Labels match COC:	☒Yes	☐No	☐N/A
-Includes date/time/ID/Analysis Matrix: SL			
All containers needing acid/base preservation have been checked. Noncompliance are noted in 13.	☐Yes	☐No	☒N/A
All containers needing preservation are found to be in compliance with EPA recommendation.	☐Yes	☐No	☒N/A
Exceptions: VOA,Coliform, TOC, Oil and Grease, WI-DRO (water)	☐Yes	☒No	
Samples checked for dechlorination:	☐Yes	☐No	☒N/A
Headspace in VOA Vials (>6mm):	☐Yes	☐No	☒N/A
Trip Blank Present:	☐Yes	☒No	☐N/A
Trip Blank Custody Seals Present	☐Yes	☐No	☒N/A
Pace Trip Blank Lot # (if purchased): NA			

1. 2. 3. 4. 5. 6. 7. 8. 9. PB 10. 11. 12.

13. ☐ HNO3 ☐ H2SO4 ☐ NaOH ☐ HCl
Samp #

Initial when completed	Lot # of added preservative

14. 15. 16.

Client Notification/ Resolution: Field Data Required? Y / N

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: Kari Pehle **Date:** 8-30-11

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e out of hold, incorrect preservative, out of temp, incorrect containers)