MONTANA DEPARTMENT OF TRANSPORTATION
WETLAND MITIGATION MONITORING REPORT: YEAR 2010

Alkali Lake
Pondera County, Montana



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An Employee-Owned Company

December 2010

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1. INTRODUCTION

The Alkali Lake Wetland Mitigation 2010 Monitoring Report presents the results of the fourth 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 Montana Department of Transportation (MDT) Mitigation Monitoring Forms, the US Army Corps of Engineers (USACE) Routine Wetland Determination Data Forms (Environmental Laboratory 1987), and the MDT Montana Wetland Assessment Forms. Appendix C contains relevant site photographs and Appendix D includes the project plan sheet. Appendix E contains the analytical results of metals in soil samples.

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. 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 determined that Alkali Lake would be a suitable area for wetland restoration (PBS&J 2009).

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 the late summer through early fall of 2005 (Appendix D). A pipeline constructed from the Birch Creek Main Canal to Blacktail Creek restored the wetland hydrology to the lakebed. Surface water flowed from a diversion in Blacktail Creek to the Badger Fisher main Canal, K Canal, and 19K Canal where a second pipeline was built to deliver water to Alkali Lake (Figure 1.) Project goals were the restoration/re-establishment of approximately 101.4 acres of open water/lake bed and potential wetland restoration and an upland buffer. The project credit ratios approved by the USACE and the Blackfeet Tribe are shown in Table 1 (PBS&J 2009).

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. The performance standards approved by the USACE and Blackfeet Tribe are listed below (PBS&J 2009).

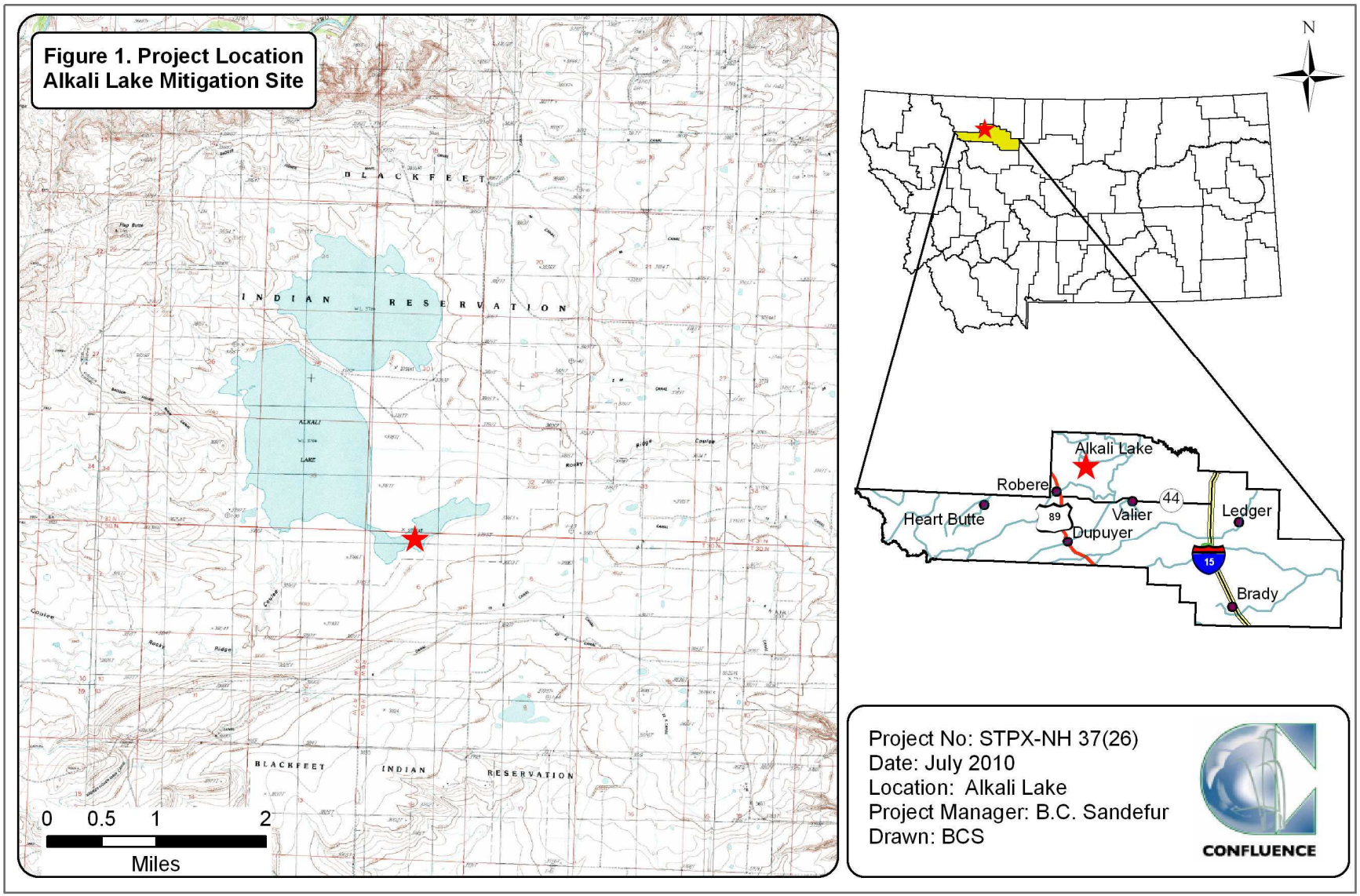


Figure 1. Project Location Alkali Lake Mitigation Site.

- **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 NRCS definitions for hydric soil) or appear to be forming, the soil is sufficiently stable to prevent erosion, and the soil is able to support plant cover. Since typical hydric soil indicators may require long periods to form, a lack of distinctive hydric soil features will not be considered a failure if hydrologic and vegetation success is achieved.
- **Hydrophytic Vegetation Success** will be achieved where wetland vegetation is dominant as per the technical guidelines in the 1987 USACE 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	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 July 23, 2010. Information contained on the 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 wetland delineation, vegetation community mapping, vegetation transect monitoring, soils data, hydrology data, bird and wildlife use documentation, photographs, 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).

Hydrological indicators as outlined on the Wetland Data form were documented 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 electronic field data sheets (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 aerial photographs. 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).

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), 297 (T-2), and 173 (T-3) feet long, respectively (Figure 2, Appendix A). The transect locations 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 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 the South Alkali Lake, North Alkali Lake, and Alkali Lake (project area) in 2009 and 2010. 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 1-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 boundary was identified on an 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 list of wildlife species observed from 2006 to 2010 was compiled.

2.6. Functional Assessment

The 1999 MDT Montana Wetland Assessment Method (Berglund 1999) was employed to complete functional assessments of the site in 2006 and 2007. The 2008 MDT Montana Wetland Assessment Method (Berglund and McEldowney 2008) was used to evaluate functions and values on the site in 2008, 2009, and 2010. 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 Functional Assessment Form was completed for each wetland or group of wetlands defined as Assessment Areas (AA) (Appendix B).

2.7. Photo Documentation

Monitoring at photo points provides supplemental information documenting wetland condition, trends, current land use surrounding the site, the upland buffer, the monitored area, and the vegetation transects. 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 transect end 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 during the 2010 monitoring season. Points were collected using WAAS-enabled differential corrected 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 an aerial photograph and then digitized. Site features and survey points that were mapped included fence boundaries, photograph points, transect beginnings and endings, wetland boundaries, 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

The growing season recorded for the area characterized by the adjacent soil map unit, Vanda clay, 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.

Hydrology was restored to the lake bed by constructing an irrigation pipeline from the Birch Creek Main Canal to Blacktail Creek. The creek drains to the Badger Fisher Main Canal, K Canal, and 19K Canal. Another pipeline was built to deliver water from the 19K Canal to the Alkali Lake site. The pipelines were not conveying water during the July 23, 2010, monitoring event.

The total area of open water habitat increased by approximately 23 acres from 2009 to 2010. Approximately 50 percent of the assessment area was inundated with surface water ranging in depth from 0 to 2 feet in 2010. The depth at the emergent vegetation and open water boundary was 1 foot.

Precipitation rates influence wetland development at the site although the primary hydrological source is water diversion from local canals. Total average annual precipitation at the Valier Weather Station (248501) was 12.42 inches from January 1911 to December 2009 (WRCC 2010). Long-term average (1911-2007) between January to June is 7.12 inches. Monthly totals from January to June were 6.57 inches in 2009 and 8.27 inches in 2010 for the same time period, indicating wetter than normal conditions.

Six data points, Alk-1 to Alk-6 were sampled in 2010 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 drainage patterns in wetlands. A secondary indicator was the FAC-Neutral Test. Data point Alk-3 was saturated at 10 inches below the ground surface (bgs) and exhibited

drainage patterns. Data point Alk-5 was saturated at 12 inches bgs. There were no hydrological indicators at the remaining data points.

3.2. Vegetation

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

Community Type 1 – *Agropyron smithii/Iva axillaris* was found in the upland areas that border the wetland fringe of the open surrounding the lake. The species were dominated by Western wheatgrass (*Agropyron smithii*), small-flower sumpweed (*Iva axillaris),* alkali bluegrass (*Poa juncifolia*), and Nuttall's saltbush (*Atriplex nuttallii*). Over thirty additional species were identified within the community at low cover percentages. The community was called *Upland* in 2009.

The Type 3 – *Hordeum* spp. community was identified in the wetland fringe that forms 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 community was bare ground. The community was called *Suaeda* (seepweed spp.) Wetland in 2009. The species was no longer dominant in 2010, potentially the result of submersion.

Wetland community Type 4 – *Scirpus* spp./*Eleocharis* spp. was identified in small, isolated areas in the southwest portion of the site. Hard-stem bulrush (*Scirpus acutus*), soft-stem bulrush (*Scirpus validus*), three-square bulrush (*Scirpus pungens*), creeping spikerush (*Eleocharis palustris*), least spikerush (*Eleocharis acicularis*), and foxtail barley 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 least spikerush, creeping spikerush, Southern naiad (*Najas guadalupensis*), Nuttall's alkali grass and green algae.

The open water in the lake was vegetated with non-persistent, aquatic bed vegetation including pursh seepweed and green algae. The surface water area of the lake was identified as transitional open water in 2009. The area was named open water in 2010 based on the increase in the cover of the aquatic bed vegetation class across most of the site. The areal extent of open water increased by approximately 23 acres in 2010.

Table 2. Vegetation species observed from 2006 to 2010 at the Alkali Lake Wetland Mitigation Site.

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
Alopercurus spp.		NL
Artemisia frigida	**prairie sagewort**	NL
Aster campestris	meadow aster, Western	NL
Aster falcatus	aster,white prairie	FACU-
Astragalus bisulcatus	two-grooved milkvetch	NL
Astragalus vexilliflexus	**bent-flowered milk-vetch**	NL
Atriplex nuttallii	**Nuttall's saltbush**	NL
Atriplex patula	saltbush,halberd-leaf	FACW
Beckmannia syzigachne	**sloughgrass, American**	OBL
Bouteloua gracilis	**blue grama**	NL
Bromus commutata	**bald brome**	NL
Carex microptera	**sedge,small-wing**	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
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
Koeleria macrantha	prairie junegrass	NL
Lactuca serriola	lettuce,prickly	FAC-
Lappula myosotis	**stickseed**	NL
Lepidium ramossissimim	manybranched pepperweed	NL
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

[1]Region 9 Northwest (Reed 1988).

Species first identified in 2010 are listed in **bold** type.

Table 2 (Continued). Vegetation species observed from 2006 to 2010 at the Alkali Lake Wetland Mitigation Site.

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 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
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 2010 are listed in **bold** type.

Three vegetation transects were monitored at Alkali Lake in 2010 (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 and 2010 are included on pages C-2 through C-4 of Appendix C. The data collected on Transect 1 is summarized in Table 3 and graphed in Charts 1 and 2. Transect 1, located near the center of the south boundary, intercepted three wetland communities, Types 3, 4, and 7, and open water. Hydrophytic vegetation communities encompassed approximately 89.8 percent of the transect, approximately 5 percent higher than in 2009.

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 in order to encompass the diversity of developing habitats. Communities Type 1 – *Agropyron smithii/Iva axillaris* Upland and Type 3 – Hordeum spp. Wetland, and open water were identified on the transect. The extent of open water increased in 2010. Bushy knotweed (*Polygonum ramosissimum*) plants evident in 2009 within the Type 6 Aquatic Wetland were dead in 2010. Fifty-two percent of the transect consisted of hydrophytic species. Above average precipitation during the first part of 2010 likely promoted the increase in open water along this transect, encompassing 42 percent of the transect intervals. It is conjectured that the sampling strategy employed at this transect began higher on the landscape as the percent length comprising upland species increased yet there was no discernable shift in wetland boundary.

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

Vegetation Community Transitions along Transect	1	3	2	6	4
Vegetation Communities along Transect	1	4	3	3	3
Hydrophytic Vegetation Communities along Transect	1	3	3	3	3
Total Vegetative Species	5	9	7	12	15
Total Hydrophytic Species	4	5	6	10	11
Total Upland Species	1	4	1	2	4
Estimated % Total Vegetative Cover	70	50	50	50	55
% Transect Length Comprising Hydrophytic Vegetation Communities	100	62	63	85	89.8
% Transect Length Comprising Upland Vegetation Communities	0	2	0	0	0.0
% Transect Length Comprising Unvegetated Open Water	0	0	37	15	10.2
% Transect Length Comprising Bare Substrate	0	36	0	0	0.0

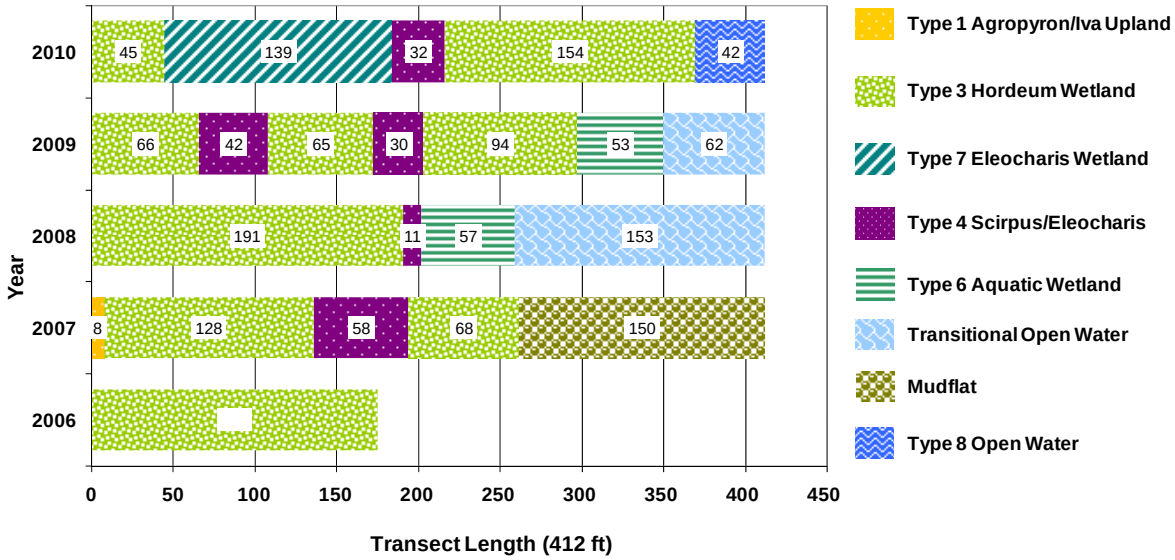


Chart 1. Length of habitat types within Transect 1 from 2006 to 2010.

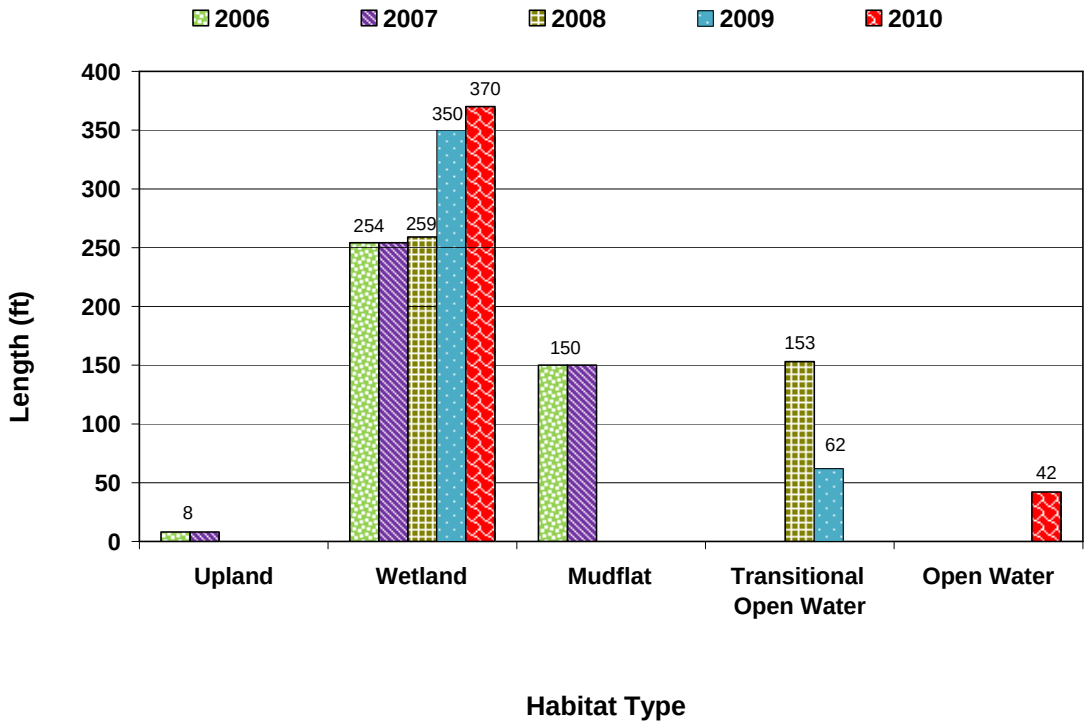


Chart 2. Transect maps showing vegetation communities on Transect 1 from start (0 feet) to end (175 feet in 2006 and 412 feet in 2007 to 2010).

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

Vegetation Community Transitions along Transect	1	2	2	2	2
Vegetation Communities along Transect	2	3	3	3	2
Hydrophytic Vegetation Communities along Transect	1	2	2	2	1
Total Vegetative Species	8	10	7	8	11
Total Hydrophytic Species	3	5	5	6	6
Total Upland Species	5	5	2	2	5
Estimated % Total Vegetative Cover	70	57	57	70	70
% Transect Length Comprising Hydrophytic Vegetation Communities	74	72	43	89	52
% Transect Length Comprising Upland Vegetation Communities	3	20	2	2	6
% Transect Length Comprising Unvegetated Open Water	23	0	55	9	42
% Transect Length Comprising Bare Substrate	0	8	0	0	0

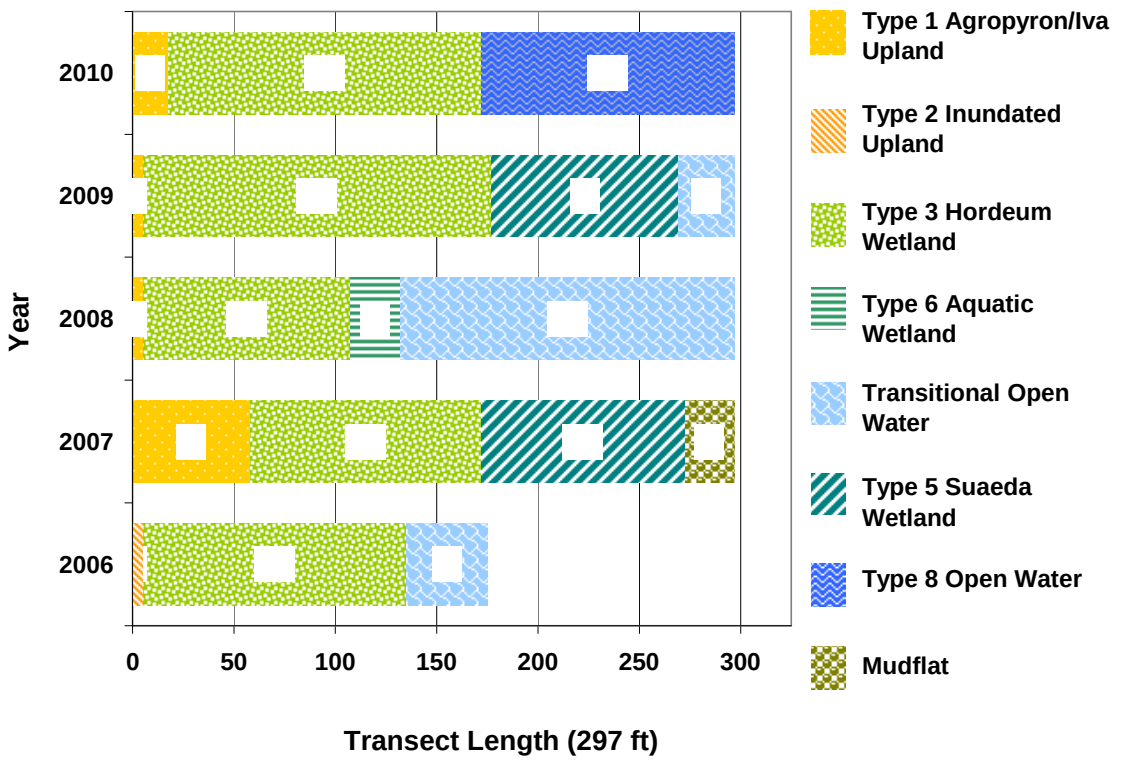


Chart 3. Length of habitat types within Transect 2 from 2006 to 2010.

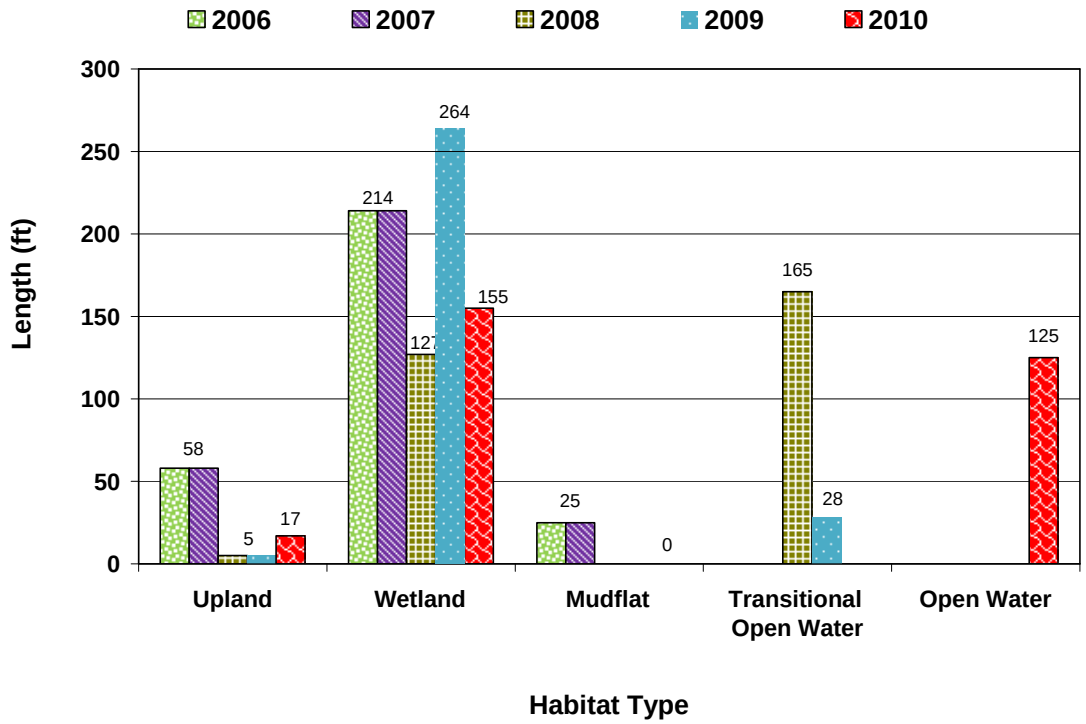


Chart 4. Transect maps showing vegetation communities on Transect 2 from start (0 feet) to end (175 feet in 2006 and 297 feet in 2007 to 2010).

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. This is attributed to the shifting of the start pin as it was sheared by wildlife. Type 3 – *Hordeum* spp. has dominated the transect since 2006. The extent of open water increased in 2010. Hydrophytic species dominated ninety percent of the transect.with open water occupying ten percent. Although the start pin likely shifted, this transect was situated completely within wetland habitat.

Canada thistle 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 throughout Community 7.

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

Vegetation Community Transitions along Transect	1	2	0	1	1
Vegetation Communities along Transect	2	3	1	2	1
Hydrophytic Vegetation Communities along Transect	1	2	1	2	1
Total Vegetative Species	8	10	7	8	9
Total Hydrophytic Species	5	6	5	6	5
Total Upland Species	3	4	2	2	4
Estimated % Total Vegetative Cover	55	53	50	75	75
% Transect Length Comprising Hydrophytic Vegetation Communities	63	52	95	100	90
% Transect Length Comprising Upland Vegetation Communities	37	19	0	0	0
% Transect Length Comprising Unvegetated Open Water	0	0	5	0	10
% Transect Length Comprising Bare Substrate	0	0	0	0	0

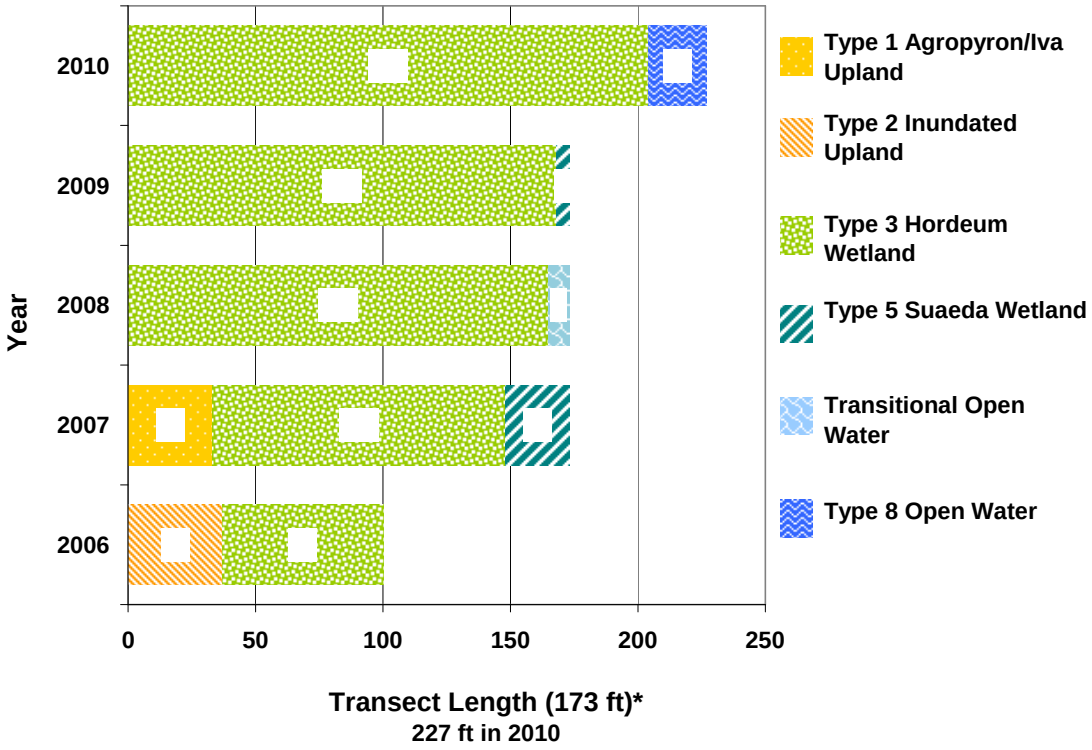


Chart 5. Length of habitat types within Transect 3 from 2006 to 2010 (*Transect length from 2007 to 2009 was recorded at 173 feet. Length measured in 2010 was 227 feet).

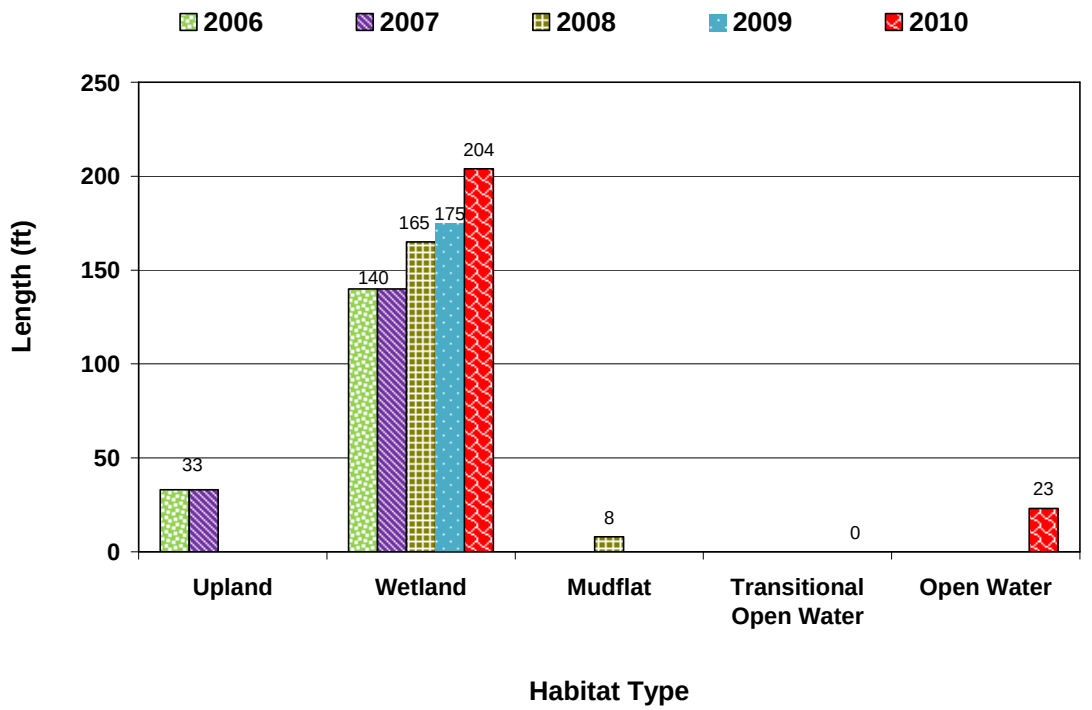


Chart 6. Transect maps showing vegetation communities on Transect 3 from start (0 feet) to end (100 feet in 2006, 173 feet from 2007 to 2009, and 227 feet in 2010).

3.3. Soil

The project site was mapped as 'lakebed' prior to construction of the wetland mitigation site (PBS&J 2009). Data points Alk-2, Alk-3, and Alk-5 were located within areas defined as wetlands. The soil at Alk-2 was a clay soil (10 YR 5/1) with redoximorphic concentrations in the matrix (10 YR 3/4). The low-chroma color and redox features were positive indicators of hydric soil. The profile at Alk-3 revealed a clay soil (2.5 YR 5/1) with redox concentrations in the matrix (10 YR 4/3), both indicators of hydric soil. Data point Alk-5 exhibited 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 were positive indicators of hydric soil. Data point Alk-6 located in upland met the hydric soil criteria with a silty clay soil (2.5 YR 4/1) and redox depletions (2.5 Y 6/1).

Baseline soil data collected in June 2004 from 10 sites was analyzed for arsenic, cadmium, nickel, and selenium (PBS&J 2009). 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).

The M1 soil site, on the eastern side of Alkali Lake, registered 9.7 mg/kg for arsenic in 2004. This value is 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 very similar. It was decided that collecting paired soil samples was not necessary (PBS&J 2009). Soil samples have been collected and analyzed for the metals listed above from 2006 to 2010. Seven sites have been sampled since 2008 (Appendix E).

Soil samples were collected at seven locations within the Alkali Lake project area in 2010. Access prevented sample collection from the North and South Alkali Lake locations in 2010. Soil samples were analyzed for arsenic (As), cadmium (Cd), nickel (Ni), and selenium (Se) by Pace Analytical of Billings, Montana (analytical results in Appendix E). The results were reported on a weight-weight basis (Table 7) for consistency between sampling events. Sample locations are shown on Figure 2 (Appendix A).

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

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 and 2010.

LAKE LOCATION	SAMPLE YEAR	SOIL SAMPLE MAP LOCATION	ARSENIC (As) mg/kg	CADMIIUM (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
Alkali	2009	J	4.85	0.37	15.20	0.12
Alkali	2010	J	7.30	0.25	8.80	0.49
Alkali	2009	L1	3.44	0.24	10.30	0.06
Alkali	2010	L1	11.40	0.27	21.10	0.67
Alkali	2009	M1	5.03	0.34	14.20	0.15
Alkali	2010	M1	5.90	0.21	18.00	0.65
Alkali	2009	O	5.12	0.38	15.20	0.41
Alkali	2010	O	7.80	0.34	16.40	0.95
Alkali	2010	K	6.30	0.20	18.70	0.65
Alkali	2010	N	5.10	0.17	15.70	0.61

Arsenic concentrations at South Alkali Lake, sample location F, increased slightly from 7.25 mg/kg in 2009 to 8.50 mg/kg in 2010. The 2010 value is within the NIWQP toxicity thresholds for constituents in sediments for arsenic. The NIWQP guideline for denoting concern is 8.2 to 70 mg/kg for arsenic. Only sample locations F and L1 were within this range in 2010, with sample L1 showing the highest concentration of arsenic (11.40 mg/kg). The arsenic concentrations in the Alkali Lake samples increased from 2009 to 2010, yet were below the Canadian Interim (CAN), NIWQP Toxicity, and National Environmental Protection Measure (NEPC) guidelines for protection of aquatic life (Table 6). The mean arsenic concentration for samples collected within the site (J, L1, M1, O, K, and N) was 7.47 mg/kg. This slight increase may be attributed to both the geologic

and environmental conditions that exist within the project area, its watershed, and/or irrigation source/infrastructure. The upper soil surface where the samples were taken (upper six inches) is affected by evaporation and accumulation of salts and other dissolved constituents within the interstitial pore water and high water table.

Cadmium concentrations recorded in 2010 generally decreased or remained consistent to the 2009 samples. One sample, L1, showed a slight increase from 0.24 mg/kg in 2009 to 0.27 mg/kg in 2010.
The mean was 0.24 mg/kg for samples collecting within the site boundaries. Differences within measured concentrations may be a result of actual increases in heavy metal concentrations, sample collection at slightly 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.

Nickel concentrations generally increased from 2009 to 2010 with only one sample, J, displaying a decrease from 15.20 mg/kg in 2009 to 8.80 mg/kg in the 2010 sample. The average nickel concentration measured in the 2010 samples was 17.63 mg/kg. The highest nickel concentration measured within the site was 24.70 mg/kg reported in sample F. None of the sample results were above the NEPC guidelines for nickel.

Selenium concentrations reported at all locations were higher in 2010 than in 2009. Selenium levels measured in 2010 ranged from 0.49 to 0.95 mg/kg in samples J and O, respectively. The mean selenium concentration for the 2010 samples was 0.70 mg/kg. The MIWQP guideline denoting concern is 1 to 4 mg/kg of selenium. The concentrations in all 2010 samples were below this range of concern.

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. Alkali Lake has been filled periodically from 2006 to 2010 with irrigation water. The extent of wetland habitat varies year to year based on the duration and timing of inundation.

Approximately 84.34 acres met the three wetland criteria for vegetation, soil and hydrology (Table 8). The area of shallow open water vegetated with submergent and floating vegetation and algae increased to 108.28 acres in 2010. There was a decrease of approximately 12 acres of wetland habitat and an increase of approximately 23 acres in open water from 2009 to 2010.

Table 8. Aquatic and wetland habitat types acreages from 2006 to 2010 at the Alkali Lake Wetland Mitigation Site.

Wetland	38.70	84.77	56.76	96.43	84.34
Mudflat and/or Open Water*	118.69	81.79	130.18	85.59	108.28
Total	157.39	166.56	186.94	182.02	192.62

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

3.5. Wildlife

Fifty bird species have been identified at the Alkali Mitigation Site from 2006 to 2010. A common garter snake (*Thamnophis radix)* was observed for the first time in 2010.

Piping plovers (*Charadrius melodus*) were observed at the mitigation site in 2007 through 2009. Two piping plovers, presumably a pair, were sighted during the May 2007 surveys. One piping plover was seen foraging at the site in 2008 and eight piping plovers were observed (PBS&J 2009). The piping plover has been federally listed as a threatened species since 1985. Montana was designated as containing critical habitat in 2002 (PBS&J 2009). 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 (PBS&J 2009). Nesting was documented along the North Alkali Lake in 1990 and 1992. According to the USFWS, Southeast Alkali Lake may contain the best potential plover habitat of the Alkali Lake complex (PBS&J 2009). 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. Spring sampling did not occur in 2010 to confirm continued nesting.

Table 9. Wildlife species observed from 2006 to 2010 at the Alkali Lake Wetland Mitigation Site.

AMPHIBIAN	
Pacific Treefrog	*Pseudacris regilla*
BIRD	
American Avocet	*Recurvirostra americana*
American Coot	*Fulica americana*
American White Pelican	*Pelecanus erythrorhynchos*
American Wigeon	*Anas americana*
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*
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*
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*

Table 9 (Continued). Fish and wildlife species observed from 2006 to 2010 at the Alkali Lake Wetland Mitigation Site.

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 Spp.	
Swallow Spp.	
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*
FISH	
Fish spp	
MAMMAL	
Badger	*Taxidea taxus*
Black Bear	*Ursus americanus*
Coyote	*Canis latrans*
Deer Mouse	*Peromyscus maniculatus*
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*
REPTILE	
Common Gartersnake	***Thamnophis sirtalis***
Plains Gartersnake	*Thamnophis radix*

Species first identified in 2010 are listed in **bold** type.

3.6. Functional Assessment

Functional assessment results from 2006 to 2010 are presented in Table 10. The AA encompassed 192.62 acres of wetland habitat and open water associated with Alkali Lake in 2010. The functional points changed from 2009 to 2010 as a result of an increase in MNHP and T&E species ratings and an increase of 0.1 points in the sediment/shoreline stabilization category. The AA received a Category II rating with 63 percent of the total possible points. Functional ratings were high for listed/proposed threatened and endangered (T&E) species habitat for the piping plover, 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 1019.25 in 2009 to 1097.93 in 2010 as a result of the increase in open water habitat.

Table 10. Summary of 2006 to 2010 wetland function/value ratings and functional points assessed for the Alkali Lake Wetland Mitigation Site.

Listed/Proposed T&E Species Habitat	Low (0.3)	Mod (0.8)	Mod (0.8)	Mod (0.8)	High (1.0)
MTNHP Species Habitat	Mod (0.6)	Mod (0.6)	Mod (0.5)	Mod (0.5)	Mod (0.6)
General Wildlife Habitat	High (0.9)	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
Flood Attenuation	N/A	N/A	N/A	N/A	N/A
Short and Long Term Surface Water Storage	High (0.9)	High (0.9)	High (0.9)	High (0.9)	High (0.9)
Sediment/Nutrient/Toxicant Removal	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)
Production Export/Food Chain Support	Mod (0.6)	Mod (0.7)	Mod (0.7)	High (0.8)	High (0.8)
Groundwater Discharge/Recharge	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)
Recreation/Education Potential (bonus points[3])	Mod (0.7)	Mod (0.7)	Low (0.05)	Low (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**
% of Possible Score Achieved	**55%**	**63%**	**61%**	**62%**	**67%**
Overall Category	**II**	**II**	**II**	**II**	**II**
Total Acreage of Assessed Wetlands and Other Aquatic Habitats within Site Boundaries	**157.31**	**166.43**	**186.94**	**182.01**	**192.62**
Functional Units (acreage x actual points)	**865.2**	**1048.50**	**1037.52**	**1019.25**	**1155.72**

[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 July 15, 2010 (Figures 2 and 3, Appendix A). Representative photos were taken of the mitigation site, upland surroundings, transect end points, and permanent photo-points. Panoramas of photo points PP1 to PP3 taken in 2009 and 2010 are shown on pages C-1 and C-2 of Appendix C. The end points of transects 1 to 3 taken in 2009 and 2010 are shown on pages C-2 to C-4 of Appendix C.

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. Chemical spraying should be implemented to prevent the spread of the weed into uninfested areas.

The excavated inlet channel was stable and in good condition in 2010. Fencing, control structures, and the western berm were also in good condition. Water management at Alkali Lake is dependent upon availability. Water levels increased from 2009 to 2010 and were sufficient to maintain foraging habitat for a variety of shorebirds and waterfowl.

3.9. Current Credit Summary

The wetland and shallow open water acreages identified in 2010 are summarized in Table 11. Approximately 84.34 acres of emergent wetlands and 108.28 acres of open water were delineated at the mitigation site in 2010. The credit acres developed to date for wetland habitat based on the Tribal credit ratios is 33.736 acres, which exceeds the credit target of 29.8 acres. Tribal credit acres for shallow open water were calculated to be 43.3 acres, which is greater than the target of 30.56 acres. The upland buffer credit acreage of 22.8 was met. The Tribal credit calculations total 99.8 acres in 2010.

The total USACE credits attained in 2010 equals 215.4 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 2010 wetland delineation exceeded both the wetland and open water targets and included 192.6 acres of wetland habitat. 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 have been 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 comprise less than 10 percent vegetation cover across the site.

Table 11. Tribal and USACE credit summary in 2010 at the Alkali Lake Wetland Mitigation Site.

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

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

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Appendix A

Figures 2 and 3

MDT Wetland Mitigation Monitoring
Alkali Lake
Pondera County, Montana

Figure 2: 2010 Monitoring Activity Locations

Legend

- Vegetation Transect
- Monitoring Limits
- DataPoints
- PhotoPoints
- Soil Samples

Base Photography Date: July 15, 2010

M1
N
Alk-1
Alk-2
PP2
T-2 start
T-2 end
L1
F
J
PP3
T-3 end
T-3 start
K
Alk-5
Alk-6
T-1 end
T-1 start
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 THAT THE ORIGINAL. ANY OTHER USE IS AT THE USER'S SOLE RISK.

LOCATION: Pondera Co., MT

PROJ NO: STPX NH37(26)

FILE: Alkali/Monitor2010.mxd

Project Name: Alkali Lake Wetland Mitigation Site

Drawing Title: 2010 Monitoring Activity Locations

DRAWN	CHECKED	APPROVED
BCS	BV	JL

SCALE: Noted

Drawn: November 3, 2010

PROJ MGR: B Sandefur

CONFLUENCE consulting incorporated

Figure 2

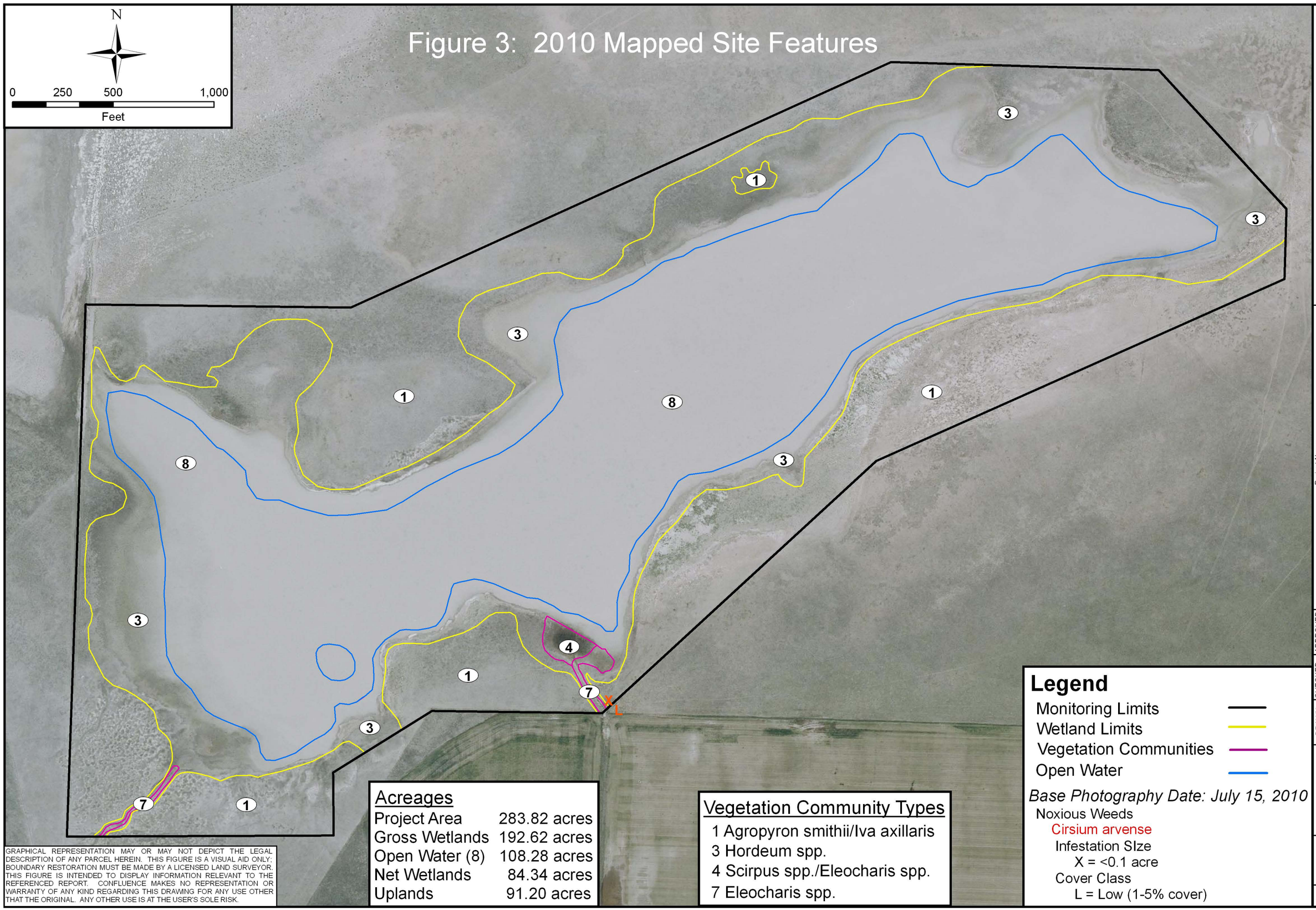
REV -

Figure 3: 2010 Mapped Site Features

N

0 250 500 1,000

Feet



Acreages

Project Area	283.82 acres
Gross Wetlands	192.62 acres
Open Water (8)	108.28 acres
Net Wetlands	84.34 acres
Uplands	91.20 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: July 15, 2010

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

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 THAT THE ORIGINAL. ANY OTHER USE IS AT THE USER'S SOLE RISK.

LOCATION: Pondera Co., MT

PROJ NO: STPX NH37(26)

FILE: Alkali/Veg2010.mxd

Project Name: Alkali Lake Wetland Mitigation Site

Drawing Title: 2010 Mapped Site Features

DRAWN	CHECKED	APPROVED
BCS	BV	JL

SCALE: Noted

Drawn: November 3, 2010

PROJ MGR: B Sandefur

CONFLUENCE consulting incorporated

Figure 3

REV -

Appendix B

2010 MDT Wetland Mitigation Site Monitoring Form
2010 USACE Wetland Determination Data Form
2010 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 7/23/2010

Person(s) conducting the assessment: J. Asebrook /J. Hintz / B. Sandefur

Weather: Overcast / intermittent showers 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: 5 #Visits in Year: 1

Size of Evaluation Area: 284 (acres)

Land use surrounding wetland:

rangeland and cropland

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**:**

Groundwater Monitoring Wells

Record depth of water surface below ground

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:

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

Species	Cover class	Species	Cover class
Agropyron smithii	5	Allium cernuum	0
Artemisia frigida	0	Astragalus bisulcatus	1
Astragalus vexilliflexus	0	Atriplex nuttallii	2
Bouteloua gracilis	0	Bromus commutata	0
Carex microptera	0	Chenopodium glaucum	0
Distichlis spicata	0	Grindelia squarrosa	0
Gutierrezia sarothrae	0	Helianthus nuttallii	0
Hordeum brachyantherum	0	Hordeum jubatum	0
Iva axillaris	4	Koeleria macrantha	0
Lactuca serriola	0	Lappula myosotis	0
Lepidium ramossissimim	0	Lomatium spp.	0
Melilotus officinalis	0	Monolepis nuttalliana	0
Phlox hoodii	0	Poa juncifolia	3
Polygonum douglasii	0	Puccinellia nuttalliana	1
Rumex crispus	0	Sarcobatus vermiculatus	1
Sphaeralcea coccinea	0	Suaeda depressa	1
Taraxacum officinale	0	Thlaspi arvense	0
Vicia americana	0		

Comments:

Community # 3 Community Type: Hordeum spp. /

Species	Cover class	Species	Cover class
Agropyron smithii	2	Algae, green	0
Aster falcatus	0	Astragalus bisulcatus	1
Atriplex nuttallii	0	Bare Ground	4
Chenopodium glaucum	0	Distichlis spicata	1
Eleocharis palustris	0	Grindelia squarrosa	0
Hordeum brachyantherum	5	Hordeum jubatum	3
Iva axillaris	3	Juncus spp.	0
Lepidium ramossissimim	0	Melilotus officinalis	0
Poa juncifolia	1	Polygonum douglasii	0
Polygonum ramosissimum	0	Puccinellia nuttalliana	3
Sarcobatus vermiculatus	0	Scirpus pungens	0
Suaeda depressa	0	Triglochin maritimum	0

Comments:

Polygonum ramossissimum was dead. Community changed from "Suaeda wetland" to "Hordeum jubatum wetland. Much of the Suaeda calceoliformis may now be underwater, thus why it was observed in lower cover. Polygonum ramossissimum was observed dead and dying in abundance.

Community # 4 Community Type: Scirpus spp. / Eleocharis spp.

Species	Cover class	Species	Cover class
Agrostis stolonifera	0	Alopecurus arundinaceus	1
Eleocharis acicularis	1	Eleocharis palustris	4
Hippuris vulgaris	0	Hordeum jubatum	4
Juncus torreyi	2	Lactuca serriola	0
Najas guadalupensis	1	Puccinellia nuttalliana	2
Rumex crispus	0	Scirpus acutus	3
Scirpus pungens	0	Scirpus validus	1
Triglochin maritimum	1	Typha latifolia	0

Comments:

Renamed this from "Aquatic wetland" to "Scirpus wetland"

Community # 7 Community Type: Eleocharis spp. /

Species	Cover class	Species	Cover class
Agrostis stolonifera	0	Algae, green	2
Alopecurus arundinaceus	1	Beckmannia syzigachne	0
Chenopodium glaucum	0	Cirsium arvense	0
Eleocharis acicularis	3	Eleocharis palustris	0
Hordeum jubatum	1	Iva axillaris	0
Juncus torreyi	1	Lactuca serriola	0
Najas guadalupensis	2	Polygonum douglasii	0
Puccinellia nuttalliana	2	Scirpus acutus	1
Scirpus pungens	0	Suaeda depressa	0
Triglochin maritimum	0		

Comments:

Changed community type from "Scirpus wetland" to "Eleocharis wetland".

Community # 8 Community Type: Open Water /

Species	Cover class	Species	Cover class
Algae, green		Suaeda depressa	

Comments:

VEGETATION TRANSECTS

Site: Alkali Lake Date: 7/23/2010

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

Interval Data:

Ending Station 45 **Community Type:** Hordeum spp. /

Species	Cover class	Species	Cover class
Agropyron smithii	1	Bare Ground	5
Distichlis spicata	0	Grindelia squarrosa	0
Hordeum brachyantherum	4	Hordeum jubatum	3
Iva axillaris	1	Puccinellia nuttalliana	2
Scirpus pungens	0		

Ending Station 184 **Community Type:** Eleocharis spp. /

Species	Cover class	Species	Cover class
Algae, green	0	Bare Ground	4
Eleocharis palustris	3	Hordeum brachyantherum	1
Hordeum jubatum	4	Open Water	4
Polygonum douglasii	1	Puccinellia nuttalliana	2
Scirpus pungens	0	Typha latifolia	0

Ending Station 216 **Community Type:** Scirpus spp. / Eleocharis spp.

Species	Cover class	Species	Cover class
Algae, green	1	Eleocharis acicularis	2
Eleocharis palustris	3	Hordeum brachyantherum	0
Hordeum jubatum	4	Open Water	5
Puccinellia nuttalliana	1	Scirpus acutus	0
Scirpus pungens	0	Triglochin maritimum	1

Ending Station 370 **Community Type:** Hordeum spp. /

Species	Cover class	Species	Cover class
Algae, green	1	Eleocharis acicularis	1
Hordeum brachyantherum	0	Hordeum jubatum	1
Open Water	5	Puccinellia nuttalliana	4

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

Species	Cover class	Species	Cover class
Bare Ground		Open Water	5

Transect Notes:

Compass at 0 declination

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

Interval Data:

Ending Station 17 **Community Type:** Agropyron smithii / Iva axillaris

Species	Cover class	Species	Cover class
Agropyron smithii	4	Astragalus bisulcatus	0
Bare Ground	4	Hordeum brachyantherum	4
Hordeum jubatum	0	Iva axillaris	2
Polygonum douglasii	0	Puccinellia nuttalliana	0

Ending Station 172 **Community Type:** Hordeum spp. /

Species	Cover class	Species	Cover class
Agropyron smithii	1	Astragalus bisulcatus	0
Bare Ground	4	Chenopodium glaucum	0
Hordeum brachyantherum	1	Hordeum jubatum	1
Iva axillaris	3	Lepidium ramossissimim	0
Polygonum douglasii	0	Puccinellia nuttalliana	1
Scirpus pungens	0		

Ending Station 297 **Community Type:** Open Water /

Species	Cover class	Species	Cover class
Hordeum brachyantherum	2	Hordeum jubatum	1
Iva axillaris	0	Open Water	5
Polygonum ramosissimum		Puccinellia nuttalliana	2

Transect Notes:

Compass at 0 declination

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

Interval Data:

Ending Station 204 **Community Type:** Hordeum spp. /

Species	Cover class	Species	Cover class
Agropyron smithii	1	Bare Ground	4
Chenopodium glaucum	1	Hordeum brachyantherum	4
Hordeum jubatum	3	Iva axillaris	1
Polygonum douglasii	1	Polygonum ramosissimum	
Puccinellia nuttalliana	2		

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

Species	Cover class	Species	Cover class
Bare Ground			

Transect Notes:

Compass at 0 declination

PLANTED WOODY VEGETATION SURVIVAL

Alkali Lake

Planting Type	#Planted	#Alive	Notes
None planted			

Comments

Seeded species included Eleocharis palustris, Juncus balticus, Juncus torreyi, Puccinellia nuttaliana, Scirpus acutus, Scirpus americanus (syn. S. pungens), Scirpus maritimus, and Triglochian maritima.

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

Bird Comments

No recrods kept

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
Common Gartersnake	1	No	No	No	

Wildlife Comments:

Sign of domestic cattle (tracks, scat) and domestic horse (scat) noted - probably from 2009.

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.

Comments:

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? No

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? No

If yes, are the structures working properly and in good working order? No

If no, describe the problems below.

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

Project/Site: Alkali Lake | City/County: Pondera | Sampling Date: 7/23/2010

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

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

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

Subregion (LRR): LRR E | Lat: | Long: | Datum:

Soil Map Unit Name: Unknown

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

% Bare Ground in Herb Stratum 25

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:
0

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	dry soils, no redox

[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
- ☐ Aquatic 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: Not mapped

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): 12

Wetland Hydrology Present? Yes ☑ No ☐

Remarks: No hydro indicators

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

Project/Site: Alkali Lake | City/County: Pondera | Sampling Date: 7/23/2010

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

Investigator(s): B. Sandefur, J. Hintz, J. Asebrook | 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: | Long: | Datum:

Soil Map Unit Name: Unknown

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: 0)	Absolute % Cover	Dominant Species?	Indicator Status
1. 0	0	☐	0
2. 0	0	☐	0
3. 0	0	☐	0
4. 0	0	☐	0
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 0)			
1. 0	0	☐	0
2. 0	0	☐	0
3. 0	0	☐	0
4. 0	0	☐	0
5. 0	0	☐	0
	0 = Total Cover		
Herb Stratum (Plot size: 0)			
1. Hordeum brachyantherum	40	☑	FACW
2. Iva axillaris	15	☑	FAC
3. Astragalus bisulcatus	5	☐	NL
4. 0	0	☐	0
5. 0	0	☐	0
6. 0	0	☐	0
7. 0	0	☐	0
8. 0	0	☐	0
9. 0	0	☐	0
10. 0	0	☐	0
11. 0	0	☐	0
	60 = Total Cover		
Woody Vine Stratum (Plot size: 0)			
1. 0	0	☐	0
2. 0	0	☐	0
	0 = Total Cover		

% Bare Ground in Herb Stratum 40

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:

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 5/1	100					Clay	
7-15	10YR 5/1	95	10YR 3/4	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
- ☐ Aquatic 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: Not mapped

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): 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: 7/23/2010

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

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

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

Subregion (LRR): LRR E | Lat: | Long: | Datum:

Soil Map Unit Name: Unknown

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.

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

% Bare Ground in Herb Stratum 10

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:
0

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
0-4	2.5YR 4/1	100					Clay	
4-12	2.5YR 5/1	95	10YR 4/3	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
- ☐ Aquatic 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: Not mapped

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): 10

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: 7/23/2010

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

Investigator(s): B. Sandefur, J. Hintz, J. Asebrook | 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: | Long: | Datum:

Soil Map Unit Name: Unknown

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: 0)	Absolute % Cover	Dominant Species?	Indicator Status
1. 0	0	☐	0
2. 0	0	☐	0
3. 0	0	☐	0
4. 0	0	☐	0
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 0)			
1. 0	0	☐	0
2. 0	0	☐	0
3. 0	0	☐	0
4. 0	0	☐	0
5. 0	0	☐	0
	0 = Total Cover		
Herb Stratum (Plot size: 0)			
1. Puccinellia maritima	10	☐	OBL
2. Iva axillaris	30	☑	FAC
3. Hordeum brachyantherum	5	☐	FACW
4. Hordeum jubatum	5	☐	FAC+
5. Atriplex gardneri	5	☐	NL
6. Agropyron smithii	30	☑	FACU
7. Lepidium ramosissimum	1	☐	NL
8. 0	0	☐	0
9. 0	0	☐	0
10. 0	0	☐	0
11. 0	0	☐	0
	86 = Total Cover		
Woody Vine Stratum (Plot size: 0)			
1. 0	0	☐	0
2. 0	0	☐	0
	0 = Total Cover		

% Bare Ground in Herb Stratum 0

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:
0

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
0-6	10YR 5/2	100					Clay	
6-14	10YR 5/3	90					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
- ☐ Aquatic 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: Not mapped

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: No hydro indicator

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

Project/Site: Alkali Lake | City/County: Pondera | Sampling Date: 7/23/2010

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

Investigator(s): B. Sandefur, J. Hintz, J. Asebrook | 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: | Long: | Datum:

Soil Map Unit Name: Unknown

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

% Bare Ground in Herb Stratum 0

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:
0

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 5/1	95	10YR 4/2	5		M	Silty Clay	
7-14	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
- ☐ Aquatic 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: Not mapped

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): 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: 7/23/2010

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

Investigator(s): B. Sandefur, J. Hintz, J. Asebrook | 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: | Long: | Datum:

Soil Map Unit Name: Unknown

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: 0)	Absolute % Cover	Dominant Species?	Indicator Status
1. 0	0	☐	0
2. 0	0	☐	0
3. 0	0	☐	0
4. 0	0	☐	0
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 0)			
1. 0	0	☐	0
2. 0	0	☐	0
3. 0	0	☐	0
4. 0	0	☐	0
5. 0	0	☐	0
	0 = Total Cover		
Herb Stratum (Plot size: 0)			
1. Agropyron smithii	40	☑	FACU
2. Hordeum brachyantherum	3	☐	FACW
3. Hordeum jubatum	5	☐	FAC+
4. Atriplex gardneri	5	☐	NL
5. Lepidium ramosissimum	2	☐	NL
6. Suaeda maritima	15	☐	FACW+
7. Iva axillaris	20	☑	FAC
8. Chenopodium glaucum	3	☐	FAC
9. Puccinellia nuttalliana	2	☐	OBL
10. 0	0	☐	0
11. 0	0	☐	0
	95 = Total Cover		
Woody Vine Stratum (Plot size: 0)			
1. 0	0	☐	0
2. 0	0	☐	0
	0 = Total Cover		

% Bare Ground in Herb Stratum 0

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:
0

SOIL

Sampling Point: Alk-6

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	2.5Y 4/1	90	2.5Y 6/1	5	D	M	Silty Clay	very friable

[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
- ☐ Aquatic 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: Not mapped

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: No hydro indicator

MDT Montana Wetland Assessment Form (revised March 2008)

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

3. Evaluation Date 7/23/2010 **4. Evaluators** J. Asebrook, J. Hintz, B **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 Marais-8 **County** Pondera

7. Evaluating Agency Confluence for MDT

8. Wetland size acres 192.62

Purpose of Evaluation

How assessed: Measured e.g. by GPS

☐ **Wetlands potentially affected by MDT project**

9. Assesssment area (AA) size (acres) 192.62

☐ **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	45
Depressional	Aquatic Bed		Seasonal/Intermittant	1
Depressional	Unconsolidated Bottom		Permanent/Perennial	54

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)

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

Low covers (<5%) of Cirsium arvense in Scirpus wetland

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

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

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 and 2009.

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	
Secondary habitat (list Species)	(•) D ( ) S	trumpeter swan, long-billed curlew
Incidental habitat (list species)	(•) D ( ) S	American white pelican
No usable habitat	[ ] S	

ii. Rating (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 Am White Pelicans 2006,07, 09; trumpeter swan 2006

14C. General Wildlife Habitat Rating:

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

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

- [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 using the site from Fall of 2003 through summer of 2010.

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**

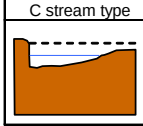
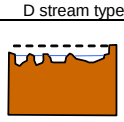
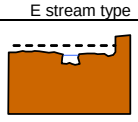
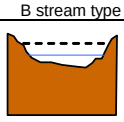
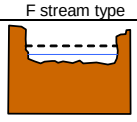
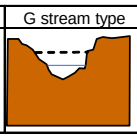
b) Does the AA contain a documented spawning area or other critical habitat feature (i.e., sanctuary pool, upwelling area, etc.- specify in comments) for native fish or introduced game fish? ◯ **Y** ◉ **N** *If yes, add 0.1 to the adjusted score in **i** or **iia** above:*
Modifed Rating

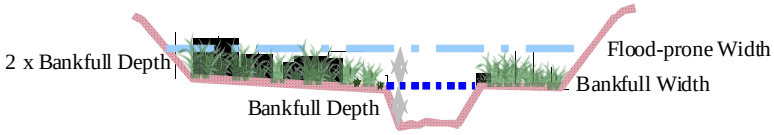
iii. Final Score and Rating: _____ **Comments:**

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)				Moderately entrenched – B stream type					
% of flooded wetland classified as forested and/or scrub/shrub				75%	25-75%	<25%			
AA contains **no outlet or restricted outlet**									
AA contains **unrestricted outlet**									

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 a permanent perennial water regime. Wetland habitats have a seasonal/intermittent 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				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:

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:

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	.9H	.6M	.7H	.4	.5M	.3L	.8H	.5M	.6M	.3L	.4M	.2L	.7H	.5M	.5M	.3L	.3L	.2L
T/E/A	.8H	.5M	.6M	.3L	.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:

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 /r echarge indicators of groundwater are p

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 educational/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	192.62	☑
B. MT Natural Heritage Program Species Habitat	M	.6	1	115.572	☐
C. General Wildlife Habitat	E	1	1	192.62	☑
D. General Fish Habitat	NA	0	0	0	☐
E. Flood Attenuation	NA	0	0	0	☐
F. Short and Long Term Surface Water Storage	H	.9	1	173.358	☑
G. Sediment/Nutrient/Toxicant Removal	M	.7	1	134.834	☐
H. Sediment/Shoreline Stabilization	L	.3	1	57.786	☐
I. Production Export/Food Chain Support	H	.8	1	154.096	☑
J. Groundwater Discharge/Recharge	L	.1	1	19.262	☐
K. Uniqueness	M	.5	1	96.31	☐
L. Recreation/Education Potential (bonus points)	M	.1	NA	19.262	☐
Totals:		6	9	1155.72	
Percent of Possible Score			**66.67** %		

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 above)

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 2 – *Photo 1*
Bearing: West
Location: Eastern boundary
Taken in 2009



Photo Point 2 – *Photo 1*
Bearing: West
Location: Eastern boundary
Taken in 2010

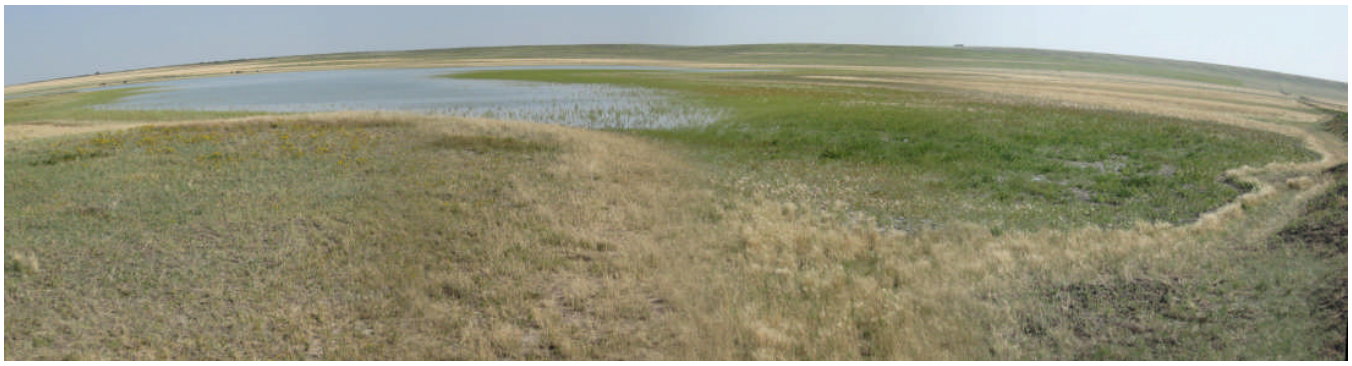


Photo Point 3 – *Photo 1*
Bearing: Southeast

Location: Northwest boundary
Taken in 2009



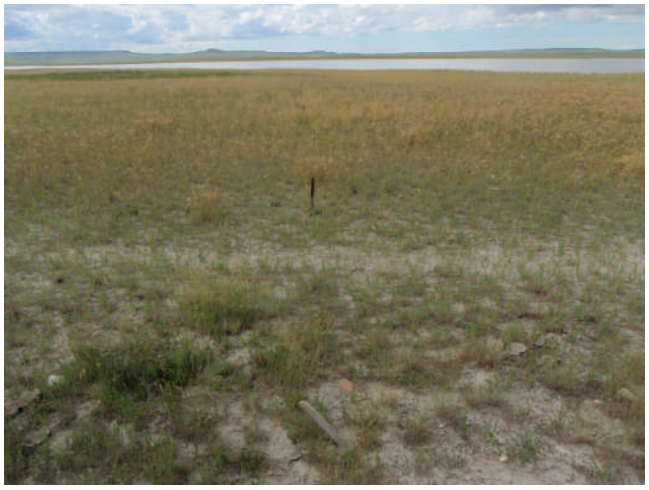
Photo Point 3 – *Photo 1*
Bearing: West

Location: Northwest boundary
Taken in 2010



Transect 1 – *Start*
Bearing: 311 Degrees

Location: NA
Taken in 2009



Transect 1 – *Start*
Bearing: 311 Degrees

Location: Veg Com 7
Taken in 2010



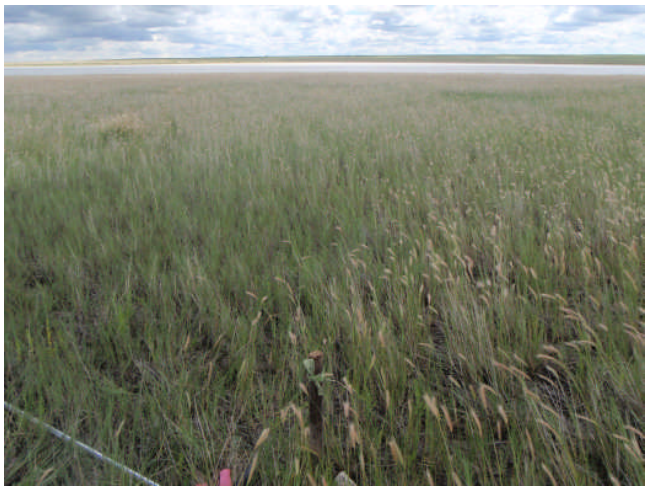
Transect 1 – *End*
Bearing: 131 Degrees
Location: NA
Taken in 2009



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



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



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



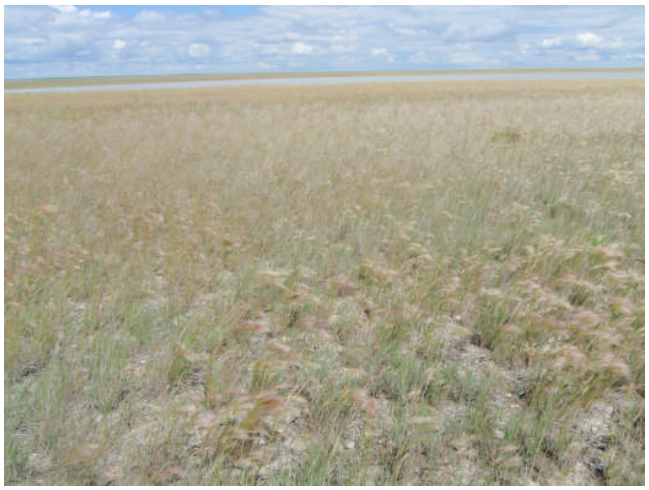
Transect 2 – *End*
Bearing: 316 Degrees
Location: NA
Taken in 2009



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



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



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



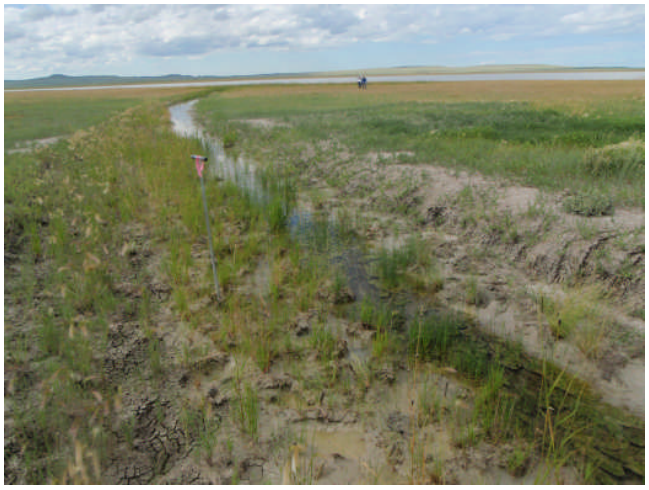
Transect 3 – *End* **Location:** NA
Bearing: Southwest **Taken in 2009**



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



Soil Pit 1 **Location:** NA
Bearing: North **Taken in 2009**

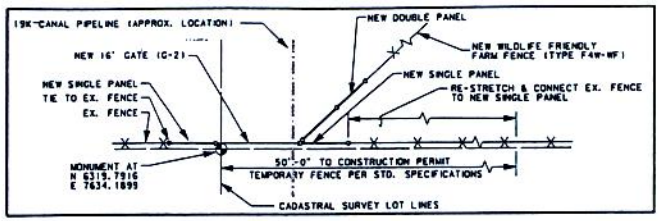


Soil Pit 1 **Location:** Along inlet
Bearing: North **Taken in 2010**

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 Susernames	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

August 19, 2010

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

RE: Project: MDT Alkali Lake
Pace Project No.: 10135372

Dear Brian Sandefur:
Enclosed are the analytical results for sample(s) received by the laboratory on August 09, 2010. The results relate only to the samples included in this report.

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

Sincerely,

Denise Jensen

denise.jensen@pacelabs.com
Project Manager

Enclosures

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

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

CERTIFICATIONS

Project: MDT Alkali Lake
Pace Project No.: 10135372

Minnesota Certification IDs
1700 Elm Street SE Suite 200, Minneapolis, MN 55414
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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(406)254-7226

SAMPLE SUMMARY

Project: MDT Alkali Lake
Pace Project No.: 10135372

Lab ID	Sample ID	Matrix	Date Collected	Date Received
10135372001	M1	Solid	07/23/10 00:00	08/09/10 10:25
10135372002	K	Solid	07/23/10 00:00	08/09/10 10:25
10135372003	N	Solid	07/23/10 00:00	08/09/10 10:25
10135372004	J	Solid	07/23/10 00:00	08/09/10 10:25
10135372005	L1	Solid	07/23/10 00:00	08/09/10 10:25
10135372006	O	Solid	07/23/10 00:00	08/09/10 10:25
10135372007	F	Solid	07/23/10 00:00	08/09/10 10:25

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SAMPLE ANALYTE COUNT

Project: MDT Alkali Lake
Pace Project No.: 10135372

Lab ID	Sample ID	Method	Analysts	Analytes Reported
10135372001	M1	EPA 6020	RJS	4
		% Moisture	JDL	1
10135372002	K	EPA 6020	RJS	4
		% Moisture	JDL	1
10135372003	N	EPA 6020	RJS	4
		% Moisture	JDL	1
10135372004	J	EPA 6020	RJS	4
		% Moisture	JDL	1
10135372005	L1	EPA 6020	RJS	4
		% Moisture	JDL	1
10135372006	O	EPA 6020	RJS	4
		% Moisture	JDL	1
10135372007	F	EPA 6020	RJS	4
		% Moisture	JDL	1

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PROJECT NARRATIVE

Project: MDT Alkali Lake
Pace Project No.: 10135372

Method: **EPA 6020**
Description: 6020 MET ICPMS
Client: Confluence, Inc
Date: August 19, 2010

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.

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

Additional Comments:

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PROJECT NARRATIVE

Project: MDT Alkali Lake
Pace Project No.: 10135372

Method: **% Moisture**
Description: Dry Weight
Client: Confluence, Inc
Date: August 19, 2010

General Information:
7 samples were analyzed for % Moisture. 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.

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.

Surrogates:
All surrogates 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.

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.

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ANALYTICAL RESULTS

Project: MDT Alkali Lake
Pace Project No.: 10135372

Sample: M1 **Lab ID: 10135372001** Collected: 07/23/10 00:00 Received: 08/09/10 10:25 Matrix: Solid

Results reported on a "dry-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	**8.8**	mg/kg	0.70	0.14	20	08/11/10 14:06	08/16/10 19:34	7440-38-2	
Cadmium	**0.32**	mg/kg	0.11	0.028	20	08/11/10 14:06	08/16/10 19:34	7440-43-9	
Nickel	**27.1**	mg/kg	0.70	0.14	20	08/11/10 14:06	08/16/10 19:34	7440-02-0	
Selenium	**0.98**	mg/kg	0.70	0.17	20	08/11/10 14:06	08/16/10 19:34	7782-49-2	
Dry Weight	Analytical Method: % Moisture								
Percent Moisture	**33.5**	%	0.10	0.10	1		08/10/10 00:00		

Sample: K **Lab ID: 10135372002** Collected: 07/23/10 00:00 Received: 08/09/10 10:25 Matrix: Solid

Results reported on a "dry-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	**9.6**	mg/kg	0.71	0.14	20	08/11/10 14:06	08/16/10 19:26	7440-38-2	
Cadmium	**0.30**	mg/kg	0.11	0.028	20	08/11/10 14:06	08/16/10 19:26	7440-43-9	
Nickel	**28.7**	mg/kg	0.71	0.14	20	08/11/10 14:06	08/16/10 19:26	7440-02-0	
Selenium	**0.98**	mg/kg	0.71	0.17	20	08/11/10 14:06	08/16/10 19:26	7782-49-2	
Dry Weight	Analytical Method: % Moisture								
Percent Moisture	**34.6**	%	0.10	0.10	1		08/10/10 00:00		

Sample: N **Lab ID: 10135372003** Collected: 07/23/10 00:00 Received: 08/09/10 10:25 Matrix: Solid

Results reported on a "dry-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	0.66	0.13	20	08/11/10 14:06	08/16/10 19:30	7440-38-2	
Cadmium	**0.27**	mg/kg	0.11	0.027	20	08/11/10 14:06	08/16/10 19:30	7440-43-9	
Nickel	**25.3**	mg/kg	0.66	0.13	20	08/11/10 14:06	08/16/10 19:30	7440-02-0	
Selenium	**0.99**	mg/kg	0.66	0.16	20	08/11/10 14:06	08/16/10 19:30	7782-49-2	
Dry Weight	Analytical Method: % Moisture								
Percent Moisture	**37.8**	%	0.10	0.10	1		08/10/10 00:00		

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ANALYTICAL RESULTS

Project: MDT Alkali Lake
Pace Project No.: 10135372

Sample: J **Lab ID: 10135372004** Collected: 07/23/10 00:00 Received: 08/09/10 10:25 Matrix: Solid
Results reported on a "dry-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	**7.7**	mg/kg	0.46	0.091	20	08/11/10 14:06	08/16/10 20:13	7440-38-2	
Cadmium	**0.26**	mg/kg	0.073	0.018	20	08/11/10 14:06	08/16/10 20:13	7440-43-9	
Nickel	**9.2**	mg/kg	0.46	0.091	20	08/11/10 14:06	08/16/10 20:13	7440-02-0	
Selenium	**0.51**	mg/kg	0.46	0.11	20	08/11/10 14:06	08/16/10 20:13	7782-49-2	
Dry Weight	Analytical Method: % Moisture								
Percent Moisture	**4.8**	%	0.10	0.10	1		08/10/10 00:00		

Sample: L1 **Lab ID: 10135372005** Collected: 07/23/10 00:00 Received: 08/09/10 10:25 Matrix: Solid
Results reported on a "dry-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	**13.3**	mg/kg	0.52	0.10	20	08/11/10 14:06	08/16/10 20:18	7440-38-2	
Cadmium	**0.32**	mg/kg	0.083	0.021	20	08/11/10 14:06	08/16/10 20:18	7440-43-9	
Nickel	**24.5**	mg/kg	0.52	0.10	20	08/11/10 14:06	08/16/10 20:18	7440-02-0	
Selenium	**0.78**	mg/kg	0.52	0.12	20	08/11/10 14:06	08/16/10 20:18	7782-49-2	
Dry Weight	Analytical Method: % Moisture								
Percent Moisture	**13.9**	%	0.10	0.10	1		08/10/10 00:00		

Sample: O **Lab ID: 10135372006** Collected: 07/23/10 00:00 Received: 08/09/10 10:25 Matrix: Solid
Results reported on a "dry-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	**9.8**	mg/kg	0.58	0.12	20	08/11/10 14:06	08/16/10 20:22	7440-38-2	
Cadmium	**0.42**	mg/kg	0.093	0.023	20	08/11/10 14:06	08/16/10 20:22	7440-43-9	
Nickel	**20.5**	mg/kg	0.58	0.12	20	08/11/10 14:06	08/16/10 20:22	7440-02-0	
Selenium	**1.2**	mg/kg	0.58	0.14	20	08/11/10 14:06	08/16/10 20:22	7782-49-2	
Dry Weight	Analytical Method: % Moisture								
Percent Moisture	**20.1**	%	0.10	0.10	1		08/10/10 00:00		

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ANALYTICAL RESULTS

Project: MDT Alkali Lake
Pace Project No.: 10135372

Sample: F **Lab ID: 10135372007** Collected: 07/23/10 00:00 Received: 08/09/10 10:25 Matrix: Solid

Results reported on a "dry-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	**11.2**	mg/kg	0.59	0.12	20	08/11/10 14:06	08/16/10 20:26	7440-38-2	
Cadmium	**0.32**	mg/kg	0.094	0.023	20	08/11/10 14:06	08/16/10 20:26	7440-43-9	
Nickel	**32.4**	mg/kg	0.59	0.12	20	08/11/10 14:06	08/16/10 20:26	7440-02-0	
Selenium	**1.1**	mg/kg	0.59	0.14	20	08/11/10 14:06	08/16/10 20:26	7782-49-2	
Dry Weight	Analytical Method: % Moisture								
Percent Moisture	**23.8**	%	0.10	0.10	1		08/10/10 00:00		

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: MDT Alkali Lake
Pace Project No.: 10135372

QC Batch: MPRP/21792 Analysis Method: EPA 6020
QC Batch Method: EPA 3050 Analysis Description: 6020 MET
Associated Lab Samples: 10135372001, 10135372002, 10135372003, 10135372004, 10135372005, 10135372006, 10135372007

METHOD BLANK: 836079 Matrix: Solid
Associated Lab Samples: 10135372001, 10135372002, 10135372003, 10135372004, 10135372005, 10135372006, 10135372007

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Arsenic	mg/kg	<0.091	0.45	08/16/10 19:17	
Cadmium	mg/kg	<0.018	0.073	08/16/10 19:17	
Nickel	mg/kg	<0.091	0.45	08/16/10 19:17	
Selenium	mg/kg	<0.11	0.45	08/16/10 19:17	

LABORATORY CONTROL SAMPLE: 836080

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Arsenic	mg/kg	19	17.2	90	75-125	
Cadmium	mg/kg	19	18.3	96	75-125	
Nickel	mg/kg	19	17.8	93	75-125	
Selenium	mg/kg	19	16.1	85	75-125	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 836081 836082

Parameter	Units	10135372001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Arsenic	mg/kg	8.8	28.1	26.3	38.0	38.7	104	113	75-125	2	20	
Cadmium	mg/kg	0.32	28.1	26.3	30.6	27.5	108	103	75-125	11	20	
Nickel	mg/kg	27.1	28.1	26.3	56.6	54.7	105	105	75-125	3	20	
Selenium	mg/kg	0.98	28.1	26.3	27.8	25.7	96	94	75-125	8	20	

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: MDT Alkali Lake
Pace Project No.: 10135372

QC Batch: MPRP/21774 Analysis Method: % Moisture
QC Batch Method: % Moisture Analysis Description: Dry Weight/Percent Moisture
Associated Lab Samples: 10135372001, 10135372002, 10135372003, 10135372004, 10135372005, 10135372006, 10135372007

SAMPLE DUPLICATE: 835584

Parameter	Units	10135372001 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	33.5	34.7	4	30	

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QUALIFIERS

Project: MDT Alkali Lake
Pace Project No.: 10135372

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.

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.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: MDT Alkali Lake
Pace Project No.: 10135372

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
10135372001	M1	EPA 3050	MPRP/21792	EPA 6020	ICPM/8929
10135372002	K	EPA 3050	MPRP/21792	EPA 6020	ICPM/8929
10135372003	N	EPA 3050	MPRP/21792	EPA 6020	ICPM/8929
10135372004	J	EPA 3050	MPRP/21792	EPA 6020	ICPM/8929
10135372005	L1	EPA 3050	MPRP/21792	EPA 6020	ICPM/8929
10135372006	O	EPA 3050	MPRP/21792	EPA 6020	ICPM/8929
10135372007	F	EPA 3050	MPRP/21792	EPA 6020	ICPM/8929
10135372001	M1	% Moisture	MPRP/21774		
10135372002	K	% Moisture	MPRP/21774		
10135372003	N	% Moisture	MPRP/21774		
10135372004	J	% Moisture	MPRP/21774		
10135372005	L1	% Moisture	MPRP/21774		
10135372006	O	% Moisture	MPRP/21774		
10135372007	F	% Moisture	MPRP/21774		

REPORT OF LABORATORY ANALYSIS

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CHAIN OF CUSTODY FORM Confluence Consulting Inc. Sheet 1 of 1

Investigator (name, address, ph & fax nos.)	Brian Sandefur PO Box 1133
Contact Person	406-585-9800 Bozeman MT 59771
Site	Alkali Lake
Laboratory (name, address, ph & fax nos.)	Pace Labs 402 S. 25th St Billings MT 59101
Contact Person	Denise Jensen 406-254-7226
Courier (name, address, ph & fax nos.)	UPS
Contact Person	

Sample ID	Laboratory ID	Container	Sampling Date	Sampling Time	Water	Soil					Ice					Arsenic	Cadmium	Nickel	Selenium				
M1		1 Gal Bag	7-23			X					X					X	X	X	X				
K		1 Gal Bag	7-23			X					X					X	X	X	X				
N		1 Gal Bag	7-23			X					X					X	X	X	X				
J		1 Gal Bag	7-23			X					X					X	X	X	X				
L1		1 Gal Bag	7-23			X					X					X	X	X	X				
O		1 Gal Bag	7-23			X					X					X	X	X	X				
F		1 Gal Bag	7-23			X					X					X	X	X	X				

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

Sampler Name: *(print & signature)* BRIAN Sandefur (Date)

Relinquished by: *(print & signature)* James Johnson	Date 8-6-10	Time 1:30	Recieved by: *(print & signature)*	Date	Time
Relinquished by: *(print & signature)* UPS	Date 8/9/10	Time 10:25	Recieved by: *(print & signature)* Jeff Graves / Pace MT	Date 8/9/10	Time 10:25
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

IMP 8/10

10135372

001
002
003
004
005
006
007

Sample Condition Upon Receipt

Pace Analytical

Client Name: Confluence Inc Project # 10135372

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

Tracking #: 1Z5977030332481079

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

Optional: Proj. Due Date: Proj. Name:

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

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

Cooler Temperature 4.0 Biological Tissue is Frozen: Yes No

Date and Initials of person examining contents: JG 8/9

Temp should be above freezing to 6°C

Comments:

Chain of Custody Present:	☒Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☒Yes ☐No ☐N/A	2.
Chain of Custody Relinquished:	☒Yes ☐No ☐N/A	3.
Sampler Name & Signature on COC:	☒Yes ☐No ☐N/A	4.
Samples Arrived within Hold Time:	☒Yes ☐No ☐N/A	5.
Short Hold Time Analysis (<72hr):	☐Yes ☒No ☐N/A	6.
Rush Turn Around Time Requested:	☐Yes ☒No ☐N/A	7.
Sufficient Volume:	☒Yes ☐No ☐N/A	8.
Correct Containers Used:	(☒Yes) ☒No ☐N/A	9. JG 8/9
-Pace Containers Used:	☐Yes ☒No ☐N/A	
Containers Intact:	☒Yes ☐No ☐N/A	10.
Filtered volume received for Dissolved tests	☐Yes ☐No ☒N/A	11.
Sample Labels match COC:	☒Yes ☐No ☐N/A	12.
-Includes date/time/ID/Analysis Matrix: Solid		
All containers needing acid/base preservation have been checked. Noncompliance are noted in 13.	☐Yes ☐No ☒N/A	13. ☐ HNO3 ☐ H2SO4 ☐ NaOH ☐ HCl Samp #
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	Initial when completed / Lot # of added preservative
Samples checked for dechlorination:	☐Yes ☐No ☒N/A	14.
Headspace in VOA Vials (>6mm):	☐Yes ☐No ☒N/A	15.
Trip Blank Present:	☐Yes ☐No ☒N/A	16.
Trip Blank Custody Seals Present	☐Yes ☐No ☒N/A	
Pace Trip Blank Lot # (if purchased):		

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

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: _____ **Date:** 8-9-09

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)