MONTANA DEPARTMENT OF TRANSPORTATION
WETLAND MITIGATION MONITORING REPORT: YEAR 2009

West Fork Charley Creek
Frazer, Montana



Prepared for:

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

Prepared by:

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820 North Montana Avenue, Suite A
Helena, MT 59601

December 2009

PBS&J Project No: 0B4308802.05.03

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1.0 INTRODUCTION

This report documents the third year of comprehensive monitoring at the West Fork Charley Creek wetland mitigation site. The project site is located on the Fort Peck Indian Reservation in Valley County, approximately five miles northwest of Frazer, north of U.S. Highway 2 (**Figure 1**). The project occurs in the Lower Missouri River Watershed (Watershed #12), in Township 27N, Range 43E, Section 1. The mitigation site was constructed to compensate for 1.6 acres of unavoidable wetland impacts associated with the MDT Frazer East and West project on U.S. Highway 2 (constructed in 1999), with any remaining credits to be used to offset unavoidable wetland impacts resulting from other MDT highway projects in the watershed as approved by the Corps of Engineers (COE).

Constructed during summer of 2006, the intent of the West Fork Charley Creek project is to provide approximately 5 acres of palustrine, semi-permanent, emergent wetland within an approximate 28.7-acre perpetual conservation easement. This was to be accomplished by flooding a primarily upland area via dike placement across ephemeral West Fork Charley Creek and retaining runoff. Additional project components include upland and wetland seeding, fencing, and implementation of a grazing management plan. Approximately 0.03 acre of emergent wetlands occurred in the project area along the fringes of the creek prior to construction. A preliminary field review report for the project prepared by MDT is provided in **Appendix D**.

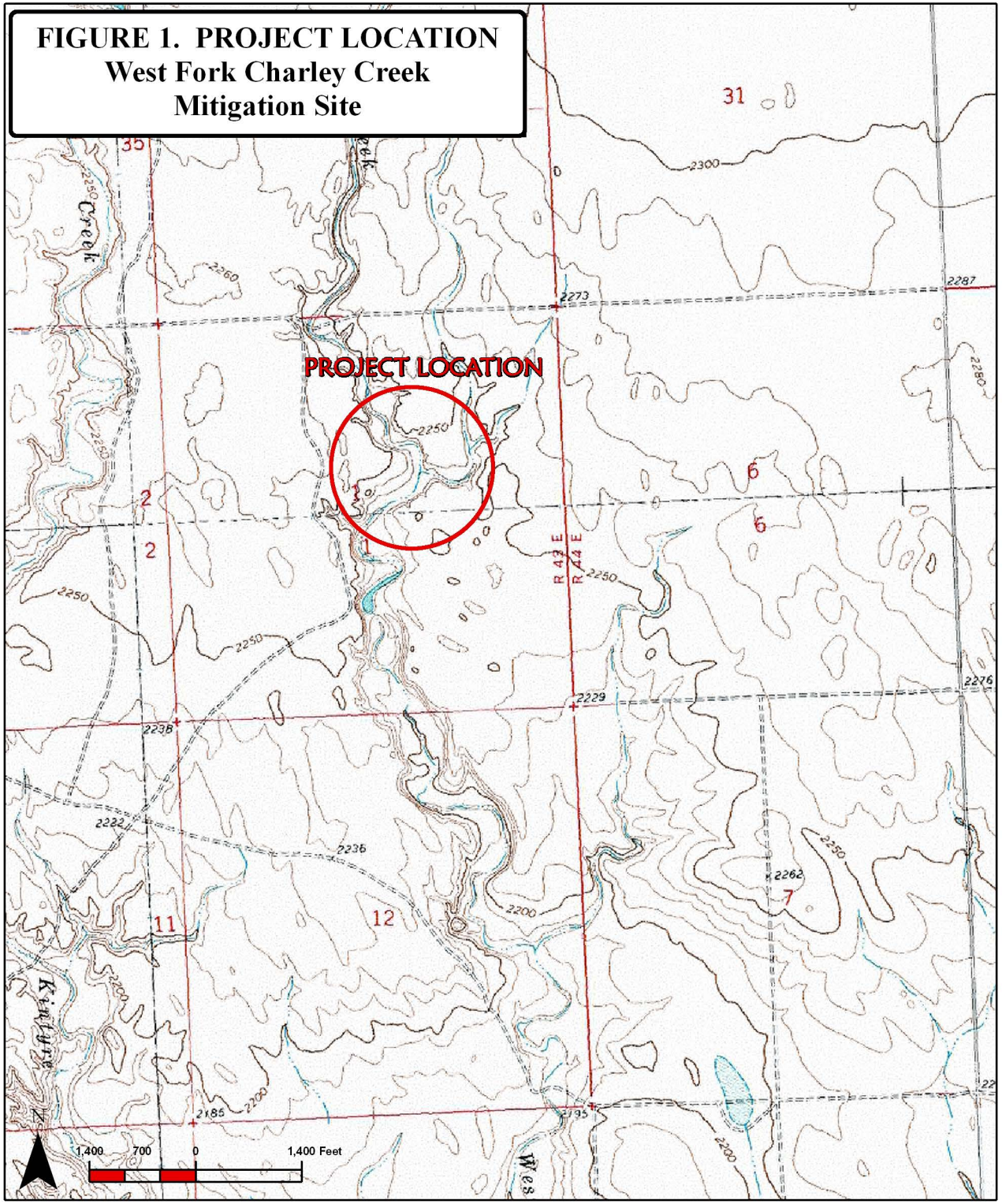
This report documents the results of 2009 monitoring efforts. The monitoring area is illustrated on **Figure 2** (**Appendix A**). No COE or Fort Peck Assiniboine and Sioux Tribes performance standards were required.

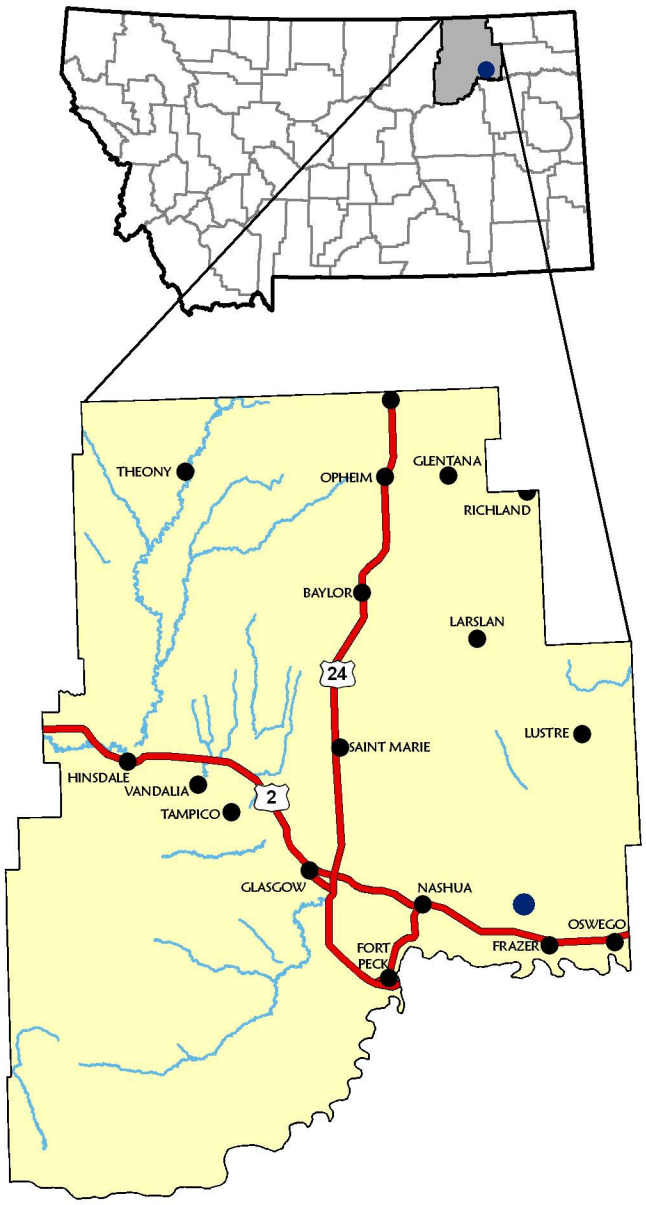
2.0 METHODS

2.1 Monitoring Dates and Activities

The site was visited on July 29th (mid-season visit) of 2009. The mid-season visit was conducted primarily to document vegetation, soil, and hydrologic conditions used to map wetlands. All information contained on the Wetland Mitigation Site Monitoring Form (**Appendix B**) was collected at this time. Activities and information conducted/collected included: wetland delineation; wetland/open water boundary mapping; vegetation community mapping; vegetation transects; soils data; hydrology data; bird and general wildlife use; photograph points; macro-invertebrate sampling; functional assessment; and (non-engineering) examination of the dike structure.

FIGURE 1. PROJECT LOCATION
West Fork Charley Creek Mitigation Site





PROJECT #: B43088.00 0404
DATE:OCTOBER 2007
LOCATION: FRAZER, MT
PROJECT MANAGER: J. BERGLUND
DRAWN BY: R. SCHREINER

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

2.2 Hydrology

Hydrologic indicators were evaluated at the site during the mid-season visit. Wetland hydrology indicators were recorded using procedures outlined in the COE 1987 Wetland Delineation Manual (Environmental Laboratory 1987). Hydrology data were recorded on COE Routine Wetland Delineation Data Forms (**Appendix B**).

All additional hydrologic data were recorded on the mitigation site monitoring form (**Appendix B**). Where possible, the boundary between wetlands and open water (no rooted vegetation) aquatic habitats was mapped on the aerial photograph and an estimate of the average water depth at this boundary was recorded.

No groundwater monitoring wells were installed at the site. If located within 18 inches of the ground surface (soil pit depth for purposes of delineation), groundwater depths were documented on the routine wetland delineation data form.

2.3 Vegetation

General dominant species-based vegetation community types (e.g., *Typha latifolia/Scirpus acutus*) were delineated on a 2008 aerial photograph during the mid-season visit and later verified with the 2009 aerial photograph. Standardized community mapping was not employed as many of these systems are geared towards climax vegetation and may not reflect yearly changes. Estimated percent cover of the dominant species in each community type was listed on the site monitoring form (**Appendix B**).

Two 10-foot wide belt transects were sampled during the mid-season monitoring event to represent the range of current vegetation conditions. The Transect 1 location approximates a pre-project transect location established by MDT across the center of the site. Transect 2 was established toward the north project end across a flat gradient likely to indicate vegetative change. The approximate transect locations are depicted on **Figure 2** (**Appendix A**). Percent cover was estimated for each vegetative species for each successive vegetation community encountered within the "belt" using the following values: + (<1%); 1 (1-5%); 2 (6-10%); 3 (11-20%); 4 (21-50%); and 5 (>50%). The transects are used to evaluate changes over time, especially the establishment and increase of hydrophytic vegetation. Transect data were recorded on the mitigation site monitoring form. Photos along the transects were taken from both ends during the mid-season visit.

A comprehensive plant species list was prepared for the site. Woody species were not planted at this mitigation site. Consequently, no monitoring relative to the survival of such species was conducted.

2.4 Soils

Soils were evaluated during the mid-season visit according to hydric soils determination procedures outlined in the COE 1987 Wetland Delineation Manual. Soil data were

recorded for each wetland determination point on the COE Routine Wetland Delineation Data Form (**Appendix B**). The most current terminology used by NRCS was used to describe hydric soils (USDA 2006).

2.5 Wetland Delineation

Wetland delineation was conducted during the mid-season visit according to the 1987 COE Wetland Delineation Manual. In July 2008, consultation with the COE (Steinle pers. comm.) confirmed that, where the 1987 manual was used to establish baseline wetland conditions at MDT wetland mitigation sites, it should continue to be applied at such sites for the duration of the monitoring period. Consequently, application of the new *Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Great Plains Region* (COE 2008) was not required or undertaken at this site in 2008 or 2009.

The indicator status of vegetation was derived from the National List of Plant Species that Occur in Wetlands: North Plains Region 4 (Reed 1988). Wetland and upland areas within the monitoring area were investigated for the presence of wetland hydrology, hydrophytic vegetation and hydric soils. The information was recorded on COE Routine Wetland Delineation Data Forms (**Appendix B**). The wetland/upland boundary was recorded by mapping onto a 2008 color aerial photograph, and then referencing that to a 2009 aerial photograph once it was available. The wetland/upland boundary in combination with the wetland/open water habitat boundary was used to calculate the developed wetland area.

2.6 Mammals, Reptiles, and Amphibians

Mammal, reptile, and amphibian species observations and other positive indicators of use, such as vocalizations, were recorded on the wetland monitoring form. Indirect use indicators, including tracks; scat; burrows; eggshells; skins; bones; etc., were also recorded. Observations were recorded as the observer traversed the site while conducting other required activities. Direct sampling methods, such as snap traps, live traps, and pitfall traps, were not implemented. A comprehensive list of observed species was compiled. Observations from past years will ultimately be compared with new data.

2.7 Birds

Bird observations were recorded. No formal census plots, spot mapping, point counts, or strip transects were conducted. Bird observations were recorded incidental to other monitoring activities. Observations were categorized by species, activity code, and general habitat association on the Bird Survey Field Data Form (**Appendix B**).

2.8 Macroinvertebrates

One macroinvertebrate sample was collected and data recorded on the wetland mitigation monitoring form. Macroinvertebrate sampling procedures are included in **Appendix F**.

The approximate location of the sample point is shown on **Figure 2** (**Appendix A**). The sample was preserved as outlined in the sampling procedure and sent to Rhithron Associates for analysis.

2.9 Functional Assessment

During 2007, the functional assessment was completed using the 1999 MDT Montana Wetland Assessment Method (Berglund 1999). In 2008 and 2009, the 2008 MDT Montana Wetland Assessment Method (Berglund and McEldowney 2008) was applied (**Appendix B**).

2.10 Photographs

Photographs were taken during the mid-season visit showing the current land use surrounding the site, the upland buffer, the monitored area, and the vegetation transect (**Appendix C**). The approximate location of photo points is shown on **Figure 2** (**Appendix A**). Photo points included those established pre-project by MDT. All photographs were taken using a digital camera. A description and compass direction for each photograph was recorded on the wetland monitoring form.

2.11 GPS Data

GPS data collected during the 2007 monitoring season included vegetation transect beginning and ending locations, all photograph locations, the macroinvertebrate sample point, and wetland boundaries. Procedures used for GPS mapping and aerial photography referencing are included in **Appendix E**. No additional GPS data were collected in 2008 or 2009; adjustments to wetland boundaries were minor and performed via mapping onto an aerial photograph.

2.12 Maintenance Needs

Dike structures were examined for obvious signs of breaching, damage, seepage, or other problems. This did not constitute an engineering-level structural inspection, but rather a cursory examination. Current or future potential problems were documented.

3.0 RESULTS

3.1 Hydrology

Approximately 95% of the designed wetland area was inundated during the July mid-season visit. Water depths ranged between approximately two to an estimated six feet deep in the open water areas, and between one inch and two feet deep in the flatter wetland areas around the impoundment fringes. Specific recorded water depths are provided on the attached data forms. During July, the surface water elevation was less than two feet below the spillway elevation, indicating that the site was at less than

potential full-pool conditions, although surface water was backed beyond both the north and east fence limits across the drainage.

Precipitation was slightly below "normal" in the general project area from January through July 2009, based on data from the Glasgow WSO Airport weather station. According to the Western Regional Climate Center (WRCC), mean monthly precipitation from January through July from 1955 to 2008 totaled 7.7 inches for the Glasgow WSO Airport station (2009). During 2009, 6.01 inches (78 % of the mean) of precipitation were recorded at this station between January and July (WRCC 2009).

3.2 Vegetation

Vegetation species identified on the site are presented in **Table 1** and on the attached data form. In addition to the upland community (Type 1), three wetland community types were identified and mapped on the mitigation area in 2009 (**Figure 3** in **Appendix A**). These included Type 2-*Eleocharis palustris / Hordeum jubatum*, Type 3-*Carex praegracilis / Juncus balticus*, and Type 5-*Distichlis stricta*. Type 4-*Agrostis alba*, had essentially been replaced by Type 5 in 2008. Dominant species within each of these communities are listed on **Monitoring Forms** (**Appendix B**).

Table 1: ***Vegetation species list from 2007 to 2009*** **at the** ***WF Charley Creek Wetland Mitigation Site.***

Species	Region 4 Wetland Indicator Status	Species	Region 4 Wetland Indicator Status
Agropyron cristatum	--	*Koeleria pyramidata*	--
Agropyron repens	FAC	*Opuntia* spp.	--
Agropyron smithii	FACU	*Plantago patagonica*	--
Agrostis alba	FACW	*Poa pratensis*	FACU
Artemisia cana	FACU	*Puccinellia nuttalliana*	OBL
Artemisia frigida	--	*Rosa nutkana*	--
Bouteloua gracilis	--	*Rumex crispus*	FACW
Carex filifolia	--	***Scirpus acutus***	**OBL**
Carex praegracilis	FACW	*Scirpus americanus*	OBL
Distichlis stricta	FACW	*Scirpus maritimus*	NI
Eleocharis palustris	OBL	*Spartina pectinata*	FACW
Grindelia squarrosa	UPL	*Symphoricarpos occidentalis*	--
Hordeum jubatum	FACW	*Thermopsis montana*	--
Juncus balticus	OBL	*Triglochin maritimum*	OBL
Kochia scoparia	FAC		

Bolded species were observed for the first time in 2009.

The upland (Type 1) communities varied throughout the site and included species of western wheatgrass (*Agropyron smithii*), junegrass (*Koeleria pyramidata*), blue grama (*Bouteloua gracilis*), fringed sage (*Artemisia frigida*), silver sage (*Artemisia cana*), snowberry (*Symphoricarpos occidentalis*), thermopsis (*Thermopsis montana*), Indian wheat (*Plantago patagonica*), and/or prickly pear (*Opuntia* spp.). Type 2 occurred primarily in newly developing wetland areas throughout the site; generally along the perimeters of open water areas. Type 3 continued to occur in a relatively confined area

along the northwest shore. Type 4 occurred in 2007 as a small patch along the northeast shoreline, but was replaced in 2008 (and perpetuated in 2009) by Type 5, which also occurred at the start of Transect 1. Transect 1 vegetation results are detailed in the **Monitoring Forms** (**Appendix B**), and are summarized in **Table 2** and in **Charts 1** and **2**.

Table 2: ***Data summary for Transect 1 from 2007 to 2009 at the WF Charley Creek Wetland Mitigation Site.***

Monitoring Year	2007	2008	2009
Transect Length (feet)	307	307	307
# Vegetation Community Transitions along Transect	5	4	5
# Vegetation Communities along Transect	3	3	3
# Hydrophytic Vegetation Communities along Transect	1	2	2
Total Vegetative Species	8	12	14
Total Hydrophytic Species	3	5	8
Total Upland Species	5	7	6
Estimated % Total Vegetative Cover	30	40	50
% Transect Length Comprised of Hydrophytic Vegetation Communities	5	25	25
% Transect Length Comprised of Upland Vegetation Communities	20	10	8
% Transect Length Comprised of Unvegetated Open Water	75	62	67
% Transect Length Comprised of Bare Substrate	0	3	0

Chart 1: ***Transect map showing vegetation types from the start (0 feet) to end (307 feet) of Transect 1 from 2007 to 2009.***

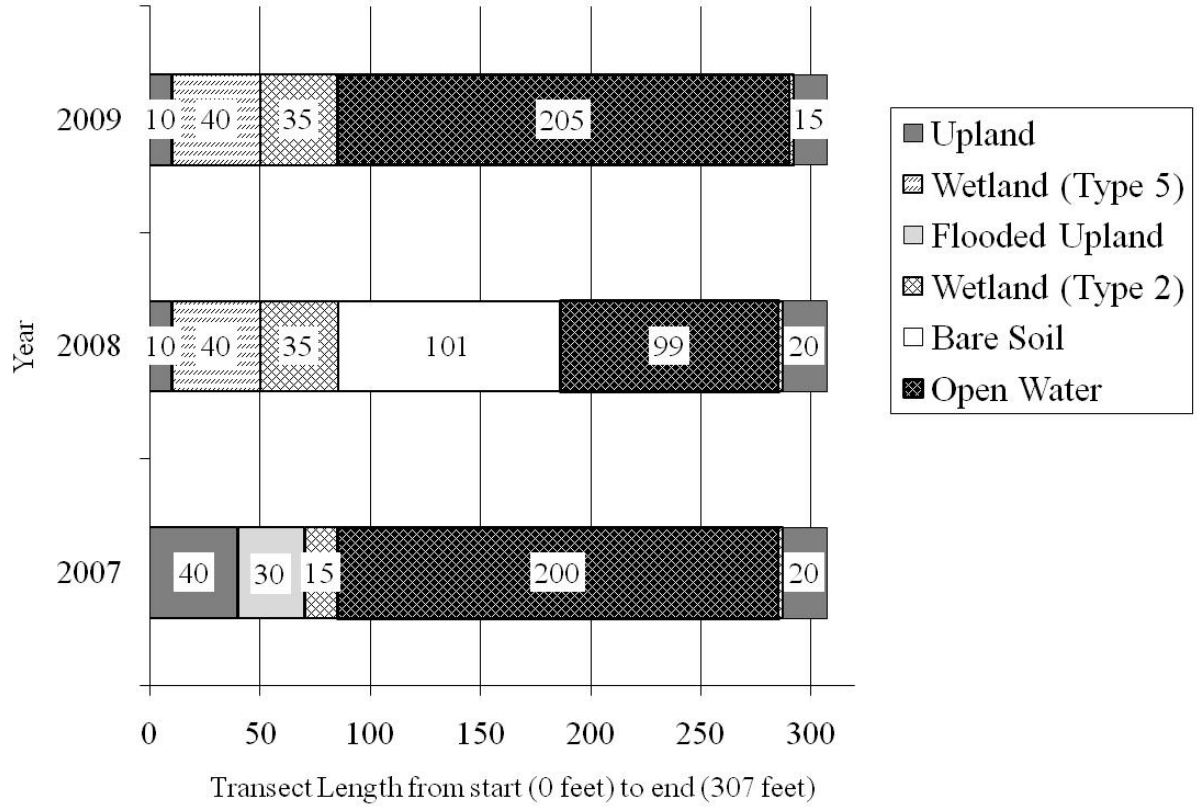
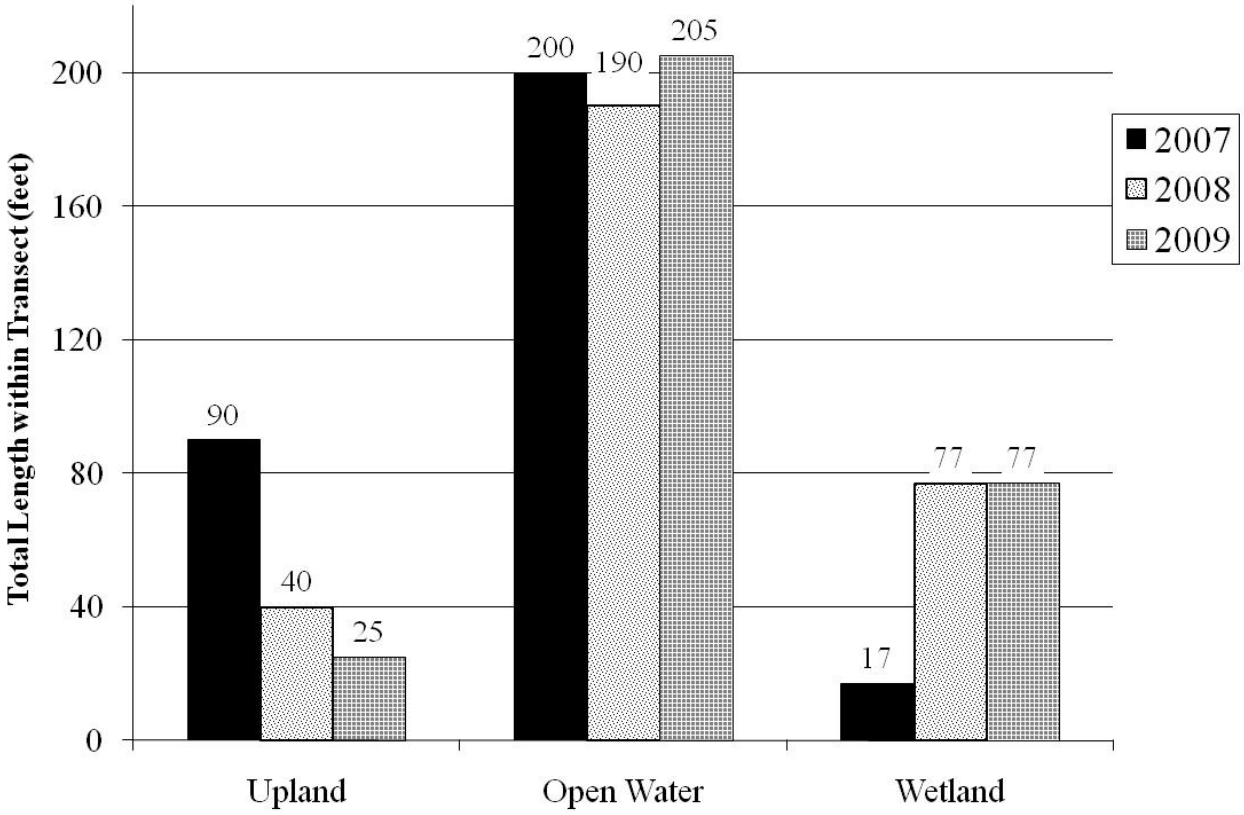


Chart 2: ***Length of vegetation communities within Transect 1 from 2007 to 2009.***



Transect 2 vegetation results are detailed in the **Monitoring Forms** (**Appendix B**), and are summarized in **Table 3** and in **Charts 3** and **4**.

Table 3: ***Data summary for Transect 2 from 2007 to 2009 at the WF Charley Creek Wetland Mitigation Site.***

Monitoring Year	2007	2008	2009
Transect Length (feet)	266	266	266
# Vegetation Community Transitions along Transect	8	5	5
# Vegetation Communities along Transect	4	3	4
# Hydrophytic Vegetation Communities along Transect	2	2	3
Total Vegetative Species	15	15	14
Total Hydrophytic Species	5	7	8
Total Upland Species	10	8	6
Estimated % Total Vegetative Cover	50	60	65
% Transect Length Comprised of Hydrophytic Vegetation Communities	36	45	43
% Transect Length Comprised of Upland Vegetation Communities	12	10	10
% Transect Length Comprised of Unvegetated Open Water	52	45	47
% Transect Length Comprised of Bare Substrate	0	0	0

Chart 3: ***Transect map showing vegetation types from start (0 feet) to end (266 feet) of Transect 2 from 2007 to 2009.***

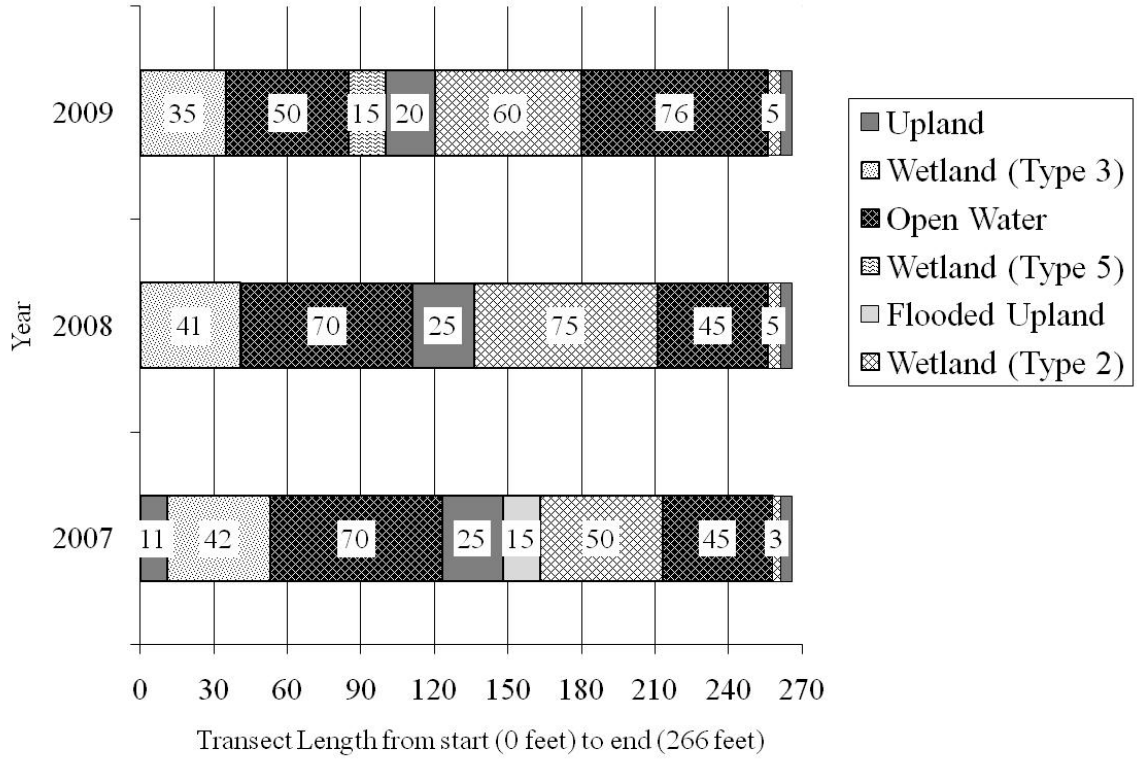
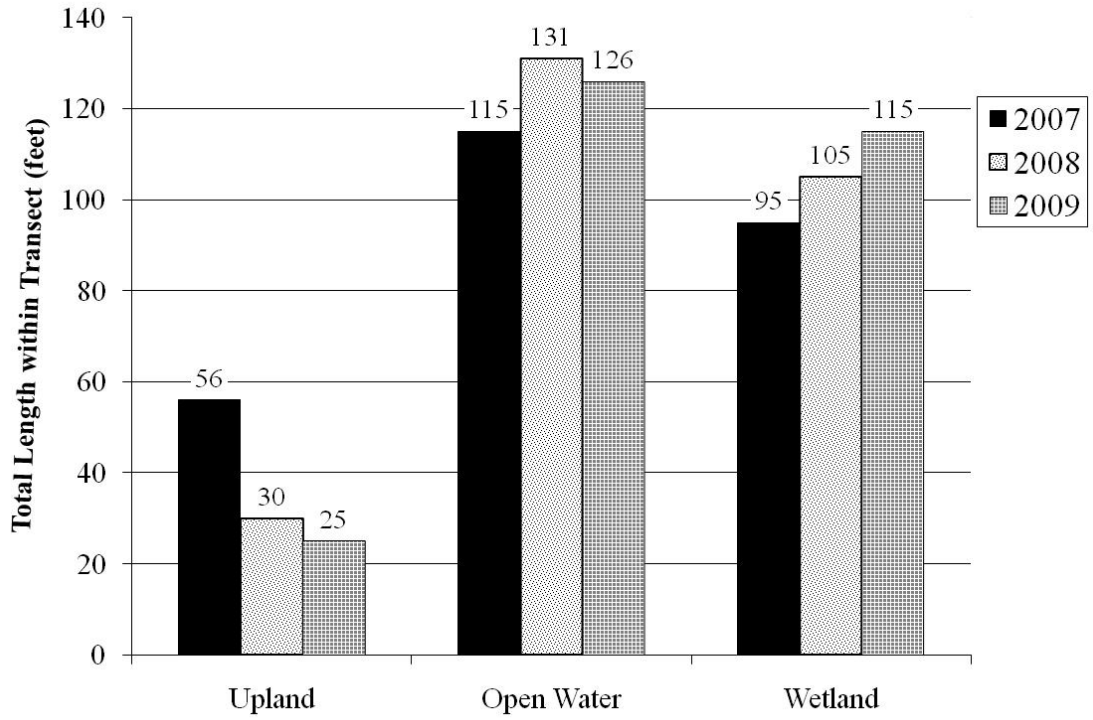


Chart 4: ***Length of vegetation communities within Transect 2 from 2007 to 2009.***



3.3 Soils

Soil at the mitigation site is mapped as Aquic Ustifluvents, saline. This soil type is included on the list of map units with hydric inclusions for Valley County. This map unit consists of deep, nearly level and gently sloping soils that formed in alluvium of floodplains along intermittent and perennial streams. The surface layer and underlying material are typically clay or clay loam. These characteristics were again generally confirmed during 2009 monitoring. Soils sampled in wetland areas were comprised of clay or sandy clay loam with a matrix color of 10YR 3/1. Wetland soils were saturated or inundated at the time of the survey.

3.4 Wetland Delineation

Delineated wetland boundaries are illustrated on **Figure 3** (**Appendix A**). Completed wetland delineation forms are included in **Appendix B**. Soils, vegetation, and hydrology are discussed in preceding sections. Delineation results are listed in **Table 4**.

Table 4: ***Wetland delineation results from 2007 to 2009 for the WF Charley Creek Wetland Mitigation Site.***

AQUATIC HABITAT	ACREAGE		
	2007	2008	2009
Vegetated Wetland	1.38	1.60	1.73
Open Water	4.82	5.19	5.19
Total Aquatic Habitat	**6.20**	**6.79**	**6.92**

Approximately 0.03 acre of wetlands occurred on the site prior to project implementation. Consequently, the net aquatic habitat developed to date is 6.92 – 0.03 = 6.89 acres. Crediting is discussed in Section 3.10.

3.5 Wildlife

Wildlife species, or evidence of their presence, observed on the site during 2009 monitoring efforts are listed in **Table 5**. Specific evidence observed, and activity codes pertaining to birds, are provided on the completed monitoring form in **Appendix B**. Two mammals and eight bird species were noted using portions of the mitigation site during the 2008 monitoring visit.

Of special interest were observations of northern leopard frogs (*Rana pipiens*) during 2007 and 2008 (not observed during 2009). Leopard frogs are considered a “species of special concern” by the MTNHP due largely to their apparent extirpation from the portion of their historic distribution west of the Continental Divide. As of July 2009, this species has been assigned the rank of S1 (critically imperiled) throughout its range in Montana by the MTNHP.

Table 5: ***Fish and Wildlife species observed at the WF Charley Creek Wetland Mitigation Site from 2007-2009.***

FISH	
fish (unidentified species)	
AMPHIBIAN	
Northern Leopard Frog (*Rana pipiens*)	
REPTILE	
None	
BIRD	
American Avocet (*Recurvirostra americana*)	Marbled Godwit (*Limosa fedoa*)
American Coot (*Fulica americana*)	Mourning Dove (*Zenaida macroura*)
American White Pelican (*Pelecanus erythrorhynchos*)	Northern Harrier (*Circus cyaneus*)
American Wigeon (*Anas americana*)	Northern Pintail (*Anas acuta*)
Bank Swallow (*Riparia riparia*)	Northern Rough-winged Swallow (*Stelgidopteryx serripennis*)
Barn Owl (*Tyto alba*)	Northern Shoveler (*Anas clypeata*)
Barn Swallow (*Hirundo rustica*)	Red-winged Blackbird (*Agelaius phoeniceus*)
Blue-winged Teal (*Anas discors*)	Ring-billed Gull (*Larus delawarensis*)
Canada Goose (*Branta canadensis*)	**Ring-necked Duck (*Aythya collaris*)**
Common Snipe (*Gallinago gallinago*)	Ruddy Duck (*Oxyura jamaicensis*)
Common Tern (*Sterna hirundo*)	**Spotted Sandpiper (*Actitis macularia*)**
Gadwall (*Anas strepera*)	**Vesper Sparrow (*Pooecetes gramineus*)**
Horned Lark (*Eremophila alpestris*)	**Western Meadowlark (*Sturnella neglecta*)**
Killdeer (*Charadrius vociferous*)	**Willet (*Catoptrophorus semipalmatus*)**
Lark Bunting (*Calamospiza melanocorys*)	Wilson's Phalarope (*Phalaropus tricolor*)
Lesser Scaup (*Aythya affinis*)	
Mallard (*Anas platyrhynchos*)	
MAMMAL	
American Badger (*Taxidea taxus*)	White-tailed Jack Rabbit (*Lepus townsendii*)
Richardson's Ground Squirrel (*Spermophilus richardsonii*)	

Bolded species were observed during 2009.

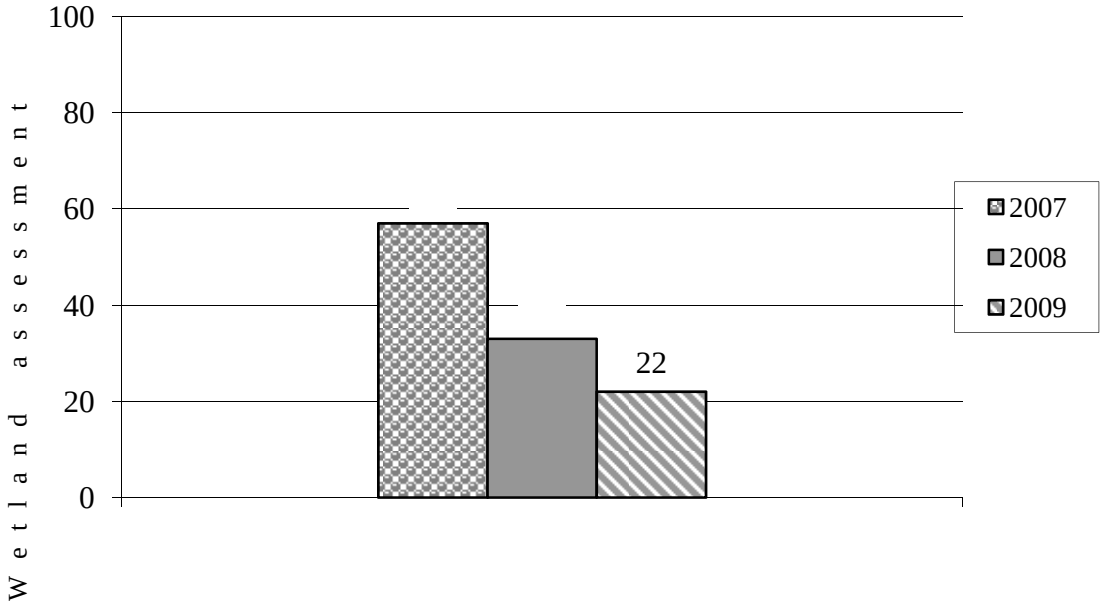
3.6 Macroinvertebrates

Macroinvertebrate sampling results are provided in **Appendix F** and are summarized below in italics by Rhithron Associates, Inc. (Bollman 2009). The wetland assessment scores from 2006 to 2009 have been graphically illustrated (**Chart 5**).

> *In 2009, the invertebrate fauna was simple and overwhelmed by large numbers of the amphipod* Hyalella *sp. Six other taxa were present in the sample, but none were represented by more than a very few specimens. It seems likely that the dominant food source at this site was the detritus from senescent macrophytes. The bioassessment metrics indicated "poor" conditions at the West Fork of Charley Creek wetland (Chart 5). Two midge taxa were collected, and both were hemoglobin-bearing taxa; this suggests hypoxic substrates. Thermal preference was roughly estimated at*

20.1ºC, but the calculation is unreliable because there were so few taxa present.

Chart 5: ***Macroinvertebrate bioassessment scores using the wetland assessment from 2007 to 2009 at the WF Charley Creek Wetland Mitigation Site.***



3.7 Functional Assessment

The completed 2009 functional assessment form (using the 2008 MDT method) is presented in **Appendix B**. Functional assessment results are summarized in **Table 6**. Functional assessment results for baseline conditions (using the 1999 MDT method) are also provided in **Table 6** for comparison.

The site currently rates as a Category III wetland and has gained over 38 functional units. Prominent functions include general wildlife habitat, surface water storage, sediment/nutrient/toxicant removal, documented MTNHP species habitat (northern leopard frog), and production export.

3.8 Photographs

Representative photographs taken from photo-points and transect ends are provided in **Appendix C**. **Figures 2** and **3** (**Appendix A**) are based on the 2009 aerial photograph.

3.9 Maintenance Needs/Recommendations

All dikes were in good condition during the mid-season visit. The designed water gap (for cattle watering) appeared to be functioning as designed, although the gates to the site were open, allowing cattle access. Trampling was evident in essentially all wetlands fringing the reservoir.

Table 6: ***Summary of the 2005 baseline and 2009 wetland function/value ratings and functional points at the West Fork Charley Creek Mitigation Site.***

Function and Value Parameters From the MDT Montana Wetland Assessment Method	2005 (Baseline)	2009[1]
Listed/Proposed T&E Species Habitat	Low (0.0)	Low (0.1)
MTNHP Species Habitat	Low (0.0)	Mod (0.7)
General Wildlife Habitat	Low (0.2)	Mod (0.7)
General Fish/Aquatic Habitat	NA	NA
Flood Attenuation	Low (0.1)	Mod (0.6)
Short and Long Term Surface Water Storage	Low (0.3)	Mod (0.6)
Sediment, Nutrient, Toxicant Removal	Mod (0.6)	Mod (0.7)
Sediment/Shoreline Stabilization	Low (0.2)	Low (0.3)
Production Export/ Food Chain Support	Low (0.3)	High (0.8)
Groundwater Discharge/Recharge	NA	Mod (0.7)
Uniqueness	Low (0.3)	Low (0.3)
Recreation/Education Potential	Low (0.1)	Low (0.05)
Actual Points/Possible Points	2.1 / 10	5.55 / 10
% of Possible Score Achieved	21	56
Overall Category	IV	III
Total Acreage of Assessed Aquatic Habitat within Easement (ac)	**0.03**	**6.92**
Functional Units (acreage x actual points) (fu)	**0.06**	**38.40**
Net Acreage Gain (ac)	NA	**6.89**
Net Functional Unit Gain (fu)	NA	**38.34**

[1] See completed functional assessment form in **Appendix B**.

3.10 Current Credit Summary

Approximately 1.73 acres of vegetated wetlands and 5.19 acres of open water were delineated on the mitigation site in 2009, for a total of 6.92 acres of aquatic habitat. Approximately 0.03 acre of wetlands occurred on the site prior to project implementation. Consequently, the net aquatic habitat created / restored to date is 6.92 – 0.03 = 6.89 acres, which is the maximum assignable credit at this site in 2009. No performance standards for the site were found in the project files; however, the goal of the project was to provide approximately 5 acres of palustrine, semi-permanent, emergent wetland. Additional flooded uplands and shallow open water areas are likely to convert to emergent wetland over time, given consistent inundation.

4.0 REFERENCES

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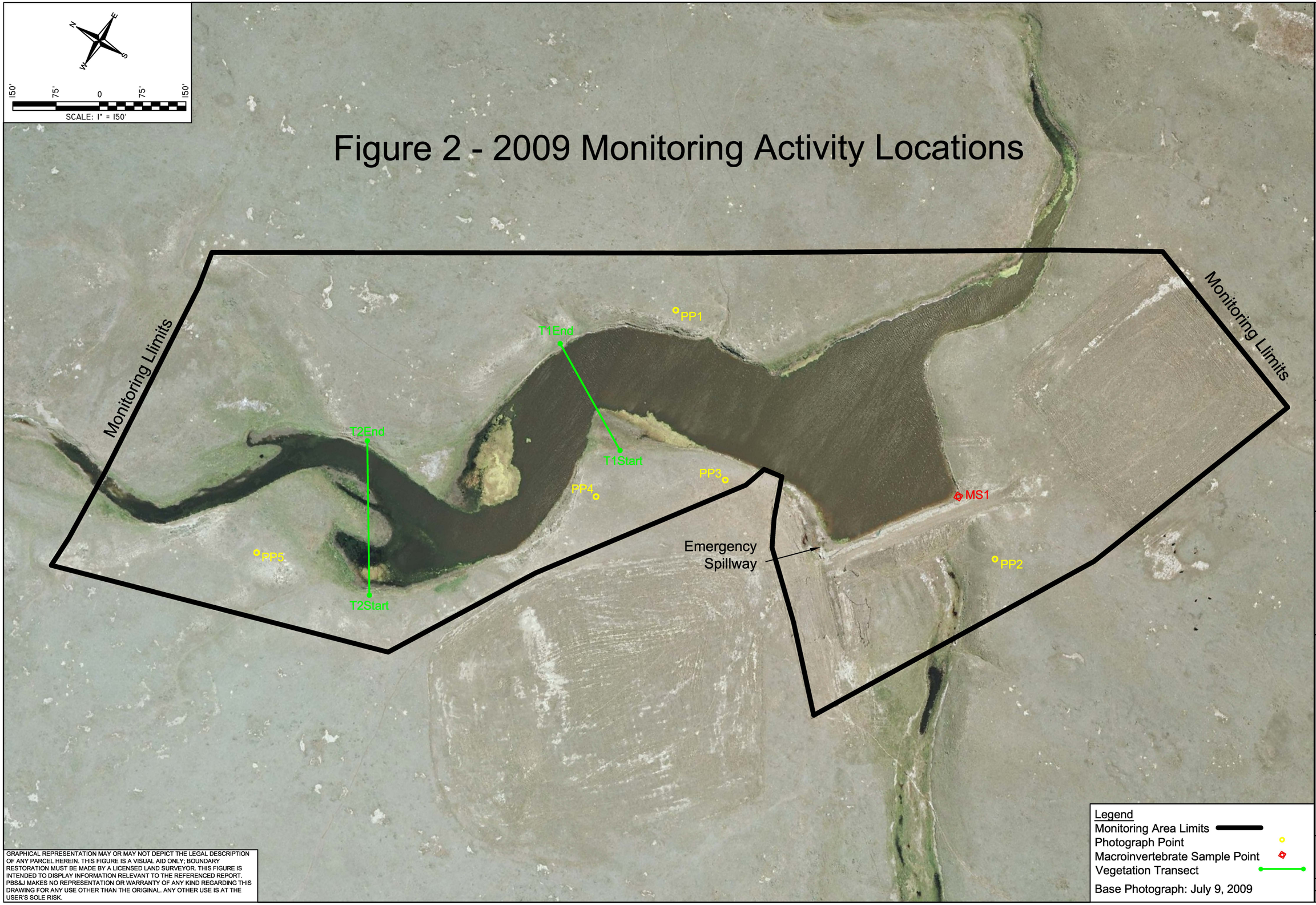
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Appendix A

FIGURES 2 & 3

MDT Wetland Mitigation Monitoring
West Fork Charley Creek
Frazer, Montana

Figure 2 - 2009 Monitoring Activity Locations



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

MDT WEST FORK CHARLEY CREEK WETLAND MITIGATION

2009 MONITORING ACTIVITY LOCATIONS

PROJ NO:	0B4308801 05.03
LOCATION:	FRAZER, MT
SCALE:	NOTED
FILE NAME:	BASE2009.dwg
DRAWN:	JR
PROJ MGR:	J. BERGLUND
CHECKED:	JB
APPVD:	JB
PLOTTED:	Aug/13/2009

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

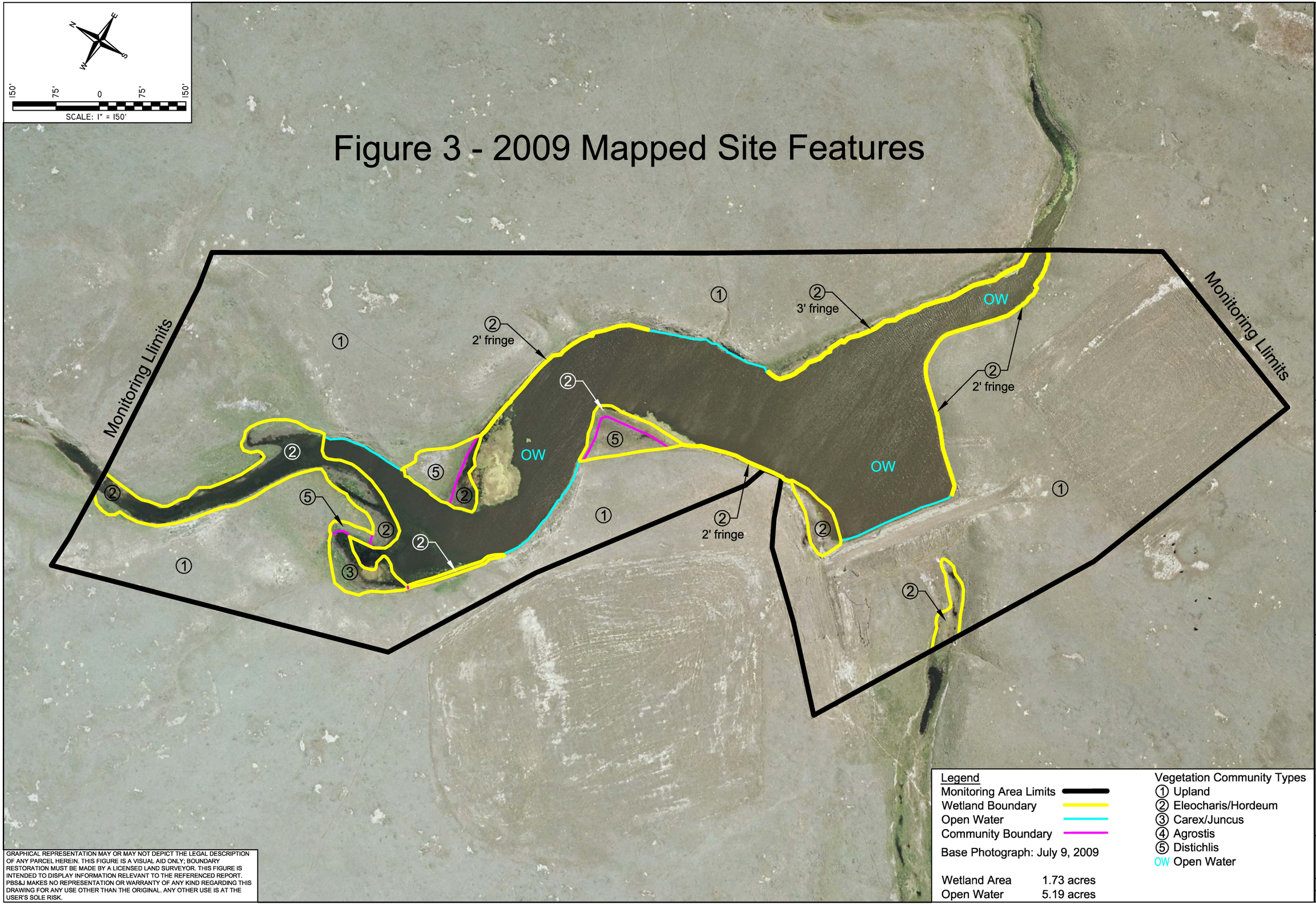
PBSJ

FIGURE
2

REV -

DATE 08/13/2009

Figure 3 - 2009 Mapped Site Features



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

MDT WEST FORK CHARLEY CREEK WETLAND MITIGATION

2009 MAPPED SITE FEATURES

PROJ NO: 0B4308801 05.03
LOCATION: FRAZER, MT
SCALE: NOTED
FILE NAME: BASE2009.dwg

DRAWN: JR
PROJ MGR: J. BERGLUND
CHECKED: JB
APPVD: JB
PLOTTED: Aug/13/2009

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

FIGURE 3

REV -

DATE 08/13/2009

Appendix B

2009 WETLAND MITIGATION SITE MONITORING FORM
2009 BIRD SURVEY FORMS
2009 WETLAND DELINEATION FORMS
2009 FUNCTIONAL ASSESSMENT FORMS

MDT Wetland Mitigation Monitoring
West Fork Charley Creek
Frazer, Montana

PBS&J / MDT WETLAND MITIGATION SITE MONITORING FORM

Project Name: **WF Charley Creek Mitigation** Project Number: **B4308802 0503**
Assessment Date: **July 29, 2009** Person(s) conducting the assessment: **Berglund**
Location: **West of Frazier, north of US HWY 2** MDT District: **Glendive** Milepost: **570**
Legal Description: T **27N** R **43E** Section **1**
Weather Conditions: **Sunny, dry, breeze** Time of Day: **06:30 - 09:30**
Initial Evaluation Date: **May 7, 2007** Monitoring Year: **3** # Visits in Year: **1**
Size of evaluation area: **29 acres** Land use surrounding wetland: **Agricultural**

HYDROLOGY

Surface Water Source: **WF Charley Creek (impounded), runoff, ppt.**
Inundation: **Present** Average Depth: **4'** Range of Depths: **0-7 feet**
Percent of assessment area under inundation: **95%**
Depth at emergent vegetation-open water boundary: **1 feet**
If assessment area is not inundated then are the soils saturated within 12 inches of surface: **Yes**
Other evidence of hydrology on the site (ex. – drift lines, erosion, stained vegetation, etc.):
Drift lines, drainage patterns, and drowned vegetation present.

Groundwater Monitoring Wells: **Absent**
Record depth of water below ground surface (in feet):

Well Number	Depth	Well Number	Depth	Well Number	Depth

Additional Activities Checklist:
☒ Map emergent vegetation-open water boundary on aerial photograph.
☒ Observe extent of surface water during each site visit and look for evidence of past surface water elevations (drift lines, erosion, vegetation staining, etc.)
☐ Use GPS to survey groundwater monitoring well locations, if present.

COMMENTS / PROBLEMS:
The designed wetland site was approximately 95% inundated. Wetlands are developing along narrow fringes where sideslopes are steep, and along benches where slopes are relatively flat, and also below the dike. Cattle had access to and trampled some wetland vegetation along reservoir fringe in 2009.

VEGETATION COMMUNITIES

Community Number: **1** Community Title (main spp): **Upland**

Dominant Species	% Cover	Dominant Species	% Cover
AGR SMI	5 = > 50%	THE MON	2 = 6-10%
KOE PYR	4 = 21-50%	ART FRI	2 = 6-10%
CAR FIL	3 = 11-20%	ART CAN	1 = 1-5%
PLA PAT	3 = 11-20%	KOC SCO	1 = 1-5%
BOT GRA	4 = 21-50%	SYM OCC	1 = 1-5%
GRI SQU	2 = 6-10%	OPU sp.	1 = 1-5%

Comments / Problems: **Occurs throughout site outside of impoundment- composition varies throughout site.**

Community Number: **2** Community Title (main spp): **Eleocharis palustris / Hordeum jubatum**

Dominant Species	% Cover	Dominant Species	% Cover
ELE PAL	3 = 11-20%	AGR SMI	+ = < 1%
SCI MAR	2 = 6-10%	DIS STR	1 = 1-5%
SCI AME	1 = 1-5%	SCI ACU	+ = < 1%
SPA PEC	1 = 1-5%		
RUM CRI	1 = 1-5%		
HOR JUB	5 = > 50%		

Comments / Problems: **Predominant wetland type on site; newly developing along margins. Changed to greater % of Hordeum in 2008-2009 SCI ACU new in 2009.**

Community Number: **3** Community Title (main spp): **Carex praegracilis / Juncus balticus**

Dominant Species	% Cover	Dominant Species	% Cover
CAR PRA	5 = > 50%		
JUN BAL	5 = > 50%		
AGR SMI	2 = 6-10%		

Comments / Problems: **This type occurs mainly in one location along the northwest shore of the impoundment. Juncus was co-dominant in 2008-2009.**

Community Number: **4** Community Title (main spp): **Agrostis alba**

Dominant Species	% Cover	Dominant Species	% Cover
AGR ALB	5 = > 50%		
DIS STR	4 = 21-50%		

Comments / Problems: **Occurred in 2007 at one location on the east shore of the impoundment. Absent in 2008-2009.**

VEGETATION COMMUNITIES (continued)

Community Number: **5** Community Title (main spp): **Distichlis stricta**

Dominant Species	% Cover	Dominant Species	% Cover
DIS STR	5 = > 50%		
HOR JUB	1 = 1-5%		
AGR ALB	1 = 1-5%		
AGR SMI	1 = 1-5%		

Comments / Problems: **New wetland community in 2008; perpetuated in 2009.**

Community Number: ___ Community Title (main spp): _____

Dominant Species	% Cover	Dominant Species	% Cover

Comments / Problems: _____

Community Number: **7** Community Title (main spp): _____

Dominant Species	% Cover	Dominant Species	% Cover

Comments / Problems: _____

Community Number: ___ Community Title (main spp): _____

Dominant Species	% Cover	Dominant Species	% Cover

Comments / Problems: _____

Additional Activities Checklist:

☒ Record and map vegetative communities on aerial photograph.

COMPREHENSIVE VEGETATION LIST

Plant Species	Vegetation Community Number (s)	Plant Species	Vegetation Community Number (s)
Agropyron cristatum	1		
Agropyron repens	1		
Agropyron smithii	1,2		
Agrostis alba	3,4		
Artemisia cana	1		
Artemisia frigida	1		
Bouteloua gracilis	1		
Carex filifolia	1		
Carex praegracilis	3		
Distichlis stricta	1,4		
Eleocharis palustris	2		
Grindelia squarrosa	1,3		
Hordeum jubatum	1,2		
Juncus balticus	3		
Kochia scoparia	1,2		
Koeleria pyramidata	1		
Opuntia sp.	1		
Plantago patagonica	1		
Poa sp.	1,3		
Puccenellia nuttalliana	2,3		
Rosa nutkana	1		
Rumex crispus	2		
Scirpus acutus	2		
Scirpus americanus	2		
Scirpus maritimus	2		
Spartina pectinata	2		
Symphoricarpos occidentalis	1		
Thermopsis montana	1		
Triglochin maritimum	2		

Comments / Problems: <u>SCI ACU starting to appear in deeper water.</u>

PLANTED WOODY VEGETATION SURVIVAL

Plant Species	Number Originally Planted	Number Observed	Mortality Causes

Comments / Problems: **No woody species planted.**

WILDLIFE

Birds

Were man-made nesting structures installed? **No**
If yes, type of structure: **NA** How many? **NA**
Are the nesting structures being used? **NA**
Do the nesting structures need repairs? **NA**

Mammals and Herptiles

Mammal and Herptile Species	Number Observed	Indirect Indication of Use			
		Tracks	Scat	Burrows	Other
		☐	☐	☐	
Richardson's ground squirrel		☐	☐	☒	
Badger		☐	☐	☒	
		☐	☐	☐	
		☐	☐	☐	
		☐	☐	☐	
		☐	☐	☐	
		☐	☐	☐	

Additional Activities Checklist:
Yes Macroinvertebrate Sampling (if required)

Comments / Problems: No leopard frogs were observed in 2009 - water was higher than previous years. Many small fish observed feeding at surface of impoundment - species unknown.

PHOTOGRAPHS

Using a camera with a 50mm lens and color film take photographs of the following permanent reference points listed in the check list below. Record the direction of the photograph using a compass. When at the site for the first time, establish a permanent reference point by setting a ½ inch rebar or fencepost extending 2-3 feet above ground. Survey the location with a resource grade GPS and mark the location on the aerial photograph.

Photograph Checklist:

- ☒ One photograph for each of the four cardinal directions surrounding the wetland.
- ☒ At least one photograph showing upland use surrounding the wetland. If more than one upland exists then take additional photographs.
- ☒ At least one photograph showing the buffer surrounding the wetland.
- ☒ One photograph from each end of the vegetation transect, showing the transect.

Location	Photograph Frame #	Photograph Description	Compass Reading (°)
		see attached photosheets	

Comments / Problems: _____

GPS SURVEYING

Using a resource grade GPS survey the items on the checklist below. Collect at least 3 location points set at a 5 second recording rate. Record file numbers for site in designated GPS field notebook.

GPS Checklist:

- ☒ Jurisdictional wetland boundary.
- ☒ 4-6 landmarks that are recognizable on the aerial photograph.
- ☒ Start and End points of vegetation transect(s).
- ☒ Photograph reference points.
- ☐ Groundwater monitoring well locations.

Comments / Problems: _____

WETLAND DELINEATION

(attach COE delineation forms)

At each site conduct these checklist items:

- ☒ Delineate wetlands according to the 1987 Army COE manual.
- ☒ Delineate wetland – upland boundary onto aerial photograph.

Yes Survey wetland – upland boundary with a resource grade GPS survey.

Comments / Problems: _____

FUNCTIONAL ASSESSMENT

(Complete and attach full MDT Montana Wetland Assessment Method field forms.)
(Also attach any completed abbreviated field forms, if used)

Comments / Problems: _____

MAINTENANCE

Were man-made nesting structure installed at this site? **No**
If yes, do they need to be repaired? **NA**
If yes, describe the problems below and indicate if any actions were taken to remedy the problems.

Were man-made structures built or installed to impound water or control water flow into or out of the wetland? **Yes**
If yes, are the structures working properly and in good working order? **Yes**
If no, describe the problems below.

Comments / Problems: **Water surface elevation currently less than 2 feet below top of spillway. Cattle had been accessing site and trampled some of shoreline wetland vegetation.**

MDT WETLAND MONITORING – VEGETATION TRANSECT

Site: **WF Charley Creek** Date: **July 29, 2009** Examiner: **Berglund**
Transect Number: **1** Approximate Transect Length: **307 feet** Compass Direction from Start: **40˚** Note: _____

Vegetation Type A: **Upland**	
Length of transect in this type: 10 feet	
Plant Species	**Cover**
AGR SMI	5 = > 50%
HOR JUB	+ = < 1%
KOE PYR	1 = 1-5%
BOT GRA	1 = 1-5%
ART CAN	1 = 1-5%
OPU spp.	+ = < 1%
UPLAND COMMUNITY	
Total Vegetative Cover:	100%

Vegetation Type B: **Distichlis stricta**	
Length of transect in this type: 40 feet	
Plant Species	**Cover**
AGR SMI	+ = < 1%
HOR JUB	+ = < 1%
DIS STR	5 = > 50%
WETLAND COMMUNITY	
Total Vegetative Cover:	100%

Vegetation Type C: **Eleocharis palustris / Hordeum jubatum**	
Length of transect in this type: 35 feet	
Plant Species	**Cover**
ELE PAL	3 = 11-20%
HOR JUB	3 = 11-20%
DIS STR	2 = 6-10%
AGR ALB	2 = 6-10%
SCI MAR	1 = 1-5%
AGR SMI	+ = < 1%
TRI MAR	+ = < 1%
Wetland community	
Total Vegetative Cover:	70%

Vegetation Type D: **Open Water**	
Length of transect in this type: 205 feet	
Plant Species	**Cover**
No Vegetation	
Total Vegetative Cover:	0%

MDT WETLAND MONITORING – VEGETATION TRANSECT

Site: **WF Charley Crk** Date: **July 29, 2009** Examiner: **JB**
Transect Number: **1** Approximate Transect Length: **307 feet** Compass Direction from Start: **40˚** Note: _____

Vegetation Type E: **Eleocharis palustris / Hordeum jubatum**	
Length of transect in this type: 2 feet	
Plant Species	**Cover**
ELE PAL	2 = 6-10%
HOR JUB	3 = 11-20%
RUM CRI	1 = 1-5%
AGR SMI	1 = 1-5%
NAJ GUA	+ = < 1%
Wetland Community	
Total Vegetative Cover:	80%

Vegetation Type F: **Upland**	
Length of transect in this type: 15 feet	
Plant Species	**Cover**
AGR SMI	5 = > 50%
GRI SQU	1 = 1-5%
BOT GRA	2 = 6-10%
KOL PYR	2 = 6-10%
HOR JUB	1 = 1-5%
Upland Community - end of Transect 1	
Total Vegetative Cover:	100%

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

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

MDT WETLAND MONITORING – VEGETATION TRANSECT

Site: **WF Charley Crk** Date: **July 29, 2009** Examiner: **JB**
Transect Number: **2** Approximate Transect Length: **266 feet** Compass Direction from Start: **80˚** Note: _____

Vegetation Type A: **Carex praegracillis / Juncus balticus**	
Length of transect in this type: 35 feet	
Plant Species	**Cover**
CAR PRA	4 = 21-50%
JUN BAL	5 = > 50%
HOR JUB	1 = 1-5%
AGR SMI	+ = < 1%
Wetland Community	
Total Vegetative Cover:	100%

Vegetation Type B: **Shallow Open Water**	
Length of transect in this type: 50 feet	
Plant Species	**Cover**
Mainly no vegetation - shallow standing open water	
NAJ GUA	+ = < 1%
Total Vegetative Cover:	1%

Vegetation Type C: **Distichlis**	
Length of transect in this type: 15 feet	
Plant Species	**Cover**
DIS STR	5 = > 50%
HOR JUB	3 = 11-20%
Wetland Community	
Total Vegetative Cover:	80%

Vegetation Type D: **Upland**	
Length of transect in this type: 20 feet	
Plant Species	**Cover**
AGR SMI	4 = 21-50%
HOR JUB	4 = 21-50%
DIS STR	1 = 1-5%
Upland Community	
Total Vegetative Cover:	100%

MDT WETLAND MONITORING – VEGETATION TRANSECT

Site: **WF Charley Crk** Date: **July 29, 2009** Examiner: **JB**
Transect Number: **2** Approximate Transect Length: **266 feet** Compass Direction from Start: **80˚** Note: _____

Vegetation Type E: **Eleocharis palustris / Hordeum jubatum**	
Length of transect in this type: 60 feet	
Plant Species	**Cover**
ELE PAL	5 = > 50%
AGR SMI	1 = 1-5%
HOR JUB	5 = > 50%
AGR ALB	1 = 1-5%
Wetland Community	
Total Vegetative Cover:	80%

Vegetation Type F: **Open Water**	
Length of transect in this type: 76 feet	
Plant Species	**Cover**
No Vegetation	
Total Vegetative Cover:	0%

Vegetation Type G: **Eleocharis palustris / Hordeum jubatum**	
Length of transect in this type: 5 feet	
Plant Species	**Cover**
ELE PAL	4 = 21-50%
SCI MAR	1 = 1-5%
HOR JUB	1 = 1-5%
AGR SMI	+ = < 1%
AGR ALB	1 = 1-5%
Wetland Community	
Total Vegetative Cover:	35%

Vegetation Type H: **Upland**	
Length of transect in this type: 5 feet	
Plant Species	**Cover**
KOL PYR	2 = 6-10%
AGR SMI	3 = 11-20%
GLY LEP	1 = 1-5%
ROS NUT	1 = 1-5%
GRI SQU	2 = 6-10%
BOT GRA	+ = < 1%
Upland Community; End of Transect 2	
Total Vegetative Cover:	100%

MDT WETLAND MONITORING – VEGETATION TRANSECT

Site: **WF Charley Crk** Date: **July 29, 2009** Examiner: **JB**
Transect Number: **2** Approximate Transect Length: **266 feet** Compass Direction from Start: **80˚** Note: _____

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

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

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

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

MDT WETLAND MONITORING – VEGETATION TRANSECT

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

Percent of perimeter developing wetland vegetation (excluding dam/berm structures): **70%**

Establish transects perpendicular to the shoreline (or saturated perimeter). The transect should begin in the upland area. Permanently mark this location with a standard metal fencepost. Extend the imaginary transect line towards the center of the wetland, ending at the 3 foot depth (in open water), or at the point where water depths or saturation are maximized. Mark this location with another metal fencepost.

Estimate cover within a 10 foot wide "belt" along the transect length. At a minimum, establish a transect at the windward and leeward sides of the wetland. Remember that the purpose of this sampling is to monitor, not inventory, representative portions of the wetland site.

Comments: **Site is continuing to develop wetland characteristics.**

BIRD SURVEY – FIELD DATA SHEET

Page__1_of_1__
Date: 7/29/09

SITE: W.F. Charley Creek

Survey Time: 0630-0930

Bird Species	#	Behavior	Habitat	Bird Species	#	Behavior	Habitat
Ring-Neck Duck	4	F, N	OW				
Spotted Sandpiper	1	F	MA				
Bank Swallow	20	F	OW				
Gadwall	7	F, N	OW				
Western Meadowlark	10	F	UP				
Killdeer	6	F	MA				
Vesper Sparrow	8	F	UP				
Willet	1	FO	OW				

Notes: Several Richardson's ground squirrel burrows and badger excavations on uplands, many small Unidentified fish observed feeding at surface. Site about 90% inundated; water level < 2' below spillway. Gates are open and cattle can freely access site; trampling evident along shoreline.

Dry, part sun, light breeze conditions.

Behavior: BP – one of a breeding pair; BD – breeding display; F – foraging; FO – flyover; L – loafing; N – nesting

Habitat: AB – aquatic bed; FO – forested; I – island; MA – marsh; MF – mud flat; OW – open water; SS – scrub/shrub; UP – upland buffer; WM – wet meadow, US – unconsolidated shoreline

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

Project / Site: **WF Charley Creek**	Date: **July 29, 2009**
Applicant / Owner: **MDT / Fort Peck Reservation**	County: **Valley**
Investigator: **PBSJ**	State: **MT**

Do Normal Circumstances exist on the site? **Yes**	Community ID: **Wetland**
Is the site significantly disturbed (Atypical Situation)? **No**	Transect ID: **T-1**
Is the area a potential Problem Area? **No**	Plot ID: **Plot 1**
(If needed, explain on reverse side)	

VEGETATION

Dominant Species	Stratum	Indicator	Dominant Species	Stratum	Indicator
1. *ELE PAL*	Herb	OBL	11.		
2. *HOR JUB*	Herb	FACW	12.		
3. *DIS STR*	Herb	FACW	13.		
4. *AGR ALB*	Herb	FACW	14.		
5.			15.		
6.			16.		
7.			17.		
8.			18.		
9.			19.		
10.			20.		

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-): **4** / **4** = **100**%	FAC Neutral: **3** / **4** = **75**%

Remarks: **Newly formed wetland community in 2008.**

HYDROLOGY

No Recorded Data (Describe in Remarks): **N/A** Stream, Lake, or Tide Gauge **N/A** Aerial Photographs **N/A** Other **Yes** No Recorded Data	Wetland Hydrology Indicators Primary Indicators: **YES** Inundated **YES** Saturated in Upper 12 Inches **YES** Water Marks **YES** Drift Lines **NO** Sediment Deposits **NO** Drainage Patterns in Wetland
Field Observations: Depth of Surface Water = **2-3** (in.) Depth to Free Water in Pit **N/A** ____ (in.) Depth to Saturated Soil **N/A** **0** (in.)	Secondary Indicators (2 or more required): **NO** Oxidized Root Channels in Upper 12 inches **NO** Water-Stained Leaves **NO** Local Soil Survey Data **NO** FAC-Neutral Test **NO** Other (Explain in Remarks)

Remarks: **Inundated to 2-3 inches.**

SOILS

Map Unit Name (Series and Phase): **Aquic ustifluvents, saline**
Map Symbol: **2** Drainage Class: **SPD** Mapped Hydric Inclusion? **No**
Taxonomy (Subgroup): **Aquic ustifluvent** Field Observations confirm Mapped Type? **Yes**

Profile Description

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Color(s) (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
6	B	10 YR 3/1	/ /	N/A N/A	Sandy Clay Loam
		/	/ /	N/A N/A	
		/	/ /	N/A N/A	
		/	/ /	N/A N/A	
		/	/ /	N/A N/A	

Hydric Soil Indicators:

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

Remarks: **Included on list of mapunits containing hydric inclusions.**

WETLAND DETERMINATION

Hydrophytic Vegetation Present? **YES** Wetland Hydrology Present? **YES** Hydric Soils Present? **YES**	Is this Sampling Point within a Wetland? **YES**

Remarks: **Plot taken on Transect 1, about 50 feet from start. Site transitioned to wetland in 2008 and remained wetland in 2009.**

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

Project / Site: **WF Charley Creek**	Date: **July 29, 2009**
Applicant / Owner: **MDT / Fort Peck Reservation**	County: **Valley**
Investigator: **PBSJ**	State: **MT**

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

VEGETATION

Dominant Species	Stratum	Indicator	Dominant Species	Stratum	Indicator
1. *CAR PRA*	Herb	FACW	11.		
2. *JUN BAL*	Herb	OBL	12.		
3. *HOR JUB*	Herb	FACW	13.		
4.			14.		
5.			15.		
6.			16.		
7.			17.		
8.			18.		
9.			19.		
10.			20.		
Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-): **3** / **3** = **100**%			FAC Neutral: **3** / **3** = **100**%		
Remarks: **AGR SMI present, but not dominent.**					

HYDROLOGY

No Recorded Data (Describe in Remarks): **N/A** Stream, Lake, or Tide Gauge **N/A** Aerial Photographs **N/A** Other **Yes** No Recorded Data	Wetland Hydrology Indicators Primary Indicators: **YES** Inundated **YES** Saturated in Upper 12 Inches **YES** Water Marks **YES** Drift Lines **NO** Sediment Deposits **NO** Drainage Patterns in Wetland
Field Observations: Depth of Surface Water = **1** (in.) Depth to Free Water in Pit **N/A** ____ (in.) Depth to Saturated Soil **N/A** **0** (in.)	Secondary Indicators (2 or more required): **NO** Oxidized Root Channels in Upper 12 inches **NO** Water-Stained Leaves **NO** Local Soil Survey Data **YES** FAC-Neutral Test **NO** Other (Explain in Remarks)
Remarks: **Inundated to 1".**	

SOILS

Map Unit Name (Series and Phase): **Aquic ustifluvents, saline**
Map Symbol: **2** Drainage Class: **SPD** Mapped Hydric Inclusion? **No**
Taxonomy (Subgroup): **Aquic ustifluvent** Field Observations confirm Mapped Type? **Yes**

Profile Description

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Color(s) (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
6	B	10 YR 3/1	10 YR 4/6 /	Few N/A	Sandy Clay Loam
		/ 	/ /	N/A N/A	
		/ 	/ /	N/A N/A	
		/ 	/ /	N/A N/A	
		/ 	/ /	N/A N/A	

Hydric Soil Indicators:

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

Remarks: **Included on list of mapunits containing hydric inclusions. Also satisfies NRCS criteria for being frequently flooded for long duration.**

WETLAND DETERMINATION

Hydrophytic Vegetation Present? **YES** Wetland Hydrology Present? **YES** Hydric Soils Present? **YES**	Is this Sampling Point within a Wetland? **YES**

Remarks: **Plot taken on Transect 2, about 20 feet from start.**

MDT MONTANA WETLAND ASSESSMENT FORM (revised March 2008)

1. Project Name: WF Charley Creek Mitigation **2. MDT Project #:** NH 53(24) **3. Control #:** A739

3. Evaluation Date: 7/29/2009 **4. Evaluator(s):** Berglund **5. Wetland/Site #(s):** WF Charley Creek

6. Wetland Location(s): Township 27 N, Range 43 E, Section 1; Township ___ N, Range ___ E, Section _____

Approximate Stationing or Roadposts: 4.5 miles north of U.S. Highway 2 - 5 miles NW of Frazer.

Watershed: 11 - Milk **County:** _ _ Valley _____

7. Evaluating Agency: MDT

Purpose of Evaluation:

- ☐ **Wetland potentially affected by MDT project**
- ☐ **Mitigation wetlands; pre-construction**
- ☒ **Mitigation wetlands; post-construction**
- ☐ **Other** _____

8. Wetland Size (acre): _____ (visually estimated)
1.73 (measured, e.g. GPS)

9. Assessment Area (AA) Size (acre): _____ (visually estimated)
(see manual for determining AA) 6.92 (measured, e.g. GPS)

10. CLASSIFICATION OF WETLAND AND AQUATIC HABITATS IN AA (See manual for definitions.)

HGM Class (Brinson)	Class (Cowardin)	Modifier (Cowardin)	Water Regime	% OF AA
Depressional	Emergent Wetland	Impounded	Seasonal / Intermittent	25
Depressional	Unconsolidated Bottom	Impounded	Permanent / Perennial	75

Comments: _____

11. ESTIMATED RELATIVE ABUNDANCE (of similarly classified sites within the same Major Montana Watershed Basin; see manual.)
common

12. GENERAL CONDITION OF AA

i. Disturbance: Use matrix below to select the appropriate response; see manual for Montana listed noxious weed and aquatic nuisance vegetation species lists.

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

Comments (types of disturbance, intensity, season, etc.)**:** Site is subject to grazing

ii. Prominent noxious, aquatic nuisance, and other exotic vegetation species: AGR CRI

iii. Provide brief descriptive summary of AA and surrounding land use/habitat: Large impounded emergent marsh; AA only includes those wetlands within the conservation easement boundary, although minor pre-existing wetlands occur to north and east. Surrounding use is agricultural.

13. STRUCTURAL DIVERSITY (Based on number of "Cowardin" ***vegetated*** classes present [do not include unvegetated classes]; see #10 above.)

Existing # of "Cowardin" Vegetated Classes in AA	Initial Rating	Is current management preventing (passive) existence of additional vegetated classes?		Modified Rating
≥3 (or 2 if one is forested) classes	---	NA	NA	NA
2 (or 1 if forested) classes	---	NA	NA	NA
1 class, but not a monoculture	mod	←NO	YES→	---
1 class, monoculture (1 species comprises ≥90% of total cover)	---	NA	NA	NA

Comments: _____

Wetland/Site #(s): WF Charley Creek

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

i. AA is Documented (D) or Suspected (S) to contain: Check box based on definitions in manual.

Primary or critical habitat (**list species**)	☐ D ☐ S	_____
Secondary habitat (**list species**)	☐ D ☐ S	_____
Incidental habitat (**list species**)	☐ D ☒ S	Whooping Crane
No usable habitat	☐ S	

ii. Rating: Based on the strongest habitat chosen in 14A(i) above, select the corresponding functional point and rating.

Highest Habitat Level	Doc/Primary	Sus/Primary	Doc/Secondary	Sus/Secondary	Doc/Incidental	Sus/Incidental	None
Functional Point/Rating	---	---	---	---	---	.1L	---

Sources for documented use (e.g. observations, records): _____

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

i. AA is Documented (D) or Suspected (S) to contain: Check box based on definitions in manual.

Primary or critical habitat (**list species**)	☐ D ☐ S	_____
Secondary habitat (**list species**)	☒ D ☐ S	Northern Leopard Frog
Incidental habitat (**list species**)	☐ D ☐ S	_____
No usable habitat	☐ S	

ii. Rating: Based on the strongest habitat chosen in 14A(i) above, select the corresponding functional point and rating.

Highest Habitat Level	Doc/Primary	Sus/Primary	Doc/Secondary	Sus/Secondary	Doc/Incidental	Sus/Incidental	None
S1 Species Functional Point/Rating	---	---	.7M	---	---	---	---
S2 and S3 Species Functional Point/Rating	---	---	---	---	---	---	---

Sources for documented use (e.g. observations, records): Several leopard frogs observed at site in 2007 and 2008

14C. GENERAL WILDLIFE HABITAT RATING

i. Evidence of Overall Wildlife Use in the AA: Check substantial, moderate, or low based on supporting evidence.

☐ ***Substantial:*** Based on any of the following [check].
- ☐ observations of abundant wildlife #s or high species diversity (during any period)
- ☐ abundant wildlife sign such as scat, tracks, nest structures, game trails, etc.
- ☐ presence of extremely limiting habitat features not available in the surrounding area
- ☐ interview with local biologist with knowledge of the AA

☐ ***Minimal:*** Based on any of the following [check].
- ☐ few or no wildlife observations during peak use periods
- ☐ little to no wildlife sign
- ☐ sparse adjacent upland food sources
- ☐ interview with local biologist with knowledge of AA

☒ ***Moderate:*** Based on any of the following [check].
- ☒ observations of scattered wildlife groups or individuals or relatively few species during peak periods
- ☒ common occurrence of wildlife sign such as scat, tracks, nest structures, game trails, etc.
- ☐ adequate adjacent upland food sources
- ☐ interview with local biologist with knowledge of the AA

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

Structural Diversity (see #13)	☐ **High**								☒ **Moderate**								☐ **Low**			
Class Cover Distribution (all vegetated classes)	☐ **Even**				☐ **Uneven**				☒ **Even**				☐ **Uneven**				☐ **Even**			
Duration of Surface Water in ≥ 10% of AA	**P/P**	**S/I**	**T/E**	**A**	**P/P**	**S/I**	**T/E**	**A**	**P/P**	**S/I**	**T/E**	**A**	**P/P**	**S/I**	**T/E**	**A**	**P/P**	**S/I**	**T/E**	**A**
☐ **Low Disturbance** at AA (see #12i)	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
☒ **Moderate Disturbance** at AA (see #12i)	---	---	---	---	---	---	---	---	H	---	---	---	---	---	---	---	---	---	---	---
☐ **High Disturbance** at AA (see #12i)	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

iii. Rating: Use the conclusions from i and ii above and the matrix below to select the functional point and rating.

Evidence of Wildlife Use (i)	**Wildlife Habitat Features Rating (ii)**			
	☐ **Exceptional**	☒ **High**	☐ **Moderate**	☐ **Low**
☐ **Substantial**	---	---	---	---
☒ **Moderate**	---	.7M	---	---
☐ **Minimal**	---	---	---	---

Comments: Scattered waterfowl and shorebirds observed.

Wetland/Site #(s): WF Charley Creek

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

If the AA is not used by fish, fish use is not restorable due to habitat constraints, or is not desired from a management perspective [such as fish entrapped in a canal], then check the NA box and proceed to 14E.

Assess this function if the AA is used by fish or the existing situation is "correctable" such that the AA could be used by fish [i.e., fish use is precluded by perched culvert or other barrier].

Type of Fishery: ☐ Cold Water (**CW**) ☐ Warm Water (**WW**) **Use the CW or WW guidelines in the manual to complete the matrix.**

i. Habitat Quality and Known / Suspected Fish Species in AA: Use matrix to select the functional point and rating.

Duration of Surface Water in AA	☐ **Permanent / Perennial**						☐ **Seasonal / Intermittent**						☐ **Temporary / Ephemeral**					
Aquatic Hiding / Resting / Escape Cover	☐ **Optimal**		☐ **Adequate**		☐ **Poor**		☐ **Optimal**		☐ **Adequate**		☐ **Poor**		☐ **Optimal**		☐ **Adequate**		☐ **Poor**	
Thermal Cover: optimal / suboptimal	**O**	**S**	**O**	**S**	**O**	**S**	**O**	**S**	**O**	**S**	**O**	**S**	**O**	**S**	**O**	**S**	**O**	**S**
FWP Tier I fish species	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
FWP Tier II or **Native Game** fish species	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
FWP Tier III or **Introduced Game** fish	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
FWP Non-Game Tier IV or **No** fish species	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Sources used for identifying fish spp. potentially found in AA: small unidentified fish in impoundment, but site not managed for fish

ii. Modified Rating: NOTE: Modified score cannot exceed 1.0 or be less than 0.1.

a) Is fish use of the AA significantly reduced by a culvert, dike, or other man-made structure or activity, ***or*** *is the waterbody included on the current final MDEQ list of waterbodies in need of TMDL development with listed "Probable Impaired Uses" including cold or warm water fishery or aquatic life support,* ***or*** *do aquatic nuisance plant or animal species (see* ***Appendix E****) occur in fish habitat?* ☐ **YES**, reduce score in **i** by 0.1 = __ or ☐ **N0**

b) Does the AA contain a documented spawning area or other critical habitat feature (i.e., sanctuary pool, upwelling area; specify in comments) for native fish or introduced game fish? ☐ **YES**, add to score in **i** or **iia** 0.1 = __ or ☐ **N0**

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

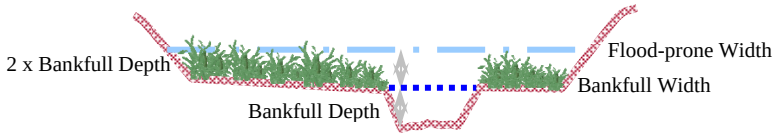
14E. FLOOD ATTENUATION ☐ **NA** (proceed to 14F)

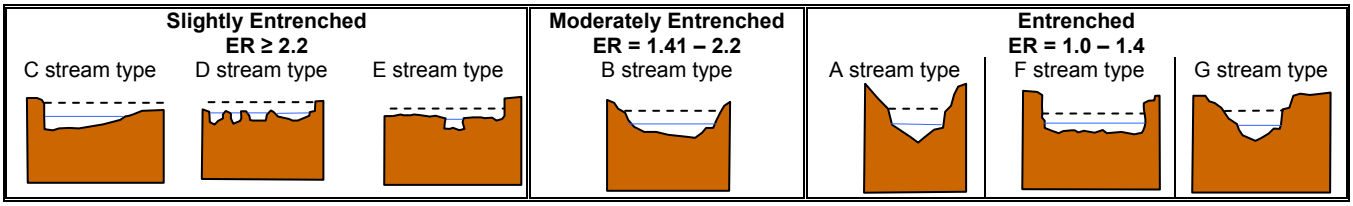
Applies only to wetlands that are subject to flooding via in-channel or overbank flow.
If wetlands in AA are not flooded from in-channel or overbank flow, check the NA box and proceed to 14F.

Entrenchment Ratio (ER) Estimation (see manual for additional guidance). Entrenchment ratio = (flood-prone width) / (bankfull width).
Flood-prone width = estimated horizontal projection of where 2 X maximum bankfull depth elevation intersects the floodplain on each side of the stream.

_____ / _____ = _____

flood prone width / bankfull width = entrenchment ratio





i. Rating: Working from top to bottom, use the matrix below to select the functional point and rating.

Estimated or Calculated Entrenchment (Rosgen 1994, 1996)	☒ Slightly Entrenched C, D, E stream types			☐ Moderately Entrenched B stream type			☐ Entrenched A, F, G stream types		
Percent of Flooded Wetland Classified as Forested and/or Scrub/Shrub	☐ 75%	☐ 25-75%	☒ <25%	☐ 75%	☐ 25-75%	☐ <25%	☐ 75%	☐ 25-75%	☐ <25%
AA contains **no outlet or restricted outlet**	---	---	.6M	---	---	---	---	---	---
AA contains **unrestricted outlet**	---	---	---	---	---	---	---	---	---

ii. Are ≥10 acres of wetland in the AA subject to flooding AND are man-made features which may be significantly damaged by floods located within 0.5 mile downstream of the AA? ☐ YES ☒ NO **Comments:** _____

Wetland/Site #(s): WF Charley Creek

14F. SHORT AND LONG TERM SURFACE WATER STORAGE ☐ **NA** (proceed to 14G)

Applies to wetlands that flood or pond from overbank or in-channel flow, precipitation, upland surface flow, or groundwater flow.
If no wetlands in the AA are subject to flooding or ponding, then check the NA box and proceed to 14G.

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

Estimated Maximum Acre Feet of Water Contained in Wetlands within the AA that are Subject to Periodic Flooding or Ponding	☐ **>5 acre feet**			☒ **1.1 to 5 acre feet**			☐ **≤1 acre foot**		
Duration of Surface Water at Wetlands within the AA	☐ **P/P**	☐ **S/I**	☐ **T/E**	☐ **P/P**	☒ **S/I**	☐ **T/E**	☐ **P/P**	☐ **S/I**	☐ **T/E**
Wetlands in AA flood or pond **≥ 5 out of 10 years**	---	---	---	---	.6M	---	---	---	---
Wetlands in AA flood or pond **< 5 out of 10 years**	---	---	---	---	---	---	---	---	---

Comments: _____

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

Applies to wetland with potential to receive sediments, nutrients, or toxicants through influx of surface or ground water or direct input.
If no wetlands in the AA are subject to such input, check the NA box and proceed to 14H.

i. Rating: Working from top to bottom, use the matrix below to select the functional point and rating.

Sediment, Nutrient, and Toxicant Input Levels within AA	**AA receives or surrounding land use has potential to deliver sediments, nutrients, or compounds at levels such that other functions are not substantially impaired. Minor sedimentation, sources of nutrients or toxicants, or signs of eutrophication present.**				**Waterbody is on MDEQ list of waterbodies in need of TMDL development for "probable causes" related to sediment, nutrients, or toxicants or AA receives or surrounding land use has potential to deliver high levels of sediments, nutrients, or compounds such that other functions are substantially impaired. Major sedimentation, sources of nutrients or toxicants, or signs of eutrophication present.**			
% Cover of Wetland Vegetation in AA	☐ **≥ 70%**		☒ **< 70%**		☐ **≥ 70%**		☐ **< 70%**	
Evidence of Flooding / Ponding in AA	☐ **Yes**	☐ **No**	☒ **Yes**	☐ **No**	☐ **Yes**	☐ **No**	☐ **Yes**	☐ **No**
AA contains **no or restricted outlet**	---	---	.7M	---	---	---	---	---
AA contains **unrestricted outlet**	---	---	---	---	---	---	---	---

Comments: Site treats agricultural runoff.

14H. SEDIMENT / SHORELINE STABILIZATION ☐ **NA** (proceed to 14I)

Applies only if AA occurs on or within the banks of a river, stream, or other natural or man-made drainage, or on the shoreline of a standing water body which is subject to wave action.
If 14H does not apply, check the NA box and proceed to 14I.

% Cover of Wetland Streambank or Shoreline by Species with Stability Ratings of ≥6 (see Appendix F).	**Duration of Surface Water Adjacent to Rooted Vegetation**		
	☒ **Permanent / Perennial**	☐ **Seasonal / Intermittent**	☐ **Temporary / Ephemeral**
☐ **≥ 65%**	---	---	---
☐ **35-64%**	---	---	---
☒ **< 35%**	.3L	---	---

Comments: Subject to wave action.

14I. PRODUCTION EXPORT / FOOD CHAIN SUPPORT

i. Level of Biological Activity: Synthesis of wildlife and fish habitat rates (select).

General Fish Habitat Rating (14Diii)	**General Wildlife Habitat Rating (14Ciii)**		
	☐ **E/H**	☒ **M**	☐ **L**
☐ **E/H**	---	---	---
☐ **M**	---	---	---
☐ **L**	---	---	---
☒ **NA**	---	M	---

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

A	☐ **Vegetated Component >5 acres**						☒ **Vegetated Component 1-5 acres**						☐ **Vegetated Component <1 acre**					
B	☐ **High**		☐ **Moderate**		☐ **Low**		☐ **High**		☒ **Moderate**		☐ **Low**		☐ **High**		☐ **Moderate**		☐ **Low**	
C	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**
P/P	---	---	---	---	---	---	---	---	.7M	---	---	---	---	---	---	---	---	---
S/I	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
T/E/A	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Wetland/Site #(s): WF Charley Creek

14I. PRODUCTION EXPORT / FOOD CHAIN SUPPORT (continued)

iii. Modified Rating: Note: Modified score cannot exceed 1.0 or be less than 0.1.

Vegetated Upland Buffer: Area with ≥ 30% plant cover, ≤ 15% noxious weed or ANVS cover, AND that is not subjected to periodic mechanical mowing or clearing (unless for weed control).
Is there an average ≥ 50-foot wide vegetated upland buffer around ≥ 75% of the AA's perimeter? ☒ **YES**, add 0.1 to score in **ii** = 0.80 ☐ **NO**

iv. Final Score and Rating: .8H **Comments:** _____

14J. GROUNDWATER DISCHARGE / RECHARGE
Check the appropriate indicators in i and ii below.

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

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: See comments

iii. Rating: Use the information from i and ii above and the table below to select the functional point and rating.

Criteria	Duration of Saturation at AA Wetlands ***FROM GROUNDWATER DISCHARGE*** or ***WITH WATER THAT IS RECHARGING THE GROUNDWATER SYSTEM***			
	☐ **P/P**	☒ **S/I**	☐ **T**	☐ **None**
☒ **Groundwater Discharge or Recharge**	---	.7M	---	---
☐ **Insufficient Data/Information**	---			

Comments: Suspect that there is minor groundwater recharge component, as well as discharge in association with the feeder drainage.

14K. UNIQUENESS

i. Rating: Working from top to bottom, use the matrix below to select the functional point and rating.

Replacement Potential	**AA contains fen, bog, warm springs or mature (>80 yr-old) forested wetland** OR **plant association listed as "S1" by the MTNHP**			**AA does not contain previously cited rare types** AND **structural diversity (#13) is high** OR **contains plant association listed as "S2" by the MTNHP**			**AA does not contain previously cited rare types** OR **associations** AND **structural diversity (#13) is low-moderate**		
Estimated Relative Abundance (#11)	☐ Rare	☐ Common	☐ Abundant	☐ Rare	☐ Common	☐ Abundant	☐ Rare	☒ Common	☐ Abundant
☐ **Low Disturbance** at AA (#12i)	---	---	---	---	---	---	---	---	---
☒ **Moderate Disturbance** at AA (#12i)	---	---	---	---	---	---	---	.3L	---
☐ **High Disturbance** at AA (#12i)	---	---	---	---	---	---	---	---	---

Comments: _____

14L. RECREATION / EDUCATION POTENTIAL ☐ NA (proceed to Overall Summary and Rating page)
Affords 'bonus' points if AA provides a recreational or educational opportunity.

i. Is the AA a known or potential recreational or educational site? ☒ **YES**, go to ii. ☐ **NO**, check the NA box.

ii. Check categories that apply to the AA: ☒ Educational/Scientific Study ☒ Consumptive Recreational ☐ Non-consumptive recreational
☐ Other: _____

iii. Rating: Use the matrix below to select the functional point and rating.

Known or Potential Recreational or Educational Area	Known	Potential
Public ownership or public easement with general public access (no permission required)	---	---
Private ownership with general public access (no permission required)	---	---
Private or public ownership without general public access, or requiring permission for public access	---	.05L

Comments: Site controlled by lessee; permission to access is required. Site close to Frazer.

15. GENERAL SITE NOTES: _____

Wetland/Site #(s): WF Charley Creek

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	low 0.10	1.00		
B. MT Natural Heritage Program Species Habitat	mod 0.70	1.00		
C. General Wildlife Habitat	mod 0.70	1.00		*
D. General Fish Habitat	NA	NA		
E. Flood Attenuation	mod 0.60	1.00		
F. Short and Long Term Surface Water Storage	mod 0.60	1.00		*
G. Sediment / Nutrient / Toxicant Removal	mod 0.70	1.00		*
H. Sediment / Shoreline Stabilization	low 0.30	1.00		
I. Production Export / Food Chain Support	high 0.80	1.00		*
J. Groundwater Discharge / Recharge	mod 0.70	1.00		
K. Uniqueness	low 0.30	1.00		
L. Recreation / Education Potential (bonus point)	low 0.05			
Total Points	**5.55**	**10**	**Total Functional Units**	
Percent of Possible Score 56% (round to nearest whole number)				

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

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

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

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

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

☐ **I** ☐ **II** ☒ **III** ☐ **IV**

Appendix C

2009 REPRESENTATIVE PHOTOGRAPHS

MDT Wetland Mitigation Monitoring
West Fork Charley Creek
Frazer, Montana

WEST FORK CHARLEY CREEK WETLAND MITIGATION SITE 2009



Photo Point 1: Facing southeast.



Photo Point 1: Facing northwest.



Photo Point 2: Facing north / northeast across the dike structure.



Photo Point 2: Facing northeast across the dike structure.



Photo Point 3: Facing east / southeast.



Photo Point 3: Facing northeast.



Photo Point 4: Facing north.



Photo Point 5: Facing southeast.



Transect 1 from start; facing northeast.



Transect 1 from end; facing southwest.



Transect 2 from start; facing east / northeast.



Transect 2 from end; facing west / southwest.

Appendix D

PRELIMINARY FIELD REVIEW REPORT

MDT Wetland Mitigation Monitoring
West Fork Charley Creek
Frazer, Montana

MASTER FILE
COPY

Montana Department of Transportation
Helena, Montana 59620-1001

Memorandum

To: Carl S. Peil, P.E.
Preconstruction Engineer

From: Ronald E. Williams, P.E. REW
Road Design Engineer

Date: November 18, 1999

Subject: Wetland Mitigation Frazer - E&W Wet. Mit.
West Fork Charley Creek - 8 km NW of Frazer E&W - wet Mit.
Control No. **** A739
Project Work Type - 510
NH 53(24)
PE & other

We request that you approve the Preliminary Field Review Report for the subject project.

Approved: _____ Date 11/22/99
Carl S. Peil, P.E.
Preconstruction Engineer

We request comments from the individuals on the distribution below who have received a copy of the report. We will assume their concurrence if no comments are received by November 30, 1999.

Distribution: (all with attachment)

C. S. Peil	J. M. Marshik
R. E. Williams	T. E. Martin
D. R. McIntyre	B. F. Juvan
D. P. Dusek	P. A. Jomini
W. L. McChesney	J. P. Kolman
R. D. Tholt	R. E. Fischer
K. H. Neumiller	J. J. Moran
J. A. Walther	P. Saindon
B. A. Larsen	FHWA (HOP-MT)

cc: D. W. Jensen, w/attachment
File, w/attachment

Preliminary Field Review & Scope of Work Report

A field review of the subject project was held on June 10, 1999 with the following people in attendance:

W. L. McChesney	District Administator	Glendive
R. E. Mengel	Engineering Services Suprv	Glendive
L. Sickerson	MDT Biologist	Helena
J. Gappa	Geotechnical Section	Helena
P. R. Ferry	Road Design Section	Helena
J. Gutowsky	Road Design Section	Helena
J. S. Michel	Hydraulics Section	Helena

Introduction

As the result of wetland impacts associated with the Frazer - East & West project (NH 1-9(30)565, Control No. 1739), we are proposing that a wetland be constructed to mitigate these impacts. We anticipate that the proposed development at this site will result in the creation of approximately 1.62 hectares of wetland. The wetland area will be fenced to facilitate the establishment of a grazing management plan. A grazing management plan will vastly improve the wildlife and vegetative communities surrounding the wetland as well as in the wetland area.

The project will be designed in the Helena Office. We recommend that the project be ready to submit to the Contract Plans Section in January 2000, as we would like to have it constructed in the 2000 construction season.

Project Location and Limits

The wetland site is located on the West Fork Charley Creek in Valley County approximately 8 km northwest of the town of Frazer. The site is located on the Fort Peck Indian Reservation; Township 27 North, Range 43 East, Section 1, SW ¼, NE ¼. The site is shown on the attached county map.

Site Description

The wetland mitigation site is located on the channel of the West Fork of Charley Creek. Our feasibility study has shown that this site has the hydrologic characteristics and enough suitable earthen fill material to develop a shallow emergent wetland. The terrain surrounding the site consists of gently rolling prairie with numerous intermittent and ephemeral drainages.

This site is located within a tribal grazing allotment on a parcel of land that is owned entirely by the Fort Peck Tribes. The Fort Peck Tribes placed a prerequisite on the MDT that the mitigation site be located on tribal land.

Construction

The Fort Peck Assiniboine & Sioux Tribes have expressed the idea that they would like to construct the wetland. They have indicated that they will make a concerted attempt to be given the contract rather than have it go through the competitive bidding process.

To give this proposal due consideration we have to resolve the following issues:

1. If the Fort Peck Tribes are given the contract without a competitive bidding process will the FHWA participate in the project costs?

2. If the Fort Peck Tribes construct the wetland, will the Department perform the construction inspection?

3. If the Fort Peck Tribes construct the wetland, will the payments be progress payments or a lump sum based on the Engineer's estimate?

We are requesting comments on these issues.

Major Design Issues

Site Design

An embankment will be constructed across the West Fork Charley Creek channel to retain runoff and create a shallow emergent wetland. An earthen spillway, lined with a geotextile, will be designed and constructed to convey excess runoff and large flood events that exceed the capacity of the wetland area and the embankment. A diversion structure will be designed and constructed perpendicular to and at the west end of the embankment to direct water conveyed by the spillway away from the downstream face of the dike. This diversion structure is needed to prevent the downstream face of the embankment from becoming saturated and eroded by the flows carried by the spillway. The diversion structure will provide an added measure of security, helping the project meet its 50-year design life.

The embankment will be constructed with a 3 m top width and have 3H:1V side slopes. The height of the embankment will vary with the terrain, but will have a maximum height of approximately 4.0 m. It will provide 2.0 m of freeboard at the full pool elevation. The dike will be approximately 73 m long.

The key will be 2.8 m deep to ensure that it extends into an impervious clay layer that will limit water from migrating under the dike. The key will have a 2.4 m bottom width. It will utilize 1½H:1V side slopes and will extend the length of the dike.

The diversion structure is located on the west end of the embankment. It will extend approximately 12 m upstream from the face of the dike. It will have a 1 m top, with a 3H:1V side slope on the spillway side and a 2H:1V side slope on the reservoir side.

The embankment, the key and the diversion structure will be constructed of compacted A-7-6 material. The material is available from two borrow areas immediately adjacent to the site. The sites have at least 2 m of overburden before reaching the suitable material.

The spillway will be 15 m wide and have a 6H:1V back slope. It will outfall approximately 75 m downstream from the dike. The Geotechnical Section has recommended that the spillway be subexcavated 125 mm below plan depth. A geotextile should be placed and the 125 mm depth should be backfilled and compacted to provide a relatively impervious surface for the spillway.

Hydrology/Hydraulics

A spillway will be designed and constructed to convey the excess runoff and large flood events that exceed the capacity of the wetland area. No additional conveyance structures are included in the reservoir facility. No other drainage features should be affected by the project.

Environmental Services and the Hydraulics Section have determined that West Fork Charley Creek watershed will provide the water necessary to create a shallow emergent wetland. Feasibility studies have revealed several similar projects in the vicinity of this site. Many of these

projects provide a greater retention capacity than the proposed project and are located on smaller watersheds.

Grading

Approximately 1500 cubic meters of excavation will be needed for the construction of the spill way and key. This material will have to be disposed off site since it is not suitable for the construction of the dike and key.

In addition to the excavation for the spill way and key, the entire base area from the downstream toe of the dike to a point 20 m upstream from the upstream toe of the dike and the base area of the diversion structure should be cleared of all vegetation, rototilled or disked to a depth of 0.25 m and compacted. This work will help to reduce the amount of subsurface infiltration through the dike. This work will be paid as Clearing and Grubbing.

The construction of the dike, diversion structure and key will be constructed of special borrow meeting the requirements of A-7-6 material of the AASHTO Soils classification. The material will be placed in 200 mm lifts and will be compacted to at least 95% of maximum density.

Topsoil & Seeding

All constructed faces on the embankment and diversion structure will be topsoiled and seeded. On the upstream face of the embankment, the topsoil will only be placed from the top of the embankment to the average high water elevation (approximately 3 m below the top of the embankment). A natural fiber mat will also be placed on the upstream face of the embankment to protect it from wave action until vegetation is established.

Geotechnical Considerations

The Geotechnical Section performed an investigation of the site. They determined that the soils in the vicinity are impervious enough to impound water. They also located borrow areas near the site that could provide the A-7-6 material for the construction of the dike and key. Approximately 4 m of overburden at the first site and 2.2 m of overburden at the second site must be removed to reach the material that meets the criteria necessary to construct the embankment. Despite the amount of overburden that must be removed to get to the A-7-6 material, we believe it will

be more cost effective to obtain the material on-site than it would be to haul it from a different source.

Right-of-Way

The site is located on property owned and governed by the Fort Peck Tribes. We will secure an easement and a project specific agreement with the Fort Peck Assiniboine and Sioux Tribes for the wetland site. Although a perpetual easement is preferred, a minimum of 30 years may be an acceptable duration. The easement should be negotiated for the longest time period that the Fort Peck Tribes will accept.

The project will have no utility or railroad involvement.

Environmental Considerations

An appropriate environmental document will be prepared for the project. The project should have minimal impacts to the environment, due to the limited nature of the work. The project should have no 4(f) involvement or 6(f) involvement even where pipes may be replaced, since all work will be in a previously disturbed area. A cultural resource survey has been completed. No sites were discovered that are eligible for the NRHP.

A hazardous waste review will not be needed.

A seed mixture will be prepared by the MDT Agronomist.

The effect of the project on any threatened or endangered species will be assessed and documented in the Biological Resources report. The project will affect less than 0.04 hectares of existing wetland.

Field Survey

A conventional field survey has been conducted for the project. Additional survey will not be necessary. The Geotechnical Section has conducted the geotechnical review and soils survey for the area.

Since an easement will be needed for the wetland, a section corner survey will be needed.

Management and Maintenance

Representatives of the Department will review the site annually for the first 5 years after development. Maintenance and management of the wetland site will be the responsibility of the Fort Peck Tribes for the duration of

the easement period. The maintenance guidelines will be included in the terms of the easement and the Project Specific Agreement.

Public Involvement

A news release will be submitted if the project is let to contract through the normal bidding process. If the Fort Peck Tribes are going to perform the construction, a news release will not be necessary. Because of the negligible effect of the project on adjacent landowners and the traveling public no other public involvement is needed.

The development of the wetland will be closely coordinated with the Fort Peck Tribes through the approval process for the PSA and the securing of the easement.

Cost Estimate

The estimated cost to construct this project is $100,000 including mobilization. The cost of Construction Engineering is not included in this estimate. The estimate has not been adjusted for inflation because we anticipate that it will be let to contract in this fiscal year.

REW.pf

Attachment

Appendix E

BIRD SURVEY PROTOCOL
GPS PROTOCOL

MDT Wetland Mitigation Monitoring
West Fork Charley Creek
Frazer, Montana

BIRD SURVEY PROTOCOL

This protocol was developed by the Montana Department of Transportation (MDT) to monitor bird use within their Wetland Mitigation Sites. Though each wetland mitigation site is vastly different, the bird survey data collection methods were standardized to order to increase repeatability. The protocol uses an "area search within a restricted time frame" to collect data on bird species, density, behavior, and habitat-type use.

Survey Area

Sites that can be entirely walked: Sites where the entire perimeter or area can be walked include, but are not limited to: small ponds, enhanced historic river channels, and wet meadows. If the wetland is not uncomfortably inundated, walk several meandering transects to sufficiently cover the wetland. Meandering transects can be used, even if a small portion of the area is inaccessible (e.g. cannot cross due to inundation). Use binoculars to identify the bird species, to count the number of individuals, and to identify their behavior and habitat type. Data can be recorded directly onto the bird survey form or into a field notebook. The number of meandering transects and their direction (or location) should be recorded in the field notebook and/or drawn onto the aerial photograph or topographic map. Meandering transects are not formal and should not be staked. Each site should be walked and surveyed to the fullest extent within the set time limit.

Sites than cannot be entirely walked: Sites where the entire perimeter or area cannot be walked include, but are not limited to: very large sites (i.e. perimeter of 2-3 miles), and large-bodied waters (i.e. reservoirs), where deep water habitat (> 6 feet) is close to shore. For large-bodied waters where only one area was graded to create or enhance the development of wetland, bird surveys should be walked along meandering transects within or around the graded area (see above.). For sites that cannot be walked, bird surveys should be conducted from many lookout posts, established at key vantage points. The general location of lookout posts should be recorded in the field notebook or drawn onto the aerial photograph or topographic map. Lookout post locations do not need to be staked. Both binoculars and spotting scopes may be used in order to accurately identify and count the birds. Depending upon the size of the open water, more time may be spent viewing the mitigation area from lookout posts than is spent traveling between posts.

Survey Time

Ideally, bird surveys should be conducted in the morning hours when bird activity is often greatest (i.e. sunrise to no later than 11:00 am). Surveys can be completed before 11am if all transects have been walked or all lookout posts have been viewed with no new bird activity observed. For some sites bird surveys may need to be performed in the late afternoon or evening due to traveling constraints or weather. The overall limiting time factor will be the number of budgeted hours for the project.

Data Recording

Bird Species List: Record each bird species observed onto the Bird Survey-Field Data Sheet (or field notebook). Record the bird's common name using the appropriate 4-letter code. The 4-letter code uses the first two letters of the first two word's of the bird's common name or if one name, the first four letters. For example, Mourning Dove is coded as MODO while Mallard is coded as MALL. If an unknown individual is observed, use the 4-letter protocol, but define your

abbreviation at the bottom of the field data sheet. For example, unknown shorebird is UNSB; unknown brown bird is UNBR; unknown warbler is UNWA; and unknown waterfowl is UNWF. For a flyover of a flock of unknown species, use a term that describes the birds' general characteristics and include the approximate flock size in parenthesis; do not fill in the habitat column. For example, a flock of black, medium-sized birds could be coded as UNBB / FO (25).

Bird Density: For each observation record the actual or estimated number of individuals observed per species and per behavior. Totals can be tallied in the office and entered onto the Bird Survey-Field Data Sheet.

Bird Behavior: Bird behavior must be identified by what is known. When a species is observed, the behavior that is immediately exhibited is recorded. Only behaviors that have discreet descriptive terms should be used. The following terms are recommended: breeding pair (BP); foraging (F); flyover (FO); loafing (L), which is defined as sleeping, roosting, or floating with head tucked under wing; and nesting (N). If other behaviors that have a specific descriptive word are observed then it can be used and should later be added to the protocol. Descriptive words or phrases such as "migrating" or "living on site" are unknown behaviors.

Bird Species Habitat Use: When a species is observed, the habitat is also recorded. The following broad habitat categories are used:

- aquatic bed (AB), defined as rooted-floating, floating-leaved, or submergent vegetation.
- marsh (MA), defined as emergent (e.g. cattail, bulrush) vegetation with surface water.
- wet meadow (WM), defined as grasses, sedges, or rushes with little to no surface water.
- scrub-shrub (SS), defined as shrub covered wetland.
- forested (FO), defined as tree covered wetland.
- open water (OW), defined as unvegetated surface water.
- upland (UP), defined as the upland buffer.

Other categories can be used and defined on the data sheet and should later be added to the protocol.

Other Fields

Bird Visit: Each bird survey (i.e. spring, fall, and mid-season) should be completed on separate Bird Survey-Field Data Sheets.

Time: Record the start time and end time on the Bird Survey-Field Data Sheet.

Date: Record the date of the bird survey.

Weather: Record the weather conditions (i.e. temperature, wind, condition).

Notes: Note if a particular individual bird is using a constructed nest box and note the condition of constructed nest box(es). Also record any comments about the site, wildlife, wetland conditions, etc.

GPS MAPPING AND AERIAL PHOTO REFERENCING PROCEDURE

From 2001 through 2006, PBS&J mapped the vegetation community boundaries, photograph points, and other sampling locations in the field using the resource-grade Trimble GEO III GPS (Global Positioning System) unit. The data were collected with a minimum of three positions per feature using Course/Acquisition code. The collected data were then transferred to a personal computer (PC) and differentially corrected to the nearest operating Community Base Station. The corrected data were then exported to ACAD drawings in Montana State Plain Coordinates NAD 83 international feet. The Trimble GEO III GPS unit was also used for some sites in 2007.

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

In 2007 and 2008 sites were mapped using the resource-grade Magellan MobileMapper Office GPS unit. The Magellan GPS unit has a comparable accuracy level to the Trimble Geo III unit.

Each year, MDT photographs each mitigation site from the air. These aerial photographs are not geo-referenced, but serve as a visual aid to map wetland development and vegetation communities, and to show approximate locations for various monitoring activities (i.e. photograph points, transects, or macroinvertebrate sampling). Reference points that are observable on the aerial photo (i.e. road, stream channel, or fence) were also marked with the GPS unit in order to better position the aerial photograph. This positioning did not remove any of the distortion inherent to all photos. All mapped features and community boundaries were reviewed by the wetland biologist, to increase the figure's accuracy.

Any relationship of features located to easement or property lines are not to be construed from these figures. These relationships can only be determined with a survey by a licensed surveyor.

Appendix F

2009 MACROINVERTEBRATE SAMPLING PROTOCOL AND DATA

MDT Wetland Mitigation Monitoring
West Fork Charley Creek
Frazer, Montana

AQUATIC INVERTEBRATE SAMPLING PROTOCOL

Equipment List

- D-frame sampling net with 1 mm mesh.
- 1-liter, wide-mouth, plastic sample jars provided by Rhithron Associates, Inc. (Quart sized, wide-mouthed canning jars can be substituted.)
- 95% ethanol (alternatively isopropyl alcohol).
- Pre-printed sample labels (printed on rite-in-the-rain paper); two labels per sample.
- Pencil.
- Clear packaging tape.
- 3-5 gallon plastic pail.
- Large tea strainer or framed screen.
- Cooler with ice for storing sample.

Site Selection

Select a site that is accessible with hip waders or rubber boots. If the substrate is too soft, place a wide board down to walk on. Choose a site that is representative of the overall condition of the wetland. Annual sampling should occur at the same site within the wetland.

Sampling Procedure

Wetland invertebrates (macroinvertebrates) inhabit the substrate, the water column, the stems and leaves of aquatic vegetation, and the water surface. At the given location, each habitat type is sampled and combined into a single 1-liter sample jar. Pre-cautions are made to minimize disturbing the sample site in order to maximize the number of animals collected.

Fill the pail with approximately 1 gallon of wetland water. Ideally, sample the water column from near-shore outward to a depth of 3 feet. Sample the water column using a long sweep of the net, keeping the net at about half the depth of the water. Sample the water surface with a long sweep of the net. Aquatic vegetation is sampled by pulling the net beneath the water surface, for at least a meter in distance. The substrate is sampled by pulling the net along the bottom, bumping it against the substrate several times as you pull. Be sure to place some muck, mud, and/or vegetation into the jar. After sampling a habitat, rinse the net in the bucket and look for insects, crustaceans, and other aquatic invertebrates. It is not necessary to sample habitats in any specific order, but all habitats, if present, are to be sampled. Habitats can be sampled more than once.

Fill about 1 cup of ethanol into the sample jar. Sieve the contents of the bucket through the straining device and pour or carefully scrape the contents of the strainer into the sample jar. Top off the jar with enough ethanol to cover all the material and leave as little headroom as possible. Alternatively, sampled materials can be lifted out of the net and put directly into the jar. Be sure to include some muck, mud, and/or vegetation into the jar. Each macroinvertebrate sampling site should have only one sampling jar.

Using pencil, complete two labels with the required information: project name, project number, date, collector's name, and habitats sampled. Do not complete the label with ink as it will dissolve in ethanol. For wetlands with at least two macroinvertebrate sampling sites, number the site consecutively followed by the total number of sites (e.g. Sample 2 of 3 sites). Place one label into the jar and seal the jar. Dry the jar off, if necessary, and tape the second label to the outside of the jar.

Photograph each macroinvertebrate sampling site.

Sample Handling/Delivery

In the field, keep sample jars cool by placing in a cooler with a small amount of ice.
Deliver samples to the PBS&J office in Missoula, where they will be inventoried and delivered to Rhithron Associates, Inc.

MDT Mitigated Wetland Monitoring Project: Aquatic Invertebrate Monitoring
Summary 2001 – 2009

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

INTRODUCTION

This report summarizes data generated from eight years of mitigated wetland monitoring from sites throughout the State of Montana. A total of 229 invertebrate samples have been collected over the study period. Table 1 lists the currently monitored sites at which aquatic invertebrates were collected in 2009, and summarizes the sampling history of each.

METHODS

Sampling and Sample Processing

Aquatic invertebrate samples were collected at mitigated wetland sites in the summer months of 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, and 2009 by personnel of PBS&J. Sampling procedures were based on the protocols developed by the Montana Department of Environmental Quality (MDEQ) for wetland sampling. Sampling consisted of D-frame net sweeps through emergent vegetation (when present), the water column, and over the water surface, and included disturbing and scraping substrates at each sampled site. These sample components were composited and preserved in ethanol at each wetland site. Samples were delivered to Rhithron Associates, Inc. for processing, taxonomic determinations, and data analysis.

Standard sorting protocols were applied to achieve representative subsamples of a minimum of 100 organisms. Caton sub-sampling devices (Caton 1991), divided into 30 grids, each approximately 5 cm by 6 cm, were used. Grid contents were examined under stereoscopic microscopes using 10x-30x magnification. All aquatic invertebrates from each selected grid were sorted from the substrate, and placed in 95% ethanol for subsequent identification. Grid selection, examination, and sorting continued until at least 100 organisms were sorted. A large/rare search was conducted to collect any taxa not found in the subsampling procedure.

Organisms were individually examined using 10x – 80x stereoscopic dissecting scopes (Leica S8E and S6E) and identified to the lowest practical taxonomic levels using appropriate published taxonomic references. Identification, counts, life stages, and information about the condition of specimens were recorded on bench sheets. To obtain accuracy in richness measures, organisms that could not be identified to the target level specified in MDEQ protocols were designated as “not unique” if other specimens from the same group could be taken to target levels. Organisms designated as “unique” were those that could be definitively distinguished from other organisms in the sample. Identified organisms were preserved in 95% ethanol in labeled vials, and archived at the Rhithron laboratory. Midges were morphotyped using 10x – 80x stereoscopic dissecting microscopes (Leica S8E and S6E) and representative specimens were slide mounted and examined at 200x – 1000x magnification using an Olympus BX 51 compound microscope. Slide mounted organisms were also archived at the Rhithron laboratory.

Assessment

The method employed to assess these wetlands is based on an index incorporating a battery of 12 bioassessment metrics or attributes (Table 1) tested and recommended by Stribling et al. (1995) in a report to the Montana Department of Health and Environmental Science. In that study, it was determined that some of the metrics were of limited use in some geographic regions, and for some wetland types. Despite that finding, all 12 metrics are used in this evaluation of mitigated wetlands, since detailed geographic information and wetland classifications were unavailable for this report. Scoring criteria for the 12 metrics were developed specifically for this project, since mitigated wetlands were not included in original criteria development.

Scoring criteria for wetland metrics were developed by generally following the tactic used by Stribling et al. (1995). Boxplots were generated using a statistical software package (Statistica™), and distributions, median values, ranges, and quartiles for each metric were examined. For the wetland sites, “good” scores were generally

those that fell above the 75th percentile (for those metrics that decrease in value in response to stress) or below the 25th percentile (for metrics that respond to stress by an increase in value) of all scores. Additional scoring ranges were established by bisecting the range below the 75th percentile for decreasing scores (or above the 25th percentile for increasing scores) into "sub-optimal" and "poor" assessment categories. A score of 5, 3, or 1 was assigned to good, sub-optimal, and poor metric performance, respectively. In this way, metric values were translated into normalized metric scores, and scores for all metrics were summed to produce a total bioassessment score, which is expressed as a percentage of the maximum possible score (60). Total bioassessment scores were classified according to a similar process, using the ranges and distributions of total scores for all sites studied between 2001 and 2007. Data from a total of 167 sites were used to develop criteria.

Six sites in this study supported aquatic fauna characteristic of lotic habitats rather than lentic wetland habitats; these sites were excluded from mitigated wetland scoring criteria development, and were evaluated with a metric battery specific to flowing water habitats. In 2008, the lotic sites were Camp Creek (2 sites), Cloud Ranch stream, Jack Creek – McKee Spring, and Jocko Spring Creek (2 sites). Invertebrate assemblages at these sites were generally characteristic of montane or foothill stream conditions and were assessed using the tested metric battery developed for montane streams of Western Montana (MVFP index: Bollman 1998).

The purpose of constructing an index from biological attributes or metrics is to provide a means of integrating information to facilitate the determination of whether management action is needed. However, the nature of the action needed is not determined solely by the index score or impairment classification, but by consideration of an analysis of the component metrics, the taxonomic composition of the assemblages, and other issues. The diagnostic functions of the metrics and taxonomic data need more study since our understanding of the interrelationships of natural environmental factors and anthropogenic disturbances is tentative. Thus, the bioassessment index used in this report may not be universally applicable to all wetland types, and in particular, to constructed wetlands. Scores and impairment classifications derived from the index may not be valid indications of impairment or non-impairment. In addition, the further interpretive remarks accompanying the raw taxonomic and metric data in this summary are offered cautiously. Year-to-year comparisons depend on an assumption that specific sites were revisited in each year, and that equivalent sampling methods were utilized at each site revisit.

Bioassessment metrics - wetlands

An index based on the performance of 12 metrics was constructed, as described above. Table 2 lists those metrics, describes their calculation and the expected response of each to increased degradation or impairment of the wetland.

In addition to the summed scores of each metric and the associated impairment classification described above, each individual metric informs the bioassessment to some degree. The four richness metrics (Total taxa, POET, Chironomidae taxa, and Crustacea taxa + Mollusca taxa) can be interpreted to express habitat complexity as well as water quality. Complex, diverse habitats consist of variable substrates, emergent vegetation, variable water depths and other factors, and are potential features of long-established stable wetlands with minimal human disturbance. In the study conducted by Stribling et al. (1995), all four richness metrics were found to be significantly associated with water quality parameters including conductance, salinity, and total dissolved solids.

Four composition metrics (%Chironomidae, %Orthocladiinae of Chironomidae, %Crustacea + %Mollusca, and %Amphipoda) measure the relative contributions of certain taxonomic groups that may have significant responses to habitat and/or water quality impacts. For example, amphipods have been demonstrated to increase in abundance in alkaline conditions. Short-lived, relatively mobile taxa such as chironomids dominate ephemeral environments; many are hemoglobin-bearers capable of tolerating de-oxygenated conditions.

Two tolerance metrics (Hilsenhoff Biotic Index [HBI] and %Dominant Taxon) were included in the bioassessment battery. The HBI indicates the overall invertebrate assemblage tolerance to nutrient enrichment, warm water, and/or low dissolved oxygen conditions. The percent abundance of the dominant taxon has been demonstrated to be strongly associated with pH, conductance, salinity, total organic carbon, and total dissolved solids.

Two trophic measures (%Collector-gatherers and %Filterers) may be helpful in expressing functional integrity of the invertebrate assemblage, which can be impacted by poor water quality or habitat degradation. High proportions of filtering organisms suggest nutrient and/or organic enrichment, while abundant collectors suggest more positive functional conditions and well-developed wetland morphology. These organisms graze periphyton growing on stable surfaces such as macrophytes.

Summary metric values and scores for the 2009 samples are given in Tables 4a-4c and 5. Thermal preference of invertebrate assemblages was calculated using Brandt 2001.

Bioassessment metrics – lotic habitats

For sites supporting rheophilic invertebrate assemblages, bioassessment was based on a metric battery and scoring criteria developed for montane regions of Montana (MVFP index: Bollman 1998). The six metrics constituting the bioassessment index used for MVFP sites in this study were selected because, both individually and as an integrated metric battery, they are robust at distinguishing impaired sites from relatively unimpaired sites (Bollman 1998). They have been demonstrated to be more variable with anthropogenic disturbance than with natural environmental gradients (Bollman 1998). Each of the six metrics and their expected responses to various stressors are described below.

1. Ephemeroptera (mayfly) taxa richness. The number of mayfly taxa declines as water quality diminishes. Impairments to water quality which have been demonstrated to adversely affect the ability of mayflies to flourish include elevated water temperatures, heavy metal contamination, increased turbidity, low or high pH, elevated specific conductance and toxic chemicals. Few mayfly species are able to tolerate certain disturbances to instream habitat, such as excessive sediment deposition.

2. Plecoptera (stonefly) taxa richness. Stoneflies are particularly susceptible to impairments that affect a stream on a reach-level scale, such as loss of riparian canopy, streambank instability, channelization, and alteration of morphological features such as pool frequency and function, riffle development and sinuosity. Just as all benthic organisms, they are also susceptible to smaller scale habitat loss, such as by sediment deposition, loss of interstitial spaces between substrate particles, or unstable substrate.

3. Trichoptera (caddisfly) taxa richness. Caddisfly taxa richness has been shown to decline when sediment deposition affects habitat. In addition, the presence of certain case-building caddisflies can indicate good retention of woody debris and lack of scouring flow conditions.

4. Number of sensitive taxa. Sensitive taxa are generally the first to disappear as anthropogenic disturbances increase. The list of sensitive taxa used here includes organisms sensitive to a wide range of disturbances, including warmer water temperatures, organic or nutrient pollution, toxic pollution, sediment deposition, substrate instability and others. Unimpaired streams of western Montana typically support at least four sensitive taxa (Bollman 1998).

5. Percent filter feeders. Filter-feeding organisms are a diverse group; they capture small particles of organic matter, or organically enriched sediment material, from the water column by means of a variety of adaptations, such as silken nets or hairy appendages. In forested montane streams, filterers are expected to occur in insignificant numbers. Their abundance increases when canopy cover is lost and when water temperatures increase and the accompanying growth of filamentous algae occurs. Some filtering organisms, specifically the Arctopsychid caddisflies (*Arctopsyche* spp. and *Parapsyche* spp.) build silken nets with large mesh sizes that capture small organisms such as chironomids and early-instar mayflies. Here they are considered predators, and, in this study, their abundance does not contribute to the percent filter feeders metric.

6. Percent tolerant taxa. Tolerant taxa are ubiquitous in stream sites, but when disturbance increases, their abundance increases proportionately. The list of taxa used here includes organisms tolerant of a wide range of disturbances, including warmer water temperatures, organic or nutrient pollution, toxic pollution, sediment deposition, substrate instability and others.

Table 1. Montana Department of Transportation Mitigated Wetlands Monitoring Project sites: sampling history. Only sites sampled in 2009 are included. An asterisk indicates lotic sites.

Site identifier	2002	2003	2004	2005	2006	2007	2008	2009
Camp Creek MS-1*	+	+	+	+	+	+	+	+
Camp Creek MS-2*					+	+	+	+
Cloud Ranch Pond			+	+	+	+	+	+
Cloud Ranch Stream (Big Timber)*			+			+	+	+
Jack Creek – McKee Spring Creek*					+	+	+	+
Jack Creek – pond			+	+	+	+	+	+
Rock Creek Ranch				+	+	+	+	+
Wagner Marsh				+	+	+	+	+
Alkali Lake 1					+	+	+	+
West Fork of Charley Creek						+	+	+
Little Muddy Creek						+	+	+
Selkirk Ranch						+	+	+
Jocko Spring Creek MS1							+	+
Jocko Spring Creek MS2							+	+
Sportsman's Campground Site #1							+	+
Sportsman's Campground Site #2							+	+
Sportsman's Campground Site #3							+	+
Lonepine #1							+	+
Lonepine #2							+	+

Table 2. Aquatic invertebrate metrics employed for wetland (lentic) invertebrate assemblages in the MDT mitigated wetlands study, 2001 – 2009.

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

RESULTS

(Note: Individual site discussions were removed from this report by PBS&J and are included in the macroinvertebrate sections of individual monitoring reports. Summary tables for lentic (4a – 4c) and lotic (5) sites and project specific taxa listing(s) and metrics report(s) are provided on the following pages.)

Table 4a. Metric values and scores for wetland (lentic) sites in the MDT mitigated wetland study – 2009 sampling.

METRIC	Cloud Ranch Pond	Jack Creek Pond	Rock Creek Ranch	Wagner Marsh	Alkali Lake	West Fork of Charley Creek	Little Muddy Creek
Total taxa	15	11	20	18	17	7	18
POET	2	0	2	3	1	0	1
Chironomidae taxa	6	3	3	5	10	2	6
Crustacea + Mollusca	0	5	6	7	1	1	6
% Chironomidae	14.47%	66.67%	43.75%	16.07%	61.00%	2.73%	42.40%
Orthocladiinae/Chir	45.45%	20.00%	57.14%	22.22%	52.46%	0.00%	86.79%
%Amphipoda	0.00%	3.33%	0.00%	1.79%	0.00%	91.82%	4.80%
%Crustacea + %Mollusca	0.00%	23.33%	32.14%	34.82%	1.00%	91.82%	34.40%
HBI	6.026666	9	7.045045	7.981652	6	7.90909	7.448
%Dominant taxon	40.79%	53.33%	23.21%	23.21%	30.00%	91.82%	36.00%
%Collector-Gatherers	21.05%	73.33%	61.61%	43.75%	51.00%	91.82%	37.60%
%Filterers	0.00%	0.00%	7.14%	4.46%	0.00%	0.00%	4.80%
Total taxa	3	1	3	3	3	1	3
POET	1	1	1	3	1	1	1
Chironomidae taxa	3	3	3	3	5	1	3
Crustacea + Mollusca	1	3	5	5	1	1	5
% Chironomidae	5	1	1	5	1	5	1
Orthocladiinae/Chir	5	3	5	3	5	1	5
%Amphipoda	5	5	5	5	5	1	3
%Crustacea + %Mollusca	5	5	5	3	5	1	3
HBI	5	1	3	1	5	1	3
%Dominant taxon	3	1	5	5	5	1	3
%Collector-Gatherers	1	3	3	1	3	5	1
%Filterers	3	3	1	3	3	3	3
Total score	**40**	**30**	**40**	**40**	**42**	**22**	**34**
Percent of maximum score	**66.67%**	**50.00%**	**66.67%**	**66.67%**	**70.00%**	**36.67%**	**56.67%**
Impairment classification	**optimal**	**sub-optimal**	**optimal**	**optimal**	**optimal**	**poor**	**sub-optimal**

Table 4b. Metric values and scores for wetland (lentic) sites in the MDT mitigated wetland study – 2009 sampling.

METRIC	Selkirk Ranch	Sportsman's Campground Site #1	Sportsman's Campground Site #2	Sportsman's Campground Site #3	Lonepine #1	Lonepine #2
Total taxa	17	19	11	23	22	19
POET	1	1	0	2	2	3
Chironomidae taxa	6	10	8	11	11	8
Crustacea + Mollusca	6	4	2	4	4	2
% Chironomidae	27.27%	38.46%	90.00%	41.82%	67.83%	25.86%
Orthocladiinae/Chir	43.33%	37.50%	3.33%	23.91%	7.69%	16.67%
%Amphipoda	5.45%	25.96%	2.00%	4.55%	0.00%	0.00%
%Crustacea + %Mollusca	62.73%	51.92%	5.00%	50.00%	6.96%	18.10%
HBI	8.245455	6.942309	6.9	7.345455	7.196427	7.191304
%Dominant taxon	30.00%	24.04%	45.00%	27.27%	51.30%	15.52%
%Collector-Gatherers	57.27%	50.00%	91.00%	83.64%	86.09%	63.79%
%Filterers	3.64%	25.96%	18.00%	29.09%	1.74%	6.03%
Total taxa	3	3	1	5	5	3
POET	1	1	1	1	1	3
Chironomidae taxa	3	5	5	5	5	5
Crustacea + Mollusca	5	3	1	3	3	1
% Chironomidae	3	3	1	1	1	3
Orthocladiinae/Chir	3	3	1	3	1	1
%Amphipoda	3	1	5	3	5	5
%Crustacea + %Mollusca	3	3	5	3	5	5
HBI	1	3	3	3	3	3
%Dominant taxon	5	5	3	5	1	5
%Collector-Gatherers	3	3	5	5	5	3
%Filterers	3	1	1	1	3	1
Total score	**36**	**34**	**32**	**38**	**38**	**38**
Percent of maximum score	**60.00%**	**56.67%**	**53.33%**	**63.33%**	**63.33%**	**63.33%**
Impairment classification	**sub-optimal**	**sub-optimal**	**sub-optimal**	**sub-optimal**	**sub-optimal**	**sub-optimal**

Table 5. Metric values and scores for stream (lotic) sites in the MDT mitigated wetland study – 2009 sampling.

METRIC	Camp Creek MS-1	Camp Creek MS-2	Cloud Ranch Stream	Jack Creek McKee	Jocko Spring Creek MS-1	Jocko Spring Creek MS-2
E Richness	2	4	1	1	2	1
P Richness	1	0	0	0	0	0
T Richness	2	4	4	1	3	2
Pollution Sensitive Richness	1	1	0	0	1	0
Filterer Percent	11.88%	22.02%	18.18%	25.23%	27.36%	10.91%
Pollution Tolerant Percent	13.86%	12.84%	15.15%	8.41%	12.26%	32.73%
E Richness	1	2	0	0	1	0
P Richness	1	0	0	0	0	0
T Richness	1	2	2	0	2	1
Pollution Sensitive Richness	1	1	0	0	1	0
Filterer Percent	1	1	1	0	0	1
Pollution Tolerant Percent	1	1	1	2	1	1
Total score	**6**	**7**	**4**	**2**	**5**	**3**
Percent of maximum score	**33.33%**	**38.89%**	**22.22%**	**11.11%**	**27.78%**	**16.67%**
Impairment classification	**moderate**	**moderate**	**moderate**	**severe**	**moderate**	**severe**

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Caton, L. W. 1991. Improving subsampling methods for the EPA's "Rapid Bioassessment" benthic protocols. Bulletin of the North American Benthological Society. 8(3): 317-319.

Stribling, J.B., J. Lathrop-Davis, M.T. Barbour, J.S. White, and E.W. Leppo. 1995. Evaluation of environmental indicators for the wetlands of Montana: the multimetric approach using benthic macroinvertebrates. Report to the Montana Department of Health and Environmental Science. Helena, Montana.

Taxa Listing

Project ID: MDT09PBSJ
RAI No.: MDT09PBSJ001

RAI No.: MDT09PBSJ001 **Sta. Name:** West Fork Charley Creek
Client ID:
Date Coll.: 7/29/2009 **No. Jars:** 1 **STORET ID:**

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Non-Insect							
Acari	3	2.73%	Yes	Unknown		5	PR
Hyalellidae							
Hyalella sp.	101	91.82%	Yes	Unknown		8	CG
Heteroptera							
Corixidae							
Corixidae	1	0.91%	Yes	Larva		10	PH
Notonectidae							
Notonecta sp.	1	0.91%	Yes	Adult		5	PR
Diptera							
Ceratopogonidae							
Ceratopogoninae	1	0.91%	Yes	Larva		6	PR
Chironomidae							
Chironomidae							
Cryptochironomus sp.	2	1.82%	Yes	Larva		8	PR
Glyptotendipes sp.	1	0.91%	Yes	Pupa		10	SH
Sample Count	**110**						

Metrics Report

Project ID: MDT09PBSJ
RAI No.: MDT09PBSJ001
Sta. Name: West Fork Charley Creek
Client ID:
STORET ID:
Coll. Date: 7/29/2009

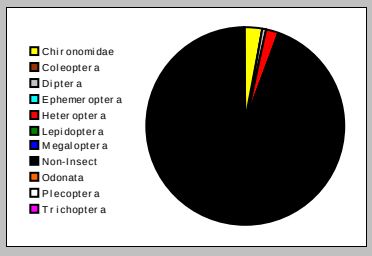
Abundance Measures

Sample Count: 110
Sample Abundance: 264.00 41.67% of sample used

Coll. Procedure:
Sample Notes:

Taxonomic Composition

Category	R	A	PRA
Non-Insect	2	104	94.55%
Odonata			
Ephemeroptera			
Plecoptera			
Heteroptera	2	2	1.82%
Megaloptera			
Trichoptera			
Lepidoptera			
Coleoptera			
Diptera	1	1	0.91%
Chironomidae	2	3	2.73%

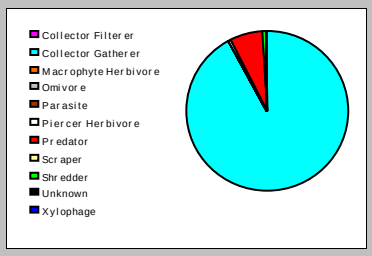


Dominant Taxa

Category	A	PRA
Hyalella	101	91.82%
Acari	3	2.73%
Cryptochironomus	2	1.82%
Notonecta	1	0.91%
Glyptotendipes	1	0.91%
Corixidae	1	0.91%
Ceratopogoninae	1	0.91%

Functional Composition

Category	R	A	PRA
Predator	4	7	6.36%
Parasite			
Collector Gatherer	1	101	91.82%
Collector Filterer			
Macrophyte Herbivore			
Piercer Herbivore	1	1	0.91%
Xylophage			
Scraper			
Shredder	1	1	0.91%
Omivore			
Unknown			



Metric Values and Scores

Metric	Value	BIBI	MTP	MTV	MTM
Composition					
Taxa Richness	7	1	0		0
Non-Insect Percent	94.55%				
E Richness	0	1		0	
P Richness	0	1		0	
T Richness	0	1		0	
EPT Richness	0		0		0
EPT Percent	0.00%		0		0
Oligochaeta+Hirudinea Percent					
Baetidae/Ephemeroptera	0.000				
Hydropsychidae/Trichoptera	0.000				
Dominance					
Dominant Taxon Percent	91.82%		0		0
Dominant Taxa (2) Percent	94.55%				
Dominant Taxa (3) Percent	96.36%	1			
Dominant Taxa (10) Percent	100.00%				
Diversity					
Shannon H (loge)	0.420				
Shannon H (log2)	0.607		0		
Margalef D	1.276				
Simpson D	0.843				
Evenness	0.040				
Function					
Predator Richness	4		2		
Predator Percent	6.36%	1			
Filterer Richness	0				
Filterer Percent	0.00%			3	
Collector Percent	91.82%		1		0
Scraper+Shredder Percent	0.91%		0		0
Scraper/Filterer	0.000				
Scraper/Scraper+Filterer	0.000				
Habit					
Burrower Richness	2				
Burrower Percent	1.82%				
Swimmer Richness	2				
Swimmer Percent	1.82%				
Clinger Richness	0	1			
Clinger Percent	0.00%				
Characteristics					
Cold Stenotherm Richness	0				
Cold Stenotherm Percent	0.00%				
Hemoglobin Bearer Richness	3				
Hemoglobin Bearer Percent	3.64%				
Air Breather Richness	0				
Air Breather Percent	0.00%				
Voltinism					
Univoltine Richness	4				
Semivoltine Richness	0	1			
Multivoltine Percent	5.45%		3		
Tolerance					
Sediment Tolerant Richness	0				
Sediment Tolerant Percent	0.00%				
Sediment Sensitive Richness	0				
Sediment Sensitive Percent	0.00%				
Metals Tolerance Index	3.119				
Pollution Sensitive Richness	0	1		0	
Pollution Tolerant Percent	1.82%	5		3	
Hilsenhoff Biotic Index	7.909		0		0
Intolerant Percent	0.00%				
Supertolerant Percent	95.45%				
CTQa	108.000				

Bioassessment Indices

BioIndex	Description	Score	Pct	Rating
BIBI	B-IBI (Karr et al.)	14	28.00%	
MTP	Montana DEQ Plains (Bukantis 1998)	6	20.00%	Moderate
MTV	Montana Revised Valleys/Foothills (Bollman 1998)	6	33.33%	Moderate
MTM	Montana DEQ Mountains (Bukantis 1998)	0	0.00%	Severe

