MONTANA DEPARTMENT OF TRANSPORTATION
WETLAND MITIGATION MONITORING REPORT: YEAR 2007

West Fork Charley Creek
Frazer, Montana

Prepared for:

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

Prepared by:

POST, BUCKLEY, SCHUH, & JERNIGAN
801 North Last Chance Gulch, Suite 101
Helena, MT 59601-3360

December 2007

PBS&J Project No: B43088.00 - 0404

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1.0 INTRODUCTION

This report documents the first 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**.

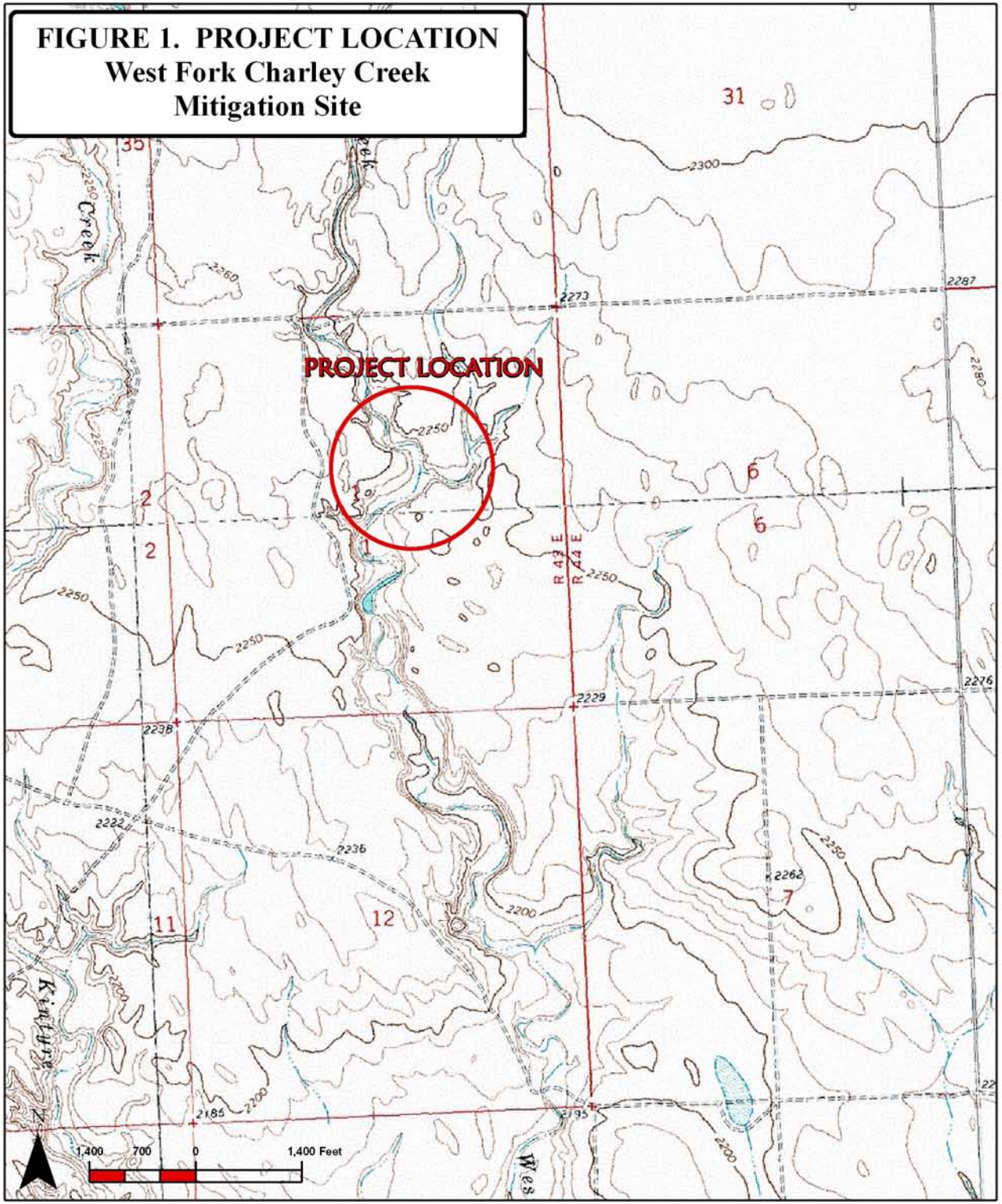
This report documents the results of 2007 monitoring efforts. The monitoring area is illustrated on **Figure 2** (**Appendix A**). No required COE or Fort Peck Assiniboine and Sioux Tribes performance standards were found in the project files.

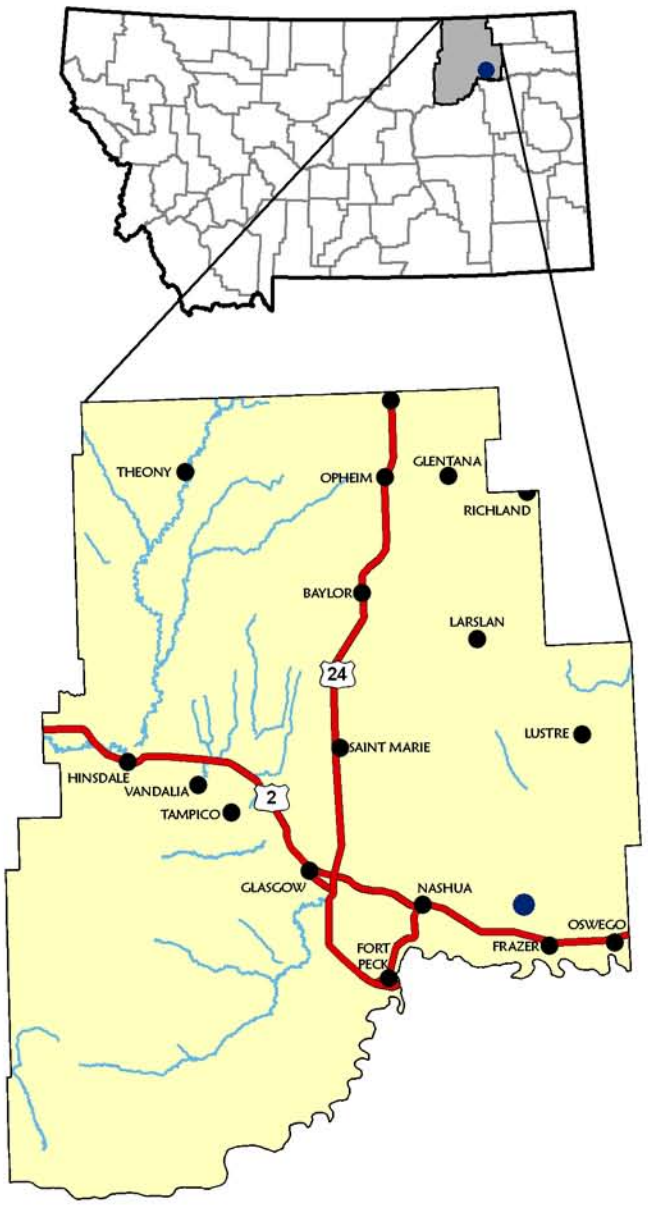
2.0 METHODS

2.1 Monitoring Dates and Activities

The site was visited on May 7th (initial reconnaissance) and July 17th (mid-season visit) of 2007. The primary purpose of the initial reconnaissance was to walk site boundaries and set up transect and photo point locations. The mid-season visit was conducted primarily to document vegetation, soil, and hydrologic conditions used to map jurisdictional 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

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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 at each data point.

2.3 Vegetation

General dominant species-based vegetation community types (e.g., *Typha latifolia/Scirpus acutus*) were delineated on a 2006 aerial photograph during the mid-season visit. 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 1998).

2.5 Wetland Delineation

Wetland delineation was conducted during the mid-season visit according to the 1987 COE Wetland Delineation Manual. 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 2006 color aerial photograph. 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 during each visit. 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 during each visit. No formal census plots, spot mapping, point counts, or strip transects were conducted. During both visits, bird observations were recorded incidental to other monitoring activities. Observations were categorized by species, activity code, and general habitat association (**Field Data Forms** in **Appendix B**).

2.8 Macroinvertebrates

One macroinvertebrate sample was collected during the mid-season site visit 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

A functional assessment was completed using the 1999 MDT Montana Wetland Assessment Method (Berglund 1999). Field data necessary for this assessment were generally collected during the mid-season site visit. An abbreviated field data sheet for the 1999 MDT Montana Wetland Assessment Method was compiled to facilitate rapid collection of field information. The remainder of the functional assessment was completed in the office. For each wetland or

group of wetlands (that share similar functions and values) a Functional Assessment Form was completed (**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**.

2.12 Maintenance Needs

Dike structures were examined during both site visits 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 99% and 95% of the designed wetland area was inundated during the May reconnaissance and the July mid-season visits, respectively. 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 May, the surface water elevation was an estimated four to six inches below the spillway elevation, indicating virtually full-pool conditions. Levels were only slightly lower during July. During both visits, surface water was backed beyond both the north and east fence limits across the drainage.

Precipitation was well above “normal” in the general project area from January through July 2007, based on data from the Glasgow WSO Airport weather station. Precipitation during this period totaled 12.16 inches, which is nearly 160% of the 7.67-inch mean for the January- July period between 1955 and 2007. Of particular significance was the 6.61 inches of precipitation received in May 2007, as compared to the 1.71-inch long-term mean for this month. Valley County was assigned a “no drought” status by the Montana Department of Natural Resources and Conservation in July 2007.

3.2 Vegetation

Vegetation species identified on the site are presented in **Table 1** and on the attached data form. In addition to upland community (Type 1), three wetland community types were identified and mapped on the mitigation area (**Figure 3** in **Appendix A**) including Type 2-*Eleocharis palustris*, Type 3-*Carex praegracilis*, and Type 4-*Agrostis alba*. Dominant species within each of these communities are listed on **Monitoring Form**s (**Appendix B**).

Table 1: ***2007 West Fork Charley Creek vegetation species list.***

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

Upland (Type 1) communities vary throughout the site and include 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 occurs primarily in newly developing wetland areas throughout the site; generally along the perimeters of open water areas. Type 3 occurs in a relatively confined area along the northwest shore. Type 4 occurs as a small patch along the northeast shoreline. Several unvegetated, but transitional (drowned upland vegetation transitioning to wetland) areas were also noted. Transect 1 vegetation results are detailed in the **Monitoring Forms** (**Appendix B**), and are summarized in **Table 2** and in **Charts 1** and **2**.

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 2: ***2007 Transect 1 data summary.***

Monitoring Year	2007
Transect Length (feet)	307
# Vegetation Community Transitions along Transect	5
# Vegetation Communities along Transect	3
# Hydrophytic Vegetation Communities along Transect	1
Total Vegetative Species	8
Total Hydrophytic Species	3
Total Upland Species	5
Estimated % Total Vegetative Cover	30
% Transect Length Comprised of Hydrophytic Vegetation Communities	5
% Transect Length Comprised of Upland Vegetation Communities	20
% Transect Length Comprised of Unvegetated Open Water	75
% Transect Length Comprised of Bare Substrate	0

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

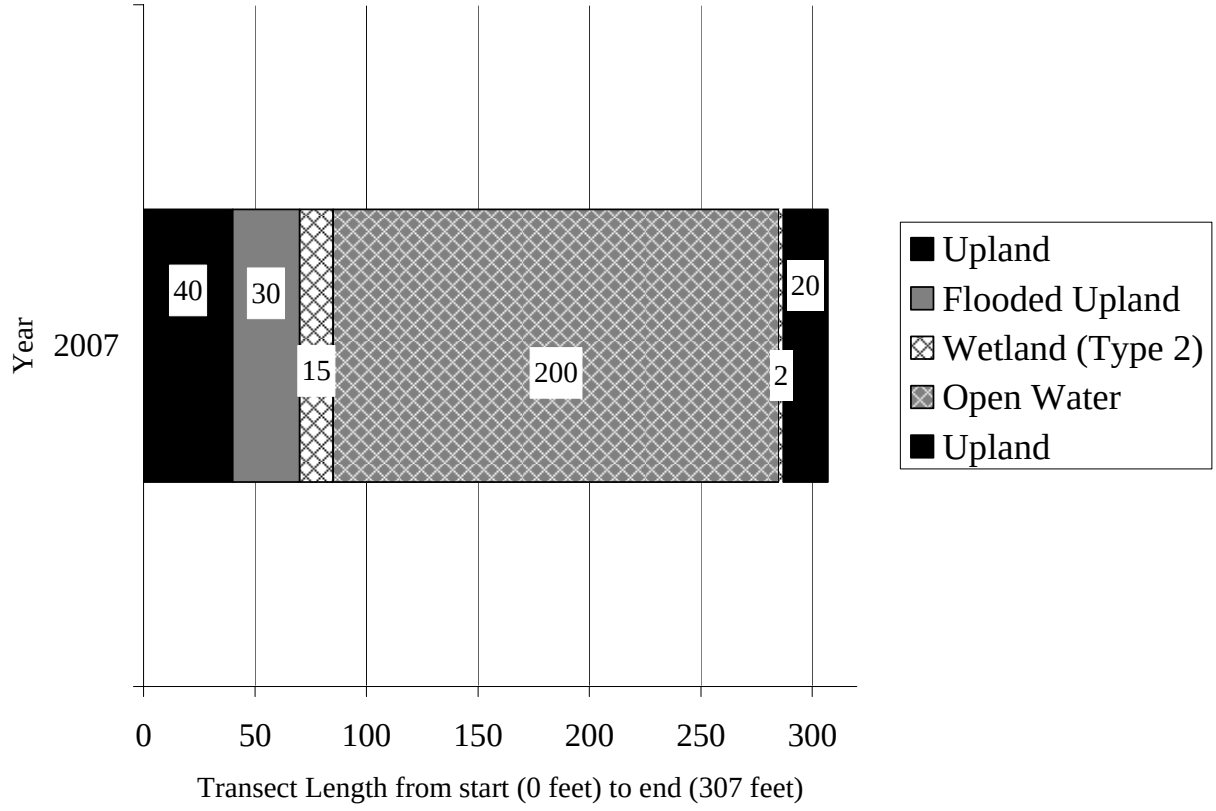


Chart 2: ***Length of vegetation communities within Transect 1 for 2007.***

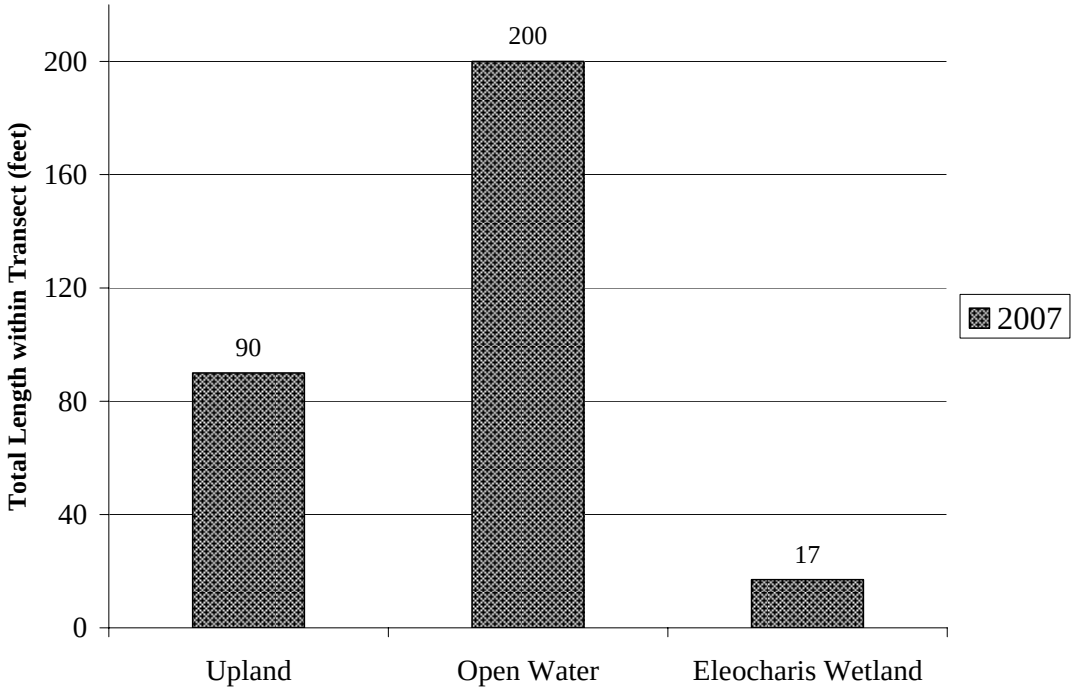


Table 3: ***2007 Transect 2 data summary.***

Monitoring Year	2007
Transect Length (feet)	266
# Vegetation Community Transitions along Transect	8
# Vegetation Communities along Transect	4
# Hydrophytic Vegetation Communities along Transect	2
Total Vegetative Species	15
Total Hydrophytic Species	5
Total Upland Species	10
Estimated % Total Vegetative Cover	50
% Transect Length Comprised of Hydrophytic Vegetation Communities	36
% Transect Length Comprised of Upland Vegetation Communities	12
% Transect Length Comprised of Unvegetated Open Water	52
% Transect Length Comprised of Bare Substrate	0

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

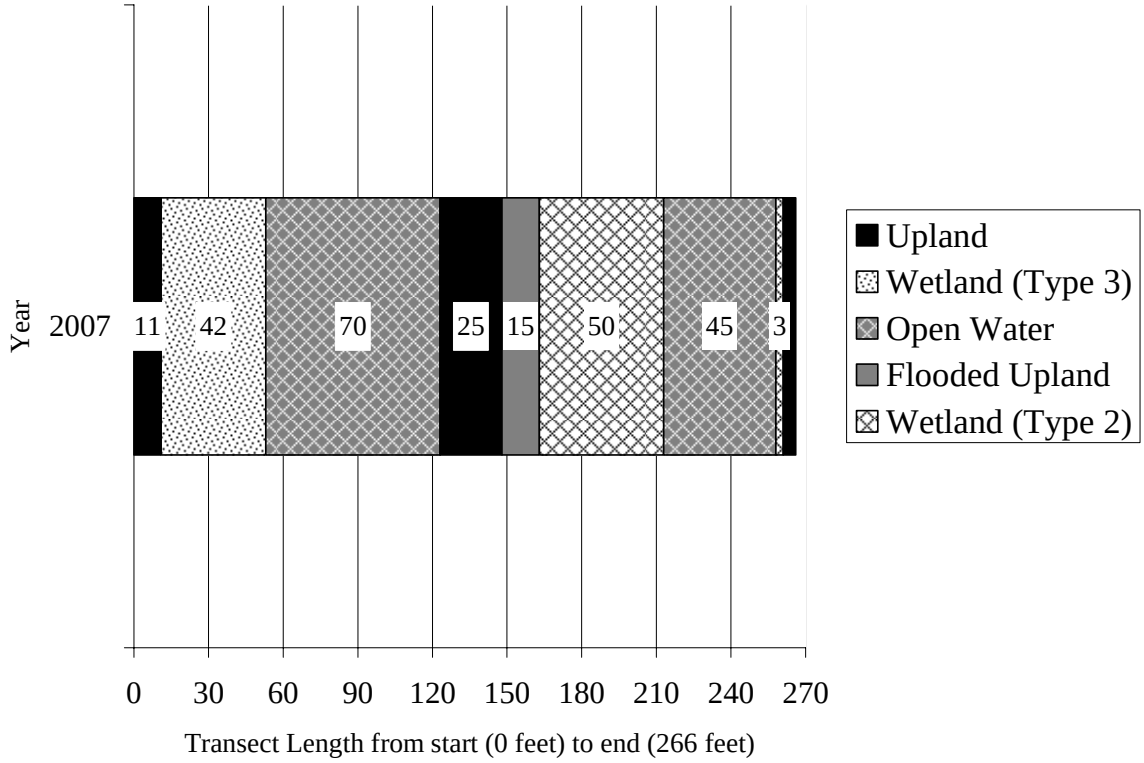
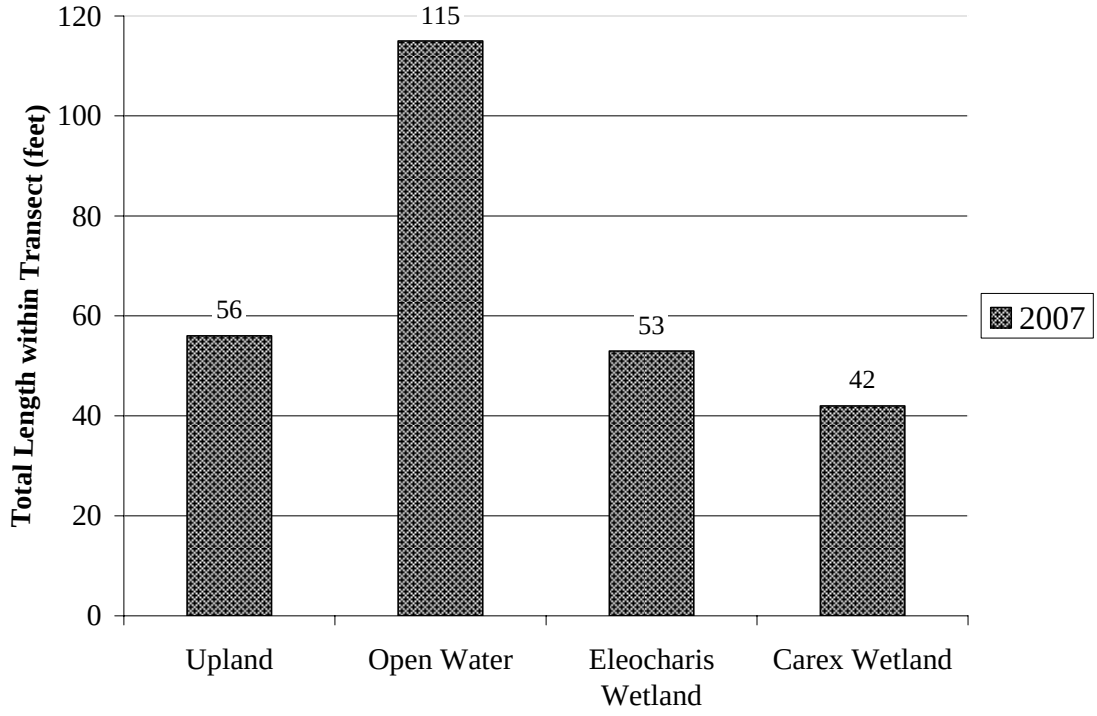


Chart 4: ***Length of vegetation communities within Transect 2 for 2007.***



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 generally confirmed during 2007 monitoring. Soils sampled in wetland areas were comprised of clay or sandy clay loam with a matrix color of 2.5Y3/2 to 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: ***2007 Wetland delineation results for WF Charley Creek Wetland Mitigation Site.***

Aquatic Habitat	Acreages
Vegetated Wetland	1.38
Open Water	4.82
Total Aquatic Habitat	**6.20**

Approximately 0.03 acre of wetlands occurred on the site prior to project implementation. Consequently, the net aquatic habitat developed to date is 6.2 – 0.03 = 6.17 acres. Crediting is discussed in Section 3.10.

3.5 Wildlife

Wildlife species, or evidence of their presence, observed on the site during 2007 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 mammal, one amphibian, and 26 bird species were noted using portions of the mitigation site during 2007.

Of special interest were observations of northern leopard frogs (*Rana pipiens*) during 2007. 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. This species has been assigned the rank of S1 (critically imperiled) in intermountain valleys and S3 (rare occurrence and/or restricted range and/or vulnerable to extinction) in the Great Plains region (which includes the project area) by the MTNHP.

3.6 Macroinvertebrates

Macroinvertebrate sampling results are provided in **Appendix F** and are summarized below in italics by Rhithron Associates, Inc. (Bollman 2007).

*Invertebrate abundance and diversity were low at the Charley Creek site. Bioassessment scores indicated sub-optimal conditions. The presence of macrocrustaceans (*Hyalella *sp.) and leeches (*Helobdella *sp.) suggests that the wetland was functional and that vegetation was well-established. Open-water habitats were apparently also available, and the presence of filamentous algae is suggested by the midges* Cricotopus *(*Isocladius*) spp.*

Table 5: ***2007 Wildlife species observed on the WF Charley Creek Wetland Mitigation Site.***

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

3.7 Functional Assessment

The completed 2007 functional assessment form is presented in **Appendix B**. Functional assessment results are summarized in **Table 6**. Functional assessment results for baseline conditions are also provided in **Table 6** for comparison.

The site currently rates as a Category III wetland and has gained 35 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 2007 aerial photograph.

Table 6: ***Summary of 2007 and baseline wetland function/value ratings and functional points at the West Fork Charley Creek Mitigation Project***

Function and Value Parameters From the 1999 MDT Montana Wetland Assessment Method[1]	2005 (Baseline)	2007
Listed/Proposed T&E Species Habitat	Low (0.0)	Low (0.3)
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)	Low (0.2)
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)	Mod (0.7)
Groundwater Discharge/Recharge	NA	NA
Uniqueness	Low (0.3)	Low (0.3)
Recreation/Education Potential	Low (0.1)	Low (0.3)
Actual Points/Possible Points	2.1 / 10	5.7 / 10
% of Possible Score Achieved	21	57
Overall Category	IV	III
Total Acreage of Assessed Aquatic Habitat within Easement (ac)	**0.03**	**6.20**
Functional Units (acreage x actual points) (fu)	**0.06**	**35.34**
Net Acreage Gain (ac)	NA	**6.17**
Net Functional Unit Gain (fu)	NA	**35.28**

[1] See completed 2007 functional assessment form in **Appendix B**.

3.9 Maintenance Needs/Recommendations

All dikes were in good condition during the spring reconnaissance and mid-season visits. The designed water gap (for cattle watering) appeared to be functioning as designed, although the gate to the site was open during both visits, allowing cattle access. The site did not appear impacted or exhibit evidence of overgrazing; cattle did not appear to congregate within the site substantively in 2007.

3.10 Current Credit Summary

Approximately 1.38 acres of vegetated wetlands and 4.82 acres of open water were delineated on the mitigation site in 2007, for a total of 6.2 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 6.2 – 0.03 = 6.17 acres, which is the maximum assignable credit at this site in 2007. 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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Soil Conservation Service. 1984. Soil survey of Valley County, Montana. Bozeman, Montana.

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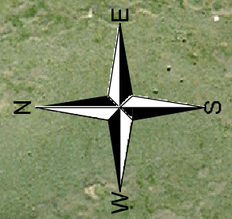
Appendix A

FIGURES 2 & 3

MDT Wetland Mitigation Monitoring
West Fork Charley Creek
Frazer, Montana

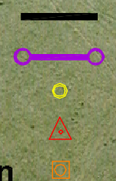
Figure 2 - Monitoring Activity Locations



LEGEND

- Monitoring Area Limits
- Vegetation Transect
- Photo Point Location
- GPS Aerial Reference Point
- Macroinvertebrate Sample Location

Base Photograph Date: July 16, 2007



PROJECT NAME
MDT West Fork Charley Creek Wetland Mitigation

DRAWING TITLE
Monitoring Activity Locations

DRAWN: LLL
PROJ MGR: J.Berglund
CHECKED: APPVD:
FILE NAME:L:\B43088.0404 CharlieCreek\dwg\MDT2007.dwg

PROJ NO: B43088.0404
LOCATION:
SCALE: 1"=150'

PBSJ
1120 Cedar
Missoula, MT 59802

FIGURE
2 OF 3
REV -
Dec/07/2007

Figure 3 - Mapped Site Features

LEGEND

Monitoring Area Limits

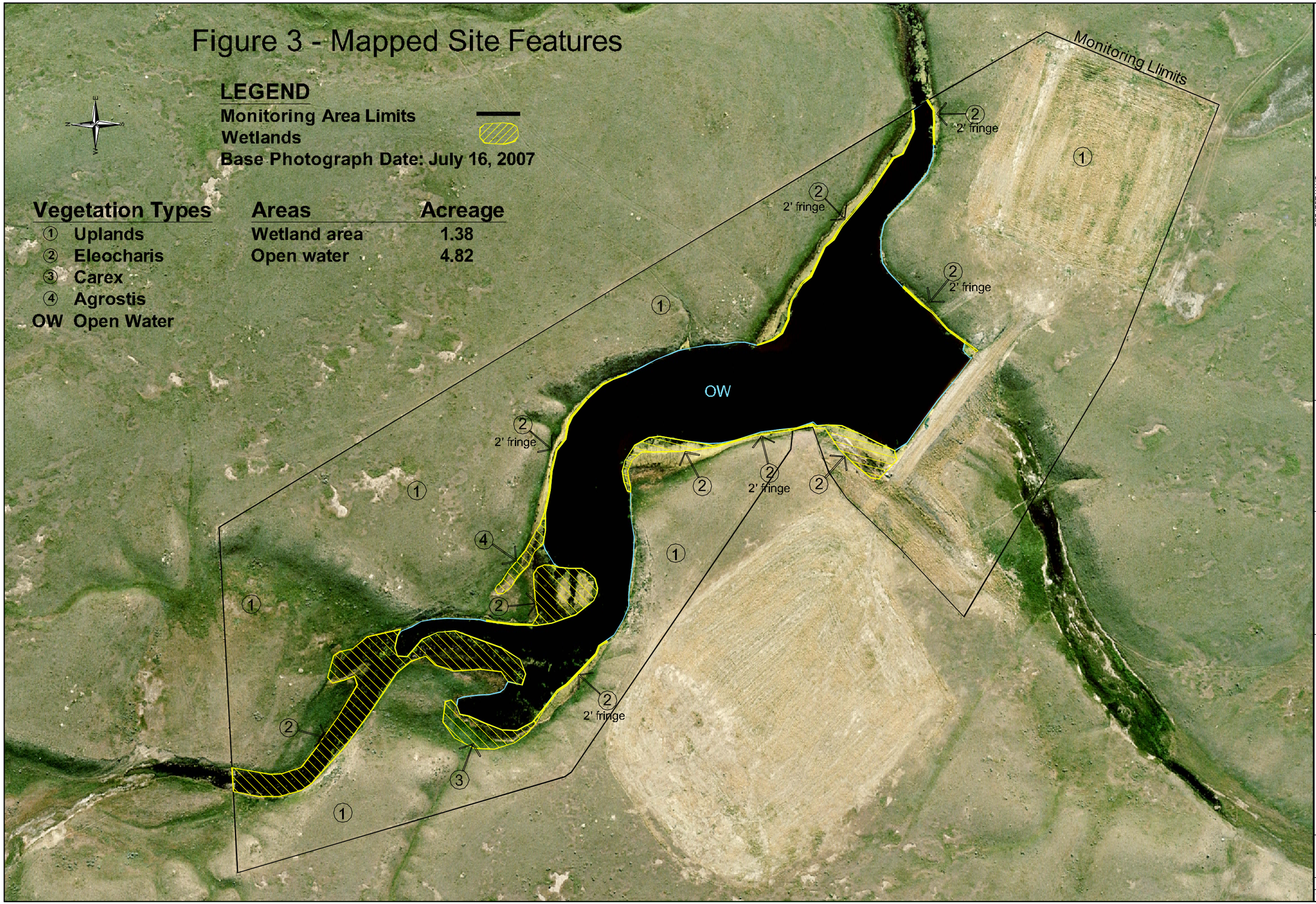
Wetlands

Base Photograph Date: July 16, 2007

Vegetation Types

① Uplands
② Eleocharis
③ Carex
④ Agrostis
OW Open Water

Areas	Acreage
Wetland area	1.38
Open water	4.82



PROJECT NAME
MDT West Fork Charley Creek Wetland Mitigation

DRAWING TITLE
Mapped Site Features

PROJ NO:	B43088.0404	DRAWN:	LLL
LOCATION:		PROJ MGR:	J.Berglund
SCALE:	1"=150'	CHECKED:	APPVD:
FILE NAME:	L:\B43088.0404 CharlieCreek\dwg\MDT2007.dwg		

PBSJ
1120 Cedar
Missoula, MT 59802

FIGURE
3 OF 3

REV -
Oct/12/2007

Appendix B

2007 WETLAND MITIGATION SITE MONITORING FORM
2007 BIRD SURVEY FORMS
2007 WETLAND DELINEATION FORMS
2007 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: **B43088.00 0404**
Assessment Date: **July 17, 2007** Person(s) conducting the assessment: **Berglund**
Location: **West of Frazier, north of US HGWY 2** MDT District: **Glendive** Milepost: **570**
Legal Description: T **27N** R **43E** Section **1**
Weather Conditions: **Sunny, dry, breeze** Time of Day: **10:00 - 13:30**
Initial Evaluation Date: **May 7, 2007** Monitoring Year: **1** # 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.

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**

Dominant Species	% Cover	Dominant Species	% Cover
ELE PAL	5 = > 50%		
SCI MAR	2 = 6-10%		
SCI AME	1 = 1-5%		
SPA PEC	1 = 1-5%		
RUM CRI	1 = 1-5%		
HOR JUB	3 = 11-20%		

Comments / Problems: **Predominant wetland type on site; newly developing along margins.**

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

Dominant Species	% Cover	Dominant Species	% Cover
CAR PRA	5 = > 50%		
JUN BAL	4 = 21-50%		
AGR SMI	2 = 6-10%		

Comments / Problems: **This type occurs mainly in one location along the northwest shore of the impoundment.**

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: **Occurs at one location on the east shore of the impoundment.**

VEGETATION COMMUNITIES (continued)

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

Dominant Species	% Cover	Dominant Species	% Cover

Comments / Problems: _____

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

Dominant Species	% Cover	Dominant Species	% Cover

Comments / Problems: _____

Community Number: **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: _____

VEGETATION COMMUNITIES (continued)

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

Dominant Species	% Cover	Dominant Species	% Cover

Comments / Problems: _____

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

Dominant Species	% Cover	Dominant Species	% Cover

Comments / Problems: _____

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

Dominant Species	% Cover	Dominant Species	% Cover

Comments / Problems: _____

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 americanus	2		
Scirpus maritimus	2		
Spartina pectinata	2		
Symphoricarpos occidentalis	1		
Thermopsis montana	1		
Triglochin maritimum	2		

Comments / Problems: _____

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
White-tailed jack-rabbit	1	☐	☐	☐	
Richardson's ground squirrel		☐	☐	☒	
Badger		☐	☐	☒	
Northern leopard frog	12	☐	☐	☐	
		☐	☐	☐	
		☐	☐	☐	
		☐	☐	☐	
		☐	☐	☐	

Additional Activities Checklist:
Yes Macroinvertebrate Sampling (if required)

Comments / Problems: _____

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 about 4-6" below top of spillway.**

MDT WETLAND MONITORING – VEGETATION TRANSECT

Site: **WF Charley Creek** Date: **July 17, 2007** 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: 40 feet	
Plant Species	**Cover**
AGR SMI	5 = > 50%
HOR JUB	+ = < 1%
KOE PYR	1 = 1-5%
BOT GRA	1 = 1-5%
UPLAND COMMUNITY	
Total Vegetative Cover:	100%

Vegetation Type B: **Flooded Upland**	
Length of transect in this type: 30 feet	
Plant Species	**Cover**
AGR SMI (standing drowned)	5 = > 50%
HOR JUB	+ = < 1%
TRANSITIONAL COMMUNITY	
Total Vegetative Cover:	100%

Vegetation Type C: **Eleocharis palustris**	
Length of transect in this type: 15 feet	
Plant Species	**Cover**
ELE PAL	3 = 11-20%
Wetland community	
Total Vegetative Cover:	20%

Vegetation Type D: **Open Water**	
Length of transect in this type: 200 feet	
Plant Species	**Cover**
No Vegetation	
Total Vegetative Cover:	0%

MDT WETLAND MONITORING – VEGETATION TRANSECT

Site: **WF Charley Crk** Date: **July 17, 2007** Examiner: **JB**
Transect Number: **1** Approximate Transect Length: **307 feet** Compass Direction from Start: **40˚** Note: _____

Vegetation Type E: **Eleocharis palustris**	
Length of transect in this type: 2 feet	
Plant Species	**Cover**
ELE PAL	2 = 6-10%
TYP LAT	1 = 1-5%
Wetland Community	
Total Vegetative Cover:	10%

Vegetation Type F: **Upland**	
Length of transect in this type: 20 feet	
Plant Species	**Cover**
AGR SMI	5 = > 50%
THE MON	2 = 6-10%
GRI SQU	1 = 1-5%
BOT GRA	2 = 6-10%
KOL PYR	2 = 6-10%
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 17, 2007** Examiner: **JB**
Transect Number: **2** Approximate Transect Length: **266 feet** Compass Direction from Start: **80˚** Note: _____

Vegetation Type A: **Upland**	
Length of transect in this type: 11 feet	
Plant Species	**Cover**
THE MON	2 = 6-10%
KOL PYR	2 = 6-10%
AGR SMI	5 = > 50%
ART FRI	1 = 1-5%
POA PRA	2 = 6-10%
Total Vegetative Cover:	100%

Vegetation Type B: **Carex praegracilis**	
Length of transect in this type: 42 feet	
Plant Species	**Cover**
CAR PRA	5 = > 50%
JUN BAL	5 = > 50%
POA PRA	2 = 6-10%
AGR SMI	1 = 1-5%
Wetland Community	
Total Vegetative Cover:	100%

Vegetation Type C: **Shallow Open Water**	
Length of transect in this type: 70 feet	
Plant Species	**Cover**
6" inundation - no vegetation	
Total Vegetative Cover:	0%

Vegetation Type D: **Upland**	
Length of transect in this type: 25 feet	
Plant Species	**Cover**
AGR SMI	5 = > 50%
KOL PYR	2 = 6-10%
GLY LEP	1 = 1-5%
HOR JUB	1 = 1-5%
Total Vegetative Cover:	100%

MDT WETLAND MONITORING – VEGETATION TRANSECT

Site: **WF Charley Crk** Date: **July 17, 2007** Examiner: **JB**
Transect Number: **2** Approximate Transect Length: **266 feet** Compass Direction from Start: **80˚** Note: _____

Vegetation Type E: **Flooded Upland**	
Length of transect in this type: 15 feet	
Plant Species	**Cover**
AGR SMI	4 = 21-50%
HOR JUB	1 = 1-5%
KOL PYR	+ = < 1%
OPU SP	+ = < 1%
Transitional area - previously flooded	
Total Vegetative Cover:	40%

Vegetation Type F: **Eleocharis palustris**	
Length of transect in this type: 50 feet	
Plant Species	**Cover**
ELE PAL	3 = 11-20%
AGR SMI	2 = 6-10%
HOR JUB	1 = 1-5%
Wetland Community	
Total Vegetative Cover:	%

Vegetation Type G: **Open Water**	
Length of transect in this type: 45 feet	
Plant Species	**Cover**
No vegetation	
Total Vegetative Cover:	0%

Vegetation Type H: **Eleocharis palustris**	
Length of transect in this type: 3 feet	
Plant Species	**Cover**
ELE PAL	4 = 21-50%
SCI MAR	1 = 1-5%
HOR JUB	1 = 1-5%
ROS NUT	+ = < 1%
CAR PRA	1 = 1-5%
AGR SMI	1 = 1-5%
AGR ALB	1 = 1-5%
Wetland Community	
Total Vegetative Cover:	30%

MDT WETLAND MONITORING – VEGETATION TRANSECT

Site: **WF Charley Crk** Date: **July 17, 2007** Examiner: **JB**
Transect Number: **2** Approximate Transect Length: **266 feet** Compass Direction from Start: **80˚** Note: _____

Vegetation Type I: **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%
Total Vegetative Cover:	100%

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): **50%**

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 developing wetland characteristics.**

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

Project / Site: **WF Charley Creek**	Date: **July 17, 2007**
Applicant / Owner: **MDT / FT Peck Reservation**	County: **Valley**
Investigator: **PBSJ**	State: **MT**

Do Normal Circumstances exist on the site? **Yes**	Community ID: **Flooded Upland**
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. *Agropyron smithii*	Herb	FACU	11.		
2. *Hordeum jubatum*	Herb	FACW	12.		
3.			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-): **1** / **2** = **50**%			FAC Neutral: **1** / **2** = **50**%		
Remarks: **AGR SMI is standing dead - HOR JUB present in trace amounts only.**					

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 **N/A** **3** (in.) Depth to Free Water in Pit **N/A** ____ (in.) Depth to Saturated Soil **N/A** ____ (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 3" deep.**	

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

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

WETLAND DETERMINATION

Hydrophytic Vegetation Present? **NO** Wetland Hydrology Present? **YES** Hydric Soils Present? **YES**	Is this Sampling Point within a Wetland? **NO**

Remarks: **Plot taken on Transect 1, about 50 feet from start. Site is transitional flooded upland area likely to transition to wetland with continued inundation.**

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

Project / Site: **WF Charley Creek**	Date: **July 17, 2007**
Applicant / Owner: **MDT / FT 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-1**
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. *Eleocharis palustris*	Herb	OBL	11.		
2.			12.		
3.			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-): **1** / **1** = **100**%			FAC Neutral: **1** / **1** = **100**%		
Remarks: **About 20+% coverage presently.**					

HYDROLOGY

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

Yes No Recorded Data

Field Observations:
- Depth of Surface Water **N/A** **4** (in.)
- Depth to Free Water in Pit **N/A** ____ (in.)
- Depth to Saturated Soil **N/A** ____ (in.)

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

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 4" deep.**

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** Histic Epipedon
- **YES** Sulfidic Odor
- **NO** Aquic Moisture Regime
- **NO** Reducing Conditions
- **YES** Gleyed or Low-Chroma Colors
- **NO** Concretions
- **NO** High Organic Content in Surface Layer in Sandy Soils
- **NO** Organic Streaking in Sandy Soils
- **NO** Listed on Local Hydric Soils List
- **NO** Listed on National Hydric Soils List
- **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 80 feet from start. Site is recently formed wetland fringe around impoundment.**

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

Project / Site: **WF Charley Creek**	Date: **July 17, 2007**
Applicant / Owner: **MDT / FT 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 3**
(If needed, explain on reverse side)	

VEGETATION

Dominant Species	Stratum	Indicator	Dominant Species	Stratum	Indicator
1. *Carex praegracilis*	Herb	FACW	11.		
2. *Juncus balticus*	Herb	OBL	12.		
3.			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-): **2** / **2** = **100**%	FAC Neutral: **2** / **2** = **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: **NO** 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 **N/A** ____ (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: **Saturated to surface.**	

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	2.5 Y 3/2	/ /	N/A N/A	Clay
		/	/ /	N/A N/A	
		/	/ /	N/A N/A	
		/	/ /	N/A N/A	
		/	/ /	N/A N/A	

Hydric Soil Indicators:

- **NO** Histosol
- **NO** Histic Epipedon
- **NO** Sulfidic Odor
- **NO** Aquic Moisture Regime
- **NO** Reducing Conditions
- **NO** Gleyed or Low-Chroma Colors
- **NO** Concretions
- **NO** High Organic Content in Surface Layer in Sandy Soils
- **NO** Organic Streaking in Sandy Soils
- **NO** Listed on Local Hydric Soils List
- **NO** Listed on National Hydric Soils List
- **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. Site is recently formed wetland fringe around impoundment.**

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

1. Project Name: WF Charley Creek Wetland Mitigation **2. Project #:** B43088.00-0404 **Control #:** NA

3. Evaluation Date: 7/17/2007 **4. Evaluator(s):** Berglund **5. Wetland / Site #(s):** WF Charley Creek

6. Wetland Location(s) i. T: 27 N **R:** 43 E **S:** 1 **T:** __ N **R:** __ E **S:** _____

ii. Approx. Stationing / Mileposts: Approximately 4.5 miles north of US Highway 2, 5 miles NW of Frazer.

iii. Watershed: 11 - Milk **GPS Reference No. (if applies):** NA

Other Location Information: On Fort Peck Indian Reservation, Valley County

7. A. Evaluating Agency MDT

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

B. Purpose of Evaluation:

- ☐ Wetlands potentially affected by MDT project
- ☐ Mitigation wetlands; pre-construction
- ☒ Mitigation wetlands; post-construction
- ☐ Other

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

Comments: AA includes wetlands plus 4.82 acres of open water.

10. CLASSIFICATION OF WETLAND AND AQUATIC HABITATS IN AA

HGM CLASS [1]	SYSTEM [2]	SUBSYSTEM [2]	CLASS [2]	WATER REGIME [2]	MODIFIER [2]	% OF AA
Depression	Palustrine	None	Emergent Wetland	Seasonally Flooded	Impounded	23
Depression	Palustrine	None	Unconsolidated Bottom	Intermittently Exposed	Impounded	77
---	---	---	---	---	---	
---	---	---	---	---	---	

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

Comments: _____

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

12. GENERAL CONDITION OF AA

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

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

Comments: (types of disturbance, intensity, season, etc.) Adjacent lands are rangelands; site is subject to light grazing.

ii. Prominent weedy, alien, & introduced species: AGR CRI

iii. Briefly describe AA and surrounding land use / habitat: AA consists of large impounded emergent marsh; the AA only includes those wetlands within the conservation easement boundary, even though minor pre-existing wetlands extend to the north and east. Surrounding land use is agricultural.

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

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

Comments:

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

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

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

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

Highest Habitat Level	doc/primary	sus/primary	doc/secondary	sus/secondary	doc/incidental	sus/incidental	none
Functional Point & Rating	---	---	---	---	---	.3 (L)	---

If documented, list the source (e.g., observations, records, etc.)**:** _____

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

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

Primary or Critical habitat **(list species)**	☐ D	☐ S	_____
Secondary habitat **(list species)**	☒ D	☐ S	Northern leopard frog
Incidental habitat **(list species)**	☐ D	☐ S	_____
No usable habitat	☐ D	☐ S	_____

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

Highest Habitat Level	doc/primary	sus/primary	doc/secondary	sus/secondary	doc/incidental	sus/incidental	none
Functional Point & Rating	---	---	.7 (M)	---	---	---	---

If documented, list the source (e.g., observations, records, etc.)**:** Approximately 12 Northern leopard frogs observed in 07.

14C. GENERAL WILDLIFE HABITAT RATING

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

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

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

☒ **Moderate** (based on any of the following)
- ☒ observations of scattered wildlife groups or individuals or relatively few species during peak periods
- ☒ common occurrence of wildlife sign such as scat, tracks, nest structures, game trails, etc.
- ☐ adequate adjacent upland food sources
- ☐ interviews with local biologists with knowledge of the AA

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

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

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

Evidence of Wildlife Use from 14C(i)	**Wildlife Habitat Features Rating** from 14C(ii)			
	☐ **Exceptional**	☒ **High**	☐ **Moderate**	☐ **Low**
Substantial	--	--	--	--
Moderate	--	.7 (M)	--	--
Low	--	--	--	--

Comments: Scattered waterfowl and shorebirds observed at the site.

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

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

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

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

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

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

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

Comments: _____

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

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

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

Estimated wetland area in AA subject to periodic flooding	☐ **≥ 10 acres**			☐ **<10, >2 acres**			☒ **≤2 acres**		
% of flooded wetland classified as forested, scrub/shrub, or both	**75%**	**25-75%**	**<25%**	**75%**	**25-75%**	**<25%**	**75%**	**25-75%**	**<25%**
AA contains **no outlet or restricted outlet**	--	--	--	--	--	--	--	--	.2 (L)
AA contains **unrestricted outlet**	--	--	--	--	--	--	--	--	--

ii. Are residences, businesses, or other features which may be significantly damaged by floods located within 0.5 miles downstream of the AA? (check)
☐**Y** ☒**N** **Comments:** Flooded by 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 NA above.

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

Estimated maximum acre feet of water contained in wetlands within the AA that are subject to periodic flooding or ponding**.**	☐ **>5 acre feet**			☒ **<5, >1 acre feet**			☐ **≤1 acre foot**		
Duration of surface water at wetlands within the AA	**P/P**	**S/I**	**T/E**	**P/P**	**S/I**	**T/E**	**P/P**	**S/I**	**T/E**
Wetlands in AA flood or pond **≥ 5 out of 10 years**	--	--	--	--	.6 (M)	--	--	--	--
Wetlands in AA flood or pond **< 5 out of 10 years**	--	--	--	--	--	--	--	--	--

Comments: _____

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

Applies to wetlands with the potential to receive excess sediments, nutrients, or toxicants through influx of surface or ground water or direct input.
If no wetlands in the AA are subject to such input, check NA above.

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

Sediment, Nutrient, and Toxicant Input Levels Within AA	AA receives or surrounding land use has potential to deliver low to moderate levels of sediments, nutrients, or compounds such that other functions are not substantially impaired. Minor sedimentation, sources of nutrients or toxicants, or signs of eutrophication present.				Waterbody on MDEQ list of waterbodies in need of TMDL development for "probable causes" related to sediment, nutrients, or toxicants **or** AA receives or surrounding land use has potential to deliver high levels of sediments, nutrients, or compounds such that other functions are substantially impaired. Major sedimentation, sources of nutrients or toxicants, or signs of eutrophication present.			
% cover of wetland vegetation in AA	☐ **≥ 70%**		☒ **< 70%**		☐ **≥ 70%**		☐ **< 70%**	
Evidence of flooding or ponding in AA	☐ **Yes**	☐ **No**	☒ **Yes**	☐ **No**	☐ **Yes**	☐ **No**	☐ **Yes**	☐ **No**
AA contains **no or restricted outlet**	--	--	.7 (M)	--	--	--	--	--
AA contains **unrestricted outlet**	--	--	--	--	--	--	--	--

Comments: Site treats adjacent 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 that is subject to wave action. If this does not apply, then check NA above.

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

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

Comments: _____

14I. PRODUCTION EXPORT / FOOD CHAIN SUPPORT

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

A	☐ Vegetated component >5 acres						☒ Vegetated component 1-5 acres						☐ Vegetated component <1 acre					
B	☐ High		☐ Moderate		☐ Low		☐ High		☐ Moderate		☒ Low		☐ High		☐ Moderate		☐ Low	
C	☐Y	☐N	☐Y	☐N	☐Y	☐N	☐Y	☐N	☐Y	☐N	☒Y	☐N	☐Y	☐N	☐Y	☐N	☐Y	☐N
P/P	--	--	--	--	--	--	--	--	--	--	.7M	--	--	--	--	--	--	--
S/I	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
T/E/A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Comments: _____

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

i. ☐ **Discharge Indicators**

- ☐ Springs are known or observed.
- ☐ Vegetation growing during dormant season / drought.
- ☐ Wetland occurs at the toe of a natural slope.
- ☐ Seeps are present at the wetland edge.
- ☐ AA permanently flooded during drought periods.
- ☐ Wetland contains an outlet, but no inlet.
- ☐ Other _____

ii. ☐ **Recharge Indicators**

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

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

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

Comments: Consistent with baseline rating.

14K. UNIQUENESS

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

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

Comments: _____

14L. RECREATION / EDUCATION POTENTIAL

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

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

iii. Based on the location, diversity, size, and other site attributes, is there a strong potential for recreational or educational use?

☒ **Yes** [Proceed to 14L (ii) and then 14L(iv)] ☐ **No** [Rate as low in 14L(iv)]

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

Ownership	Disturbance at AA from 12(i)		
	☐ Low	☒ Moderate	☐ High
Public ownership	--	--	--
Private ownership	--	.3(L)	--

Comments: Site controlled by lessee; permission required; close to Frazer, but relatively low potential for recreation & educational study.

FUNCTION, VALUE SUMMARY, AND OVERALL RATING

Function and Value Variables	Rating	Actual Functional Points	Possible Functional Points	Functional Units (Actual Points x Estimated AA Acreage)
A. Listed/Proposed T&E Species Habitat	low	0.30	1	
B. MT Natural Heritage Program Species Habitat	moderate	0.70	1	
C. General Wildlife Habitat	moderate	0.70	1	
D. General Fish/Aquatic Habitat	N/A		--	
E. Flood Attenuation	low	0.20	1	
F. Short and Long Term Surface Water Storage	moderate	0.60	1	
G. Sediment/Nutrient/Toxicant Removal	moderate	0.70	1	
H. Sediment/Shoreline Stabilization	low	0.30	1	
I. Production Export/Food Chain Support	moderate	0.70	1	
J. Groundwater Discharge/Recharge	N/A (unknown)	0.00	--	
K. Uniqueness	low	0.30	1	
L. Recreation/Education Potential	low	0.30	1	
	Total:	**5.70**	**10.00**	____
		Percent of Total Possible Points:	**57%** (Actual / Possible) x 100 [rd to nearest whole #]	

Category I Wetland: (Must satisfy **one** of the following criteria. If not satisfied, proceed to Category II.)
- ☐ Score of 1 functional point for Listed/Proposed Threatened or Endangered Species; **or**
- ☐ Score of 1 functional point for Uniqueness; **or**
- ☐ Score of 1 functional point for Flood Attenuation **and** answer to Question 14E(ii) is "yes"; **or**
- ☐ Percent of total Possible Points is > 80%.

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

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

Category IV Wetland: (Criteria for Categories I or II are not satisfied **and** all of the following criteria are met; If not satisfied, return to Category III.)
- ☐ "Low" rating for Uniqueness; **and**
- ☐ "Low" rating for Production Export / Food Chain Support; **and**
- ☐ Percent of total possible points is < 30%.

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

☐ **I** ☐ **II** ☒ **III** ☐ **IV**

Appendix C

2007 REPRESENTATIVE PHOTOGRAPHS

MDT Wetland Mitigation Monitoring
West Fork Charley Creek
Frazer, Montana

WEST FORK CHARLEY CREEK WETLAND MITIGATION SITE 2007

Photo Point 1: Facing southeast.

Photo Point 1: Facing northwest.

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

Photo Point2: 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

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
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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 1-3(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 collected and processed Trimble Geo III GPS positions had a 68% accuracy of 7 feet except in isolated areas where accuracy fell to 12 feet. This is within the 1 to 5 meter range listed as the expected accuracy of the mapping grade Trimble GPS.

In 2007, some sites continued to be mapped using the Trimble GEO III GPS unit while most sites were mapped using the resource-grade Magellan MobileMapper Office GPS unit. The Magellan GPS unit has a comparable accuracy level to the Trimble Geo III unit.

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

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

Appendix F

2007 MACROINVERTEBRATE SAMPLING PROTOCOL AND DATA

MDT Wetland Mitigation Monitoring
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 – 2007

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

INTRODUCTION

Aquatic invertebrate assemblages were collected at a number of mitigated wetlands throughout Montana. This report summarizes data generated from seven years of collection. Over all years of sampling, a total of 182 invertebrate samples were collected. Table 1 lists the currently monitored sites at which aquatic invertebrates were collected in 2007, and summarizes the sampling history of each.

METHODS

Sample processing

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

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

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

Quality assurance systems

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

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

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

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

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

Assessment

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

Scoring criteria for wetland metrics were developed by generally following the tactic used by Stribling et al. (1995). Boxplots were generated using a statistical software package (Statistica™), and distributions, median values, ranges, and quartiles for each metric were examined. For the wetland sites, "optimal" scores were generally those that fell above the 75th percentile (for those metrics that decrease in value in response to stress) or below the 25th percentile (for metrics that respond to stress by an increase in value) of all scores. Additional scoring ranges were established by bisecting the range below the 75th percentile for decreasing scores (or above the 25th percentile for increasing scores) into "sub-optimal" and "poor" assessment categories. A score of 5, 3, or 1 was assigned to optimal, sub-optimal, and poor metric performance, respectively. In this way, metric values were translated into normalized metric scores, and scores for all metrics were summed to produce a total bioassessment score, which is expressed as a percentage of the maximum possible score (60). Total bioassessment scores were classified according to a similar process, using the ranges and distributions of total scores for all sites studied in all years. Data from a total of 167 samples were used to develop criteria.

Several sites in this study supported aquatic fauna characteristic of lotic habitats rather than lentic wetland habitats; these sites were excluded from mitigated wetland scoring criteria development, and were evaluated with a metric battery specific to flowing water habitats. In 2007, the lotic sites were Camp Creek (2 sites), Cloud Ranch stream, Kleinschmidt stream, Jack Creek, and Woodson Creek-Ringling stream. Invertebrate assemblages at these sites were generally characteristic of montane or foothill stream conditions and were assessed using the tested metric battery developed for montane streams of Western Montana (Bollman 1998).

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

Bioassessment metrics - wetlands

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

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

Four composition metrics (%Chironomidae, %Orthocladiinae of Chironomidae, %Crustacea + %Mollusca, and %Amphipoda) measure the relative contributions of certain taxonomic groups that may have significant responses to habitat and/or water quality impacts. For example, amphipods have been demonstrated to increase in abundance in

alkaline conditions. Short-lived, relatively mobile taxa such as chironomids dominate ephemeral environments; many are hemoglobin-bearers capable of tolerating de-oxygenated conditions.

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

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

Summary metric values and scores for the 2007 samples are given in Tables 4a-4c and 5.

In 2007, thermal preference of the invertebrate assemblages was calculated when possible, using the tool developed by Brandt 2001.

Bioassessment metrics – lotic habitats

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

1. Ephemeroptera (mayfly) taxa richness. The number of mayfly taxa declines as water quality diminishes. Impairments to water quality which have been demonstrated to adversely affect the ability of mayflies to flourish include elevated water temperatures, heavy metal contamination, increased turbidity, low or high pH, elevated specific conductance and toxic chemicals. Few mayfly species are able to tolerate certain disturbances to instream habitat, such as excessive sediment deposition.
2. Plecoptera (stonefly) taxa richness. Stoneflies are particularly susceptible to impairments that affect a stream on a reach-level scale, such as loss of riparian canopy, streambank instability, channelization, and alteration of morphological features such as pool frequency and function, riffle development and sinuosity. Just as all benthic organisms, they are also susceptible to smaller scale habitat loss, such as by sediment deposition, loss of interstitial spaces between substrate particles, or unstable substrate.
3. Trichoptera (caddisfly) taxa richness. Caddisfly taxa richness has been shown to decline when sediment deposition affects habitat. In addition, the presence of certain case-building caddisflies can indicate good retention of woody debris and lack of scouring flow conditions.
4. Number of sensitive taxa. Sensitive taxa are generally the first to disappear as anthropogenic disturbances increase. The list of sensitive taxa used here includes organisms sensitive to a wide range of disturbances, including warmer water temperatures, organic or nutrient pollution, toxic pollution, sediment deposition, substrate instability and others. Unimpaired streams of western Montana typically support at least four sensitive taxa (Bollman 1998).
5. Percent filter feeders. Filter-feeding organisms are a diverse group; they capture small particles of organic matter, or organically enriched sediment material, from the water column by means of a variety of adaptations, such as silken nets or hairy appendages. In forested montane streams, filterers are expected to occur in insignificant numbers. Their abundance increases when canopy cover is lost and when water temperatures increase and the accompanying growth of filamentous algae occurs. Some filtering organisms, specifically the Arctopsychid caddisflies (*Arctopsyche* spp. and *Parapsyche* spp.) build silken nets with large mesh sizes that capture small organisms such as chironomids and early-instar mayflies. Here they are considered predators, and, in this study, their abundance does not contribute to the percent filter feeders metric.
6. Percent tolerant taxa. Tolerant taxa are ubiquitous in stream sites, but when disturbance increases, their abundance increases proportionately. The list of taxa used here includes organisms tolerant of a wide range of disturbances, including warmer water temperatures, organic or nutrient pollution, toxic pollution, sediment deposition, substrate instability and others.

Table 1. Montana Department of Transportation Mitigated Wetlands Monitoring Project sites: sampling history. Only those sites monitored in 2007 are included. An asterisk (*) indicates lotic sites.

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

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

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

RESULTS

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

Quality Assurance

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

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

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

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

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

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

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

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

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

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

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

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Taxa Listing

Project ID: MDT07PBSJ
RAI No.: MDT07PBSJ003

RAI No.: MDT07PBSJ003 Sta. Name: Charley Creek
Client ID:
Date Coll.: 7/17/2007 No. Jars: 1 STORET ID:

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Non-Insect							
Acari	5	5.43%	Yes	Unknown		5	PR
Ostracoda	1	1.09%	Yes	Unknown		8	CG
Glossiphoniidae							
Helobdella sp.	3	3.26%	Yes	Unknown		6	PA
Hyalellidae							
Hyalella sp.	21	22.83%	Yes	Unknown		8	CG
Lymnaeidae							
Stagnicola sp.	27	29.35%	Yes	Unknown		6	SC
Coleoptera							
Dytiscidae							
Liodessus sp.	1	1.09%	Yes	Adult		5	PR
Haliplidae							
Haliplus sp.	1	1.09%	Yes	Adult		5	PH
Hydrophilidae							
Hydrophilidae	1	1.09%	Yes	Larva		5	PR
Diptera							
Ceratopogonidae							
Ceratopogoninae	1	1.09%	Yes	Larva		6	PR
Chaoboridae							
Chaoboridae	6	6.52%	Yes	Larva		8	PR
Chironomidae							
Chironomidae							
Cricotopus (Isocladius) sp.	17	18.48%	Yes	Larva		7	SH
Dicrotendipes sp.	1	1.09%	Yes	Larva		8	CG
Psectrocladius sp.	7	7.61%	Yes	Larva		8	CG
Sample Count	92						

Metrics Report

Project ID: MDT07PBSJ
RAI No.: MDT07PBSJ003
Sta. Name: Charley Creek
Client ID:
STORET ID:
Coll. Date: 7/17/2007

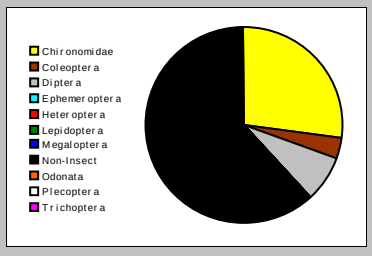
Abundance Measures

Sample Count: 92
Sample Abundance: 92.00 100.00% of sample used

Coll. Procedure:
Sample Notes:

Taxonomic Composition

Category	R	A	PRA
Non-Insect	5	57	61.96%
Odonata			
Ephemeroptera			
Plecoptera			
Heteroptera			
Megaloptera			
Trichoptera			
Lepidoptera			
Coleoptera	3	3	3.26%
Diptera	2	7	7.61%
Chironomidae	3	25	27.17%

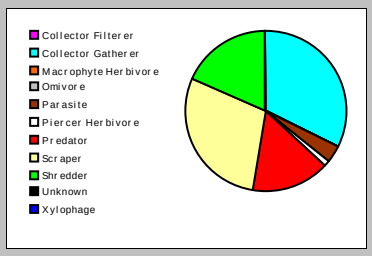


Dominant Taxa

Category	A	PRA
Stagnicola	27	29.35%
Hyalella	21	22.83%
Cricotopus (Isocladius)	17	18.48%
Psectrocladius	7	7.61%
Chaoboridae	6	6.52%
Acari	5	5.43%
Helobdella	3	3.26%
Ostracoda	1	1.09%
Liodessus	1	1.09%
Hydrophilidae	1	1.09%
Haliplus	1	1.09%
Dicrotendipes	1	1.09%
Ceratopogoninae	1	1.09%

Functional Composition

Category	R	A	PRA
Predator	5	14	15.22%
Parasite	1	3	3.26%
Collector Gatherer	4	30	32.61%
Collector Filterer			
Macrophyte Herbivore			
Piercer Herbivore	1	1	1.09%
Xylophage			
Scraper	1	27	29.35%
Shredder	1	17	18.48%
Omivore			
Unknown			



Metric Values and Scores

Metric	Value	BIBI	MTP	MTV	MTM
Composition					
Taxa Richness	13	1	1		0
Non-Insect Percent	61.96%				
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	3.26%				
Baetidae/Ephemeroptera	0.000				
Hydropsychidae/Trichoptera	0.000				
Dominance					
Dominant Taxon Percent	29.35%		3		2
Dominant Taxa (2) Percent	52.17%				
Dominant Taxa (3) Percent	70.65%	3			
Dominant Taxa (10) Percent	96.74%				
Diversity					
Shannon H (loge)	1.948				
Shannon H (log2)	2.810		2		
Margalef D	2.654				
Simpson D	0.178				
Evenness	0.110				
Function					
Predator Richness	5		2		
Predator Percent	15.22%	3			
Filterer Richness	0				
Filterer Percent	0.00%			3	
Collector Percent	32.61%		3		3
Scraper+Shredder Percent	47.83%		3		2
Scraper/Filterer	0.000				
Scraper/Scraper+Filterer	0.000				
Habit					
Burrower Richness	2				
Burrower Percent	2.17%				
Swimmer Richness	2				
Swimmer Percent	2.17%				
Clinger Richness	1	1			
Clinger Percent	18.48%				
Characteristics					
Cold Stenotherm Richness	0				
Cold Stenotherm Percent	0.00%				
Hemoglobin Bearer Richness	1				
Hemoglobin Bearer Percent	1.09%				
Air Breather Richness	2				
Air Breather Percent	2.17%				
Voltinism					
Univoltine Richness	4				
Semivoltine Richness	3	3			
Multivoltine Percent	33.70%		3		
Tolerance					
Sediment Tolerant Richness	1				
Sediment Tolerant Percent	29.35%				
Sediment Sensitive Richness	0				
Sediment Sensitive Percent	0.00%				
Metals Tolerance Index	3.304				
Pollution Sensitive Richness	0	1		0	
Pollution Tolerant Percent	39.13%	3		0	
Hilsenhoff Biotic Index	6.880		1		0
Intolerant Percent	0.00%				
Supertolerant Percent	39.13%				
CTQa	93.000				

Bioassessment Indices

BioIndex	Description	Score	Pct	Rating
BIBI	B-IBI (Karr et al.)	18	36.00%	
MTP	Montana DEQ Plains (Bukantis 1998)	18	60.00%	Slight
MTV	Montana Revised Valleys/Foothills (Bollman 1998)	3	16.67%	Severe
MTM	Montana DEQ Mountains (Bukantis 1998)	7	33.33%	Moderate