

# MONTANA DEPARTMENT OF TRANSPORTATION STATEWIDE WETLAND MITIGATION SITE MONITORING PROJECT

## EXECUTIVE SUMMARY - 2006 MONITORING RESULTS



*Prepared for:*



**Montana Department of Transportation**

**ENVIRONMENTAL SERVICES  
2701 PROSPECT AVENUE  
HELENA, MONTANA 59620**

*Prepared by:*



**POST, BUCKLEY, SCHUH, & JERNIGAN  
P.O. BOX 239  
HELENA, MONTANA 59624**

**December 2006**

## TABLE OF CONTENTS

<b>1.0 INTRODUCTION</b> .....	1
<b>2.0 INDIVIDUAL MITIGATION SITE DISCUSSIONS</b> .....	4
2.1 Alkali Lake (Great Falls District, Year 1) .....	4
2.2 American Colloid (Glendive District, Year 5).....	6
2.3 Batavia Waterfowl Production Area (Missoula District, Year 6).....	7
2.4 Beaverhead Gateway Ranch (Butte District, Year 6 – Final Year) .....	10
2.5 Camp Creek (Missoula District, Year 5) .....	12
2.6 Cloud Ranch (Billings District, Year 3) .....	16
2.7 Hoskins Landing (Missoula District, Year 5).....	19
2.8 Jack Creek Ranch (Butte District, Year 3).....	22
2.9 Kleinschmidt Creek (Missoula District, Year 5) .....	23
2.10 Lame Deer (Glendive District, Year 5).....	27
2.11 Little Muddy Creek (Great Falls District, Year 3).....	29
2.12 Meriwether-East (Great Falls District, Year 1).....	30
2.13 Musgrave Lake (Great Falls District, Year 6 - Final Year) .....	32
2.14 Norem Ranch (Billings District, Year 3) .....	36
2.15 Perry Ranch (Great Falls District, Year 5).....	38
2.16 Peterson Ranch (Missoula District, Year 5) .....	40
2.17 Ridgeway Complex ( Glendive District, Year 6).....	43
2.18 Ringling (Butte District, Year 6) .....	44
2.19 Rock Creek Ranch (Glendive District, Year 2) .....	45
2.20 Roundup (Billings District, Year 6).....	48
2.21 South Fork Smith (Butte District, Year 5).....	50
2.22 Wagner Marsh (Billings District, Year 2).....	52
2.23 Wigeon Reservoir (Glendive District, Year 6 – Final Year) .....	55

## CHART

Chart 1 *Percent of MDT Wetland Mitigation Target Achieved in 2006 by Watershed*

## APPENDICES

Appendix A *Table 1: Summary Information for MDT Wetland Mitigation Sites*

Appendix B *Table 32: 2006 Maintenance Summary/Update*

## TABLES

- Table 1 *Summary of MDT Wetland Mitigation Sites monitored during 2001 to 2006.*
- Table 2 *Target verses actual credit acreage by watershed basin at MDT Wetland Mitigation Sites monitored during 2001 to 2006.*
- Table 3 *2006 Tribal and Corps of Engineers credits at the Alkali Lake Wetland Mitigation Site.*
- Table 4 *Summary of 2006 wetland function/value ratings and functional points at the Alkali Lake Wetland Mitigation Site.*
- Table 5 *Summary of 2002 (initial) and 2006 wetland function/value ratings and functional points at the American Colloid Wetland Mitigation Project.*
- Table 6 *Summary of 1996 (baseline) and 2006 wetland function/value ratings and functional points at the Batavia Wetland Mitigation Project.*
- Table 7 *Summary of 2006 wetland function/value ratings and functional points at the Beaverhead Gateway Ranch Wetland Mitigation Project..*
- Table 8 *2006 functional unit-based credit for the Camp Creek Wetland Mitigation Project.*
- Table 9 *Summary of 2001 (baseline) and 2006 wetland function/value ratings and functional points at Camp Creek Wetland Mitigation Site.*
- Table 10 *2006 credit acreages and ratios for the Cloud Ranch Wetland Mitigation Site.*
- Table 11 *Summary of 2004 to 2006 wetland function/value ratings and functional points at the Cloud Ranch Wetland Mitigation Project.*
- Table 12 *Summary of 1999 (baseline) and 2006 wetland function/value ratings and functional points at the Hoskins Landing Wetland Mitigation Project.*
- Table 13 *Summary of 2002 and 2006 wetland function/value ratings and functional points at the Jack Creek Ranch Wetland Mitigation Project.*
- Table 14 *Maximum Kleinschmidt Creek Mitigation Site credits as of 2006.*
- Table 15 *Summary of 1998 (baseline) and 2006 wetland function/value ratings and functional points at the Kleinschmidt Creek Wetland Mitigation Project.*
- Table 16 *Summary of 2006 wetland function/value ratings and functional points at the Lame Deer – East Wetland Mitigation Project.*

**TABLES (continued)**

- Table 17 *Summary of 2006 wetland function/value ratings and functional points at the Little Muddy Creek Wetland Mitigation Site.*
- Table 18 *Summary of 2006 wetland function/value ratings and functional points at Site 2 of the Meriwether-East Wetland Mitigation Site.*
- Table 19 *Original wetland credit breakdown for the Musgrave Lake Wetland Mitigation Site.*
- Table 20 *Summary of 1999 (reference and baseline) and 2006 wetland function/value ratings and functional points at the Musgrave Lake Wetland Mitigation Project.*
- Table 21 *2006 Norem Ranch Wetland Mitigation Site monitoring results.*
- Table 22 *Summary of 2001(baseline) and 2006 wetland function/value ratings and functional points at the Norem Ranch Wetland Mitigation Project.*
- Table 23 *Summary of baseline and 2006 wetland function/value ratings and functional points at the Perry Ranch Wetland Mitigation Project.*
- Table 24 *Summary of 1998 (baseline) and 2006 wetland function/value ratings and functional points at the Peterson Ranch Wetland Mitigation Project.*
- Table 25 *Summary of 2006 wetland function/value ratings and functional points for all Ridgeway Complex Wetland Mitigation Sites.*
- Table 26 *Summary of 2003 and 2006 wetland function/value ratings and functional points at the Rock Creek Ranch Wetland Mitigation Project.*
- Table 27 *Summary of 2001 and 2006 wetland function/value ratings and functional points at the Roundup Wetland Mitigation Project.*
- Table 28 *Summary of 2001 (baseline) and 2006 wetland function/value ratings and functional points at the South Fork Smith River Wetland Mitigation Project.*
- Table 29 *2006 mitigation credit summary for the Wagner Marsh Wetland Mitigation Site.*
- Table 30 *Summary of 2001 (baseline) and 2006 wetland function/value ratings and functional points at the Wagner Marsh Wetland Mitigation Project.*
- Table 31 *Summary of 2001 and 2006 wetland function/value ratings and functional points at the Wigeon Reservoir Wetland Mitigation Project.*
- Table 32 *2006 maintenance summary and update for each MDT Wetland Mitigation Site.*

## ABBREVIATIONS AND ACRONYMS

AA	Assessment Area
ADC	Aquatic Design and Consturction
BLM	Bureau of Land Management
COE	U.S. Army Corps of Engineers
DEQ	Montana Department of Environmental Quality
DU	Ducks Unlimited
EPA	U.S. Environmental Protection Agency
FFIP	Future Fisheries Improvement Program
LWC	Land and Water Consulting, Inc.
MDT	Montana Department of Transportation
MFWP	Montana Fish, Wildlife and Parks
MTNHP	Montana Natural Heritage Program
MOA	Memorandum of Agreement
OW	Open water
PBS&J	Post, Buckley, Schuh, and Jernigan (formerly LWC)
T&E	Threatened and Endangered
USFWS	U.S. Fish and Wildlife Service
WPA	Waterfowl Production Area

## 1.0 INTRODUCTION

This document summarizes the results of the 2006 monitoring efforts at 23 wetland mitigation sites located throughout Montana that were constructed by or for the Montana Department of Transportation (MDT). Full monitoring reports for each of these sites were prepared and presented to MDT in December 2006. The following mitigation sites were monitored during 2006:

Alkali Lake	Musgrave Lake
American Colloid	Norem Ranch
Batavia Waterfowl Production Area	Perry Ranch
Beaverhead Gateway Ranch	Peterson Ranch
Camp Creek	Ringling
Cloud Ranch	Ridgeway Complex
Hoskins Landing	Rock Creek Ranch
Jack Creek Ranch	Roundup
Kleinschmidt Creek	South Fork Smith River
Lame Deer-East	Wagner Marsh
Little Muddy Creek	Wigeon Reservoir
Meriwether-East	

Monitoring activities were conducted by PBS&J wetland scientists between April and October 2006 in accordance with standard MDT wetland mitigation site monitoring protocols. Activities and information conducted/collected included: wetland delineation; wetland/open water aquatic habitat boundary mapping; vegetation community mapping; vegetation transects; soils data; hydrology data; seasonal bird and general wildlife use; photograph points; macroinvertebrate sampling; functional assessment; and (non-engineering) examination of constructed features. Monitoring methods are discussed at length in the individual site monitoring reports and are generally not discussed further in this summary.

**Table 1 (Appendix A)** provides, for each monitored mitigation site: site name, MDT District, year constructed, major Montana watershed basin, pre-project wetland acreage and functional assessment category, target wetland credit, 2006 wetland acreage and functional assessment category, enhancement credit ratios, upland credit ratios, total wetland acreage gain / credit and functional unit gain as of 2006, and comments.

**Table 2** presents target verses actual credit acreage by watershed basin at MDT mitigation sites monitored in 2001, 2002, 2003, 2004, 2005, and 2006. **Chart 1** presents this information on a percentage basis. Statewide, the target credit acreage at monitored sites is approximately 757 acres. For purposes of **Table 2**, “target” acreage includes projected credit reserves as well as impact-specific compensatory targets. Consequently, the target may actually be substantially larger than the required mitigation needs in some watersheds. As of the 2006 monitoring season, approximately 690 acres of “wetland credit” have developed at these monitored sites. Thus, cumulatively, monitored mitigation projects are at approximately 91% of the statewide credit target.

A summary of maintenance issues identified in 2006 is provided in **Table 32 (Appendix B)**.

**Table 2: Target versus actual credit acreage by watershed basin at the MDT Wetland Mitigation Sites monitored during 2001 to 2006.**

Major Montana Watershed Basin	Monitoring Site	Minimum Target Credit Acreage <sup>a</sup>	Credit Acreage as of 2006 Monitoring	Percent of Target Acreage Achieved as of 2006 Monitoring	Approximate Functional Unit Gain as of 2006 Monitoring (acre x functional point)
1 – Kootenai	No Site	---	---	---	---
2 – Upper Clark Fork	Peterson Ranch Brown's Gulch Kleinschmidt Creek	33.26	19.52	101	198.29
3 – Lower Clark Fork	Camp Creek Hoskins Landing	19.50	23.68 <sup>b</sup>	121	225.59
4 – Flathead	Batavia WPA Creston Lawrence Park	36.72	27.15 <sup>c</sup>	74	291.72
5 – St Mary	No Site	---	---	---	---
6 – Upper Missouri	Beaverhead Jack Creek Ranch Rey Creek	103.20	135.37 <sup>d</sup>	131	1,137.90
7 – Missouri-Sun-Smith	Cow Coulee Little Muddy Creek Ringling-Galt SF Smith River	88.07 <sup>e</sup>	66.44 <sup>e</sup>	75	454.13
8 – Marias	Alkali Lake Jack Johnson Meriwether-East Perry Ranch	212.97	128.76	61	1,102.46
9 – Middle Missouri	Fourchette Creek Big Spring Creek	17.21 <sup>f</sup>	15.08 <sup>f</sup>	88	108.15
10 – Musselshell	Lavina Ryegate Roundup	26.00	25.59	98	184.90
11 – Milk	Big Sandy Musgrave Lake Rock Creek Ranch	86.64	126.81	146	800.52
12 – Lower Missouri	Vida Circle Plentywood-N	8.30	4.94	60	40.83
13 – Upper Yellowstone	Cloud Ranch Norem Ranch Stillwater Vince Ames Wagner Marsh Wyola-Sunlight	64.49	44.95	70	296.94 <sup>g</sup>
14 – Middle Yellowstone	Lame Deer-East	3.18	1.92	60	14.24
15 – Lower Yellowstone	Crackerbox Creek	1.20	1.60	133	7.20
16 – Little Missouri	American Colloid Ridgeway Wigeon Reservoir	56.60	67.82	120	517.99
<b>TOTAL</b>	<b>41</b>	<b>757.34 acres</b>	<b>690.48 acres</b>	<b>91%</b>	<b>5,380.86 funct. units</b>
Average per Site	--	18.47 acres	16.84 acres	--	131.24 funct. units

<sup>a</sup> Includes proposed "reserves" as well as impact-specific targets.

<sup>b</sup> Includes functional unit-based credits at Camp Creek mitigation site.

<sup>c</sup> Accounts for agency negotiation that resulted in 19.6 acres of additional enhancement credit at Batavia WPA.

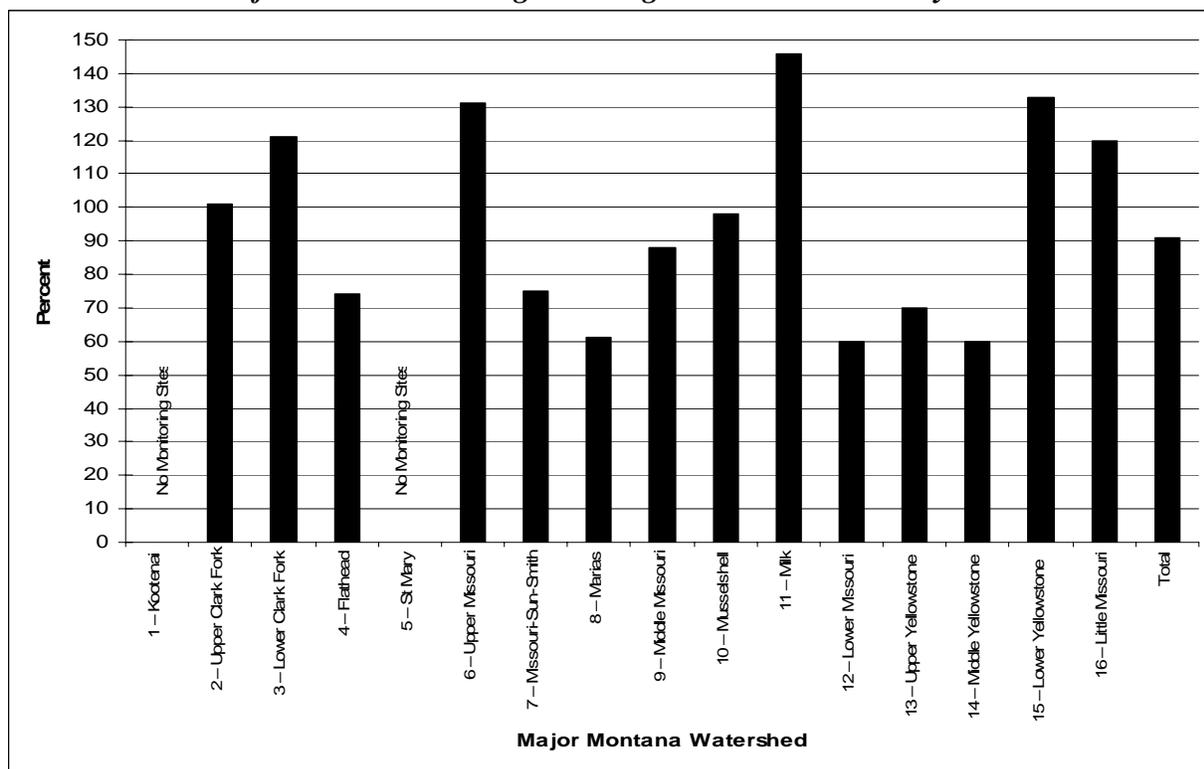
<sup>d</sup> Wetland "credit" total no longer includes 20.3 acres at Beaverhead Ranch that MDT elected not to purchase from the landowner.

<sup>e</sup> Does not include wetland acreage for SF Smith site because no target was assigned. Caps credits at 63.57 acres at Little Muddy Creek site per COE; although 102.45 acres of wetlands were present in 2006.

<sup>f</sup> Assumes 7.21 acres for both target and credit at Big Spring Creek.

<sup>g</sup> Does not include functional unit gain at Cloud Ranch as baseline was unavailable.

**Chart 1: Percent of MDT wetland mitigation target achieved in 2006 by watershed.**



The current 67-acre discrepancy between target and credit figures is due to a few main factors. A primary factor was that some large sites (Alkali Lake [2005], Jack Creek Ranch [2003]) were recently constructed and were just beginning to develop wetland characteristics. The cumulative credit target for these two sites was over 204 acres. Another main factor was that one of the larger sites, Peterson Ranch (17.5-acre target), was not receiving its planned hydrology due to water right permit denial.

For reference, **Tables 1** and **2** include the following sites that were monitored only one year for “final” documentation purposes in 2001: Lawrence Park, Big Sandy, Crackerbox Creek, Vida, Lavina, Ryegate, Vince Ames, and Wyola-Sunlight Ranch. These tables also include the Plentywood-North mitigation site, which was only monitored in 2001. The MDT determined that the Plentywood-North mitigation site would be monitored in-house subsequent to 2001 due to its small size and remote location. **Tables 1** and **2** also include the Jack Johnson and Rey Creek sites, which were finalized in 2003; the Fourchette, Brown’s Gulch, and Circle sites, which were finalized in 2004; and the Creston, Big Spring Creek, and Stillwater sites which were finalized in 2005. The Cow Coulee site was also included, which has not been finalized nor was it monitored in 2006. Monitoring at this site was suspended during 2005 and 2006 due to water delivery problems.

Summaries of each of the mitigation sites monitored in 2006 are presented in alphabetical order in Section 2.0. Each discussion includes site history and objectives, delineation and functional assessment results, maintenance needs, and other recommendations, where applicable.

Supporting materials such as site maps, figures, data forms, photographs, and other information can be found in each of the individual monitoring reports, and are not included in this summary.

## 2.0 INDIVIDUAL MITIGATION SITE DISCUSSIONS

### 2.1 Alkali Lake (Great Falls District, Year 1)

MDT, in cooperation with the Bureau of Indian Affairs (BIA) and the Blackfeet Nation's Environmental Office and Fish & Wildlife Department, designed and built a wetland restoration project within a historic lakebed (Southeast Alkali Lake) on the Blackfeet Indian Reservation in Pondera County, Montana. The Alkali Lake restoration project was originally proposed in 1996 by the Blackfeet Nation Fish & Wildlife program and the U.S. Fish and Wildlife Service (USFWS) as a means to re-establish shorebird and wetland habitat to the southeastern arm of Alkali Lake.

The Alkali Lake Wetland Mitigation project is comprised of an approximate 175.8-acre historic lakebed and was constructed and flooded in late summer/early fall 2005. Hydrology was restored to the lakebed by constructing a pipeline from the Birch Creek Main Canal to Blacktail Creek; water then flows from a diversion in Blacktail Creek into the Badger Fisher Main Canal, K Canal, and 19K Canal where another pipeline was built to deliver water to the Alkali Lake site. Project goals are to restore/re-establish approximately 74.42 acres of historic wetlands (an estimated 20-30 acres of which were dominated by remnant hydrophytic vegetation, but lacked wetland hydrology); restore/re-establish approximately 101.4 acres of historic open water/lakebed (some or much of which could also conceivably result in wetland restoration); and provide fencing and an upland buffer. The project credit ratios were approved by the Corps of Engineers and the Blackfeet Tribe.

In 2006, 38.7 acres of emergent wetlands were delineated at the site. These areas satisfied soils, hydrology, and vegetation performance standards. Additionally, the site contained 118.61 acres of transitional shallow open water, for a total of 157.31 acres of aquatic habitat. The upland buffer also satisfied applicable performance standards. The 2006 credits at the site, applying Tribal and COE credit ratios, are presented in **Table 3**. It is anticipated that wetlands will continue to develop over time.

**Table 3: 2006 Tribal and Corps of Engineers credits at the Alkali Lake Wetland Mitigation Site.**

Proposed Feature	2006 Delineated Acres	Tribal Credit Ratio and 2006 Calculated Credit	Tribal Credit Target	Corps Credit Ratio and 2006 Calculated Credit	Corps Credit Target
Primary emergent wetland restoration	38.7	1:2.5 credit ratio 15.48 credit acres	29.77 credit acres	1:1 credit ratio 38.7 credit acres	74.42 credit acres
Shallow open water restoration	118.61	1:2.5 credit ratio 47.44 credit acres	40.56 credit acres	1:1 credit ratio (to a max. matching wetland acres) 38.7 credit acres	74.42 credit acres
100-ft-wide upland buffer	45.12	1:4 credit ratio 11.28 credit acres	1:4 credit ratio 11.28 credit acres	1:4 credit ratio (on max. 50-ft width) 5.64 credit acres	1:4 credit ratio (on max. 50-ft width) 5.64 credit acres
<b>TOTALS</b>	157.31 (aquatic only)	<b>74.2 credit acres</b>	81.61 credit acres	<b>83.04 credit acres</b>	154.48 credit acres

In 2006, the Alkali Lake Wetland Mitigation Site rated as a Category II wetland because of its high wildlife habitat rating (**Table 4**). The site also rated high or moderate for the following functions or values: MTNHP Species Habitat; Short and Long Term Surface Water Storage; Sediment, Nutrient, Toxicant Removal; Production Export/Food Chain Support; Uniqueness; and Recreation/Education Potential (**Table 4**).

**Table 4: Summary of 2006 wetland function/value ratings and functional points at the Alkali Lake Wetland Mitigation Site.**

Function and Value Parameters from the 1999 MDT Montana Wetland Assessment Method <sup>1</sup>	2006
Listed/Proposed T&E Species Habitat	Low (0.3)
MTNHP Species Habitat	Mod (0.6)
General Wildlife Habitat	High (0.9)
General Fish/Aquatic Habitat	N/A
Flood Attenuation	N/A
Short and Long Term Surface Water Storage	High (0.9)
Sediment, Nutrient, Toxicant Removal	Mod (0.7)
Sediment/Shoreline Stabilization	Low (0.2)
Production Export/Food Chain Support	Mod (0.6)
Groundwater Discharge/Recharge	Low (0.1)
Uniqueness	Mod (0.4)
Recreation/Education Potential	Mod (0.7)
Actual Points/Possible Points	5.4 / 10
% of Possible Score Achieved	54%
Overall Category	II
<b>Total Acreage of Assessed Wetlands and Other Aquatic Habitats within Site Boundaries (ac)</b>	<b>157.31</b>
<b>Functional Units (acreage x actual points)</b>	<b>849.47</b>

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

## 2.2 American Colloid (Glendive District, Year 5)

The American Colloid wetland mitigation site was constructed in October 2001 in an ephemeral drainage to mitigate 4.4 acres of unavoidable wetland impacts associated with the following MDT projects: Alzada-West and Alzada-South, in the Little Missouri Watershed (watershed #16). The wetland site was constructed to encompass 5 acres and includes a 10-acre buffer zone; the entire 15 acres have been fenced. The wetland mitigation site is located in Carter County, MT, near the community of Alzada.

At the time of the investigation, the water level was full-pool. *Spartina* is beginning to colonize the outer edges of the full-pool water level and a mixed wetland vegetation community is developing in the northeast thumb at high water level. A dramatic increase in wetland vegetation coverage is expected during the next two growing seasons now that the water level has stabilized and a seed source is developing at various intervals around the pond. The gross wetland and open water boundary totaled 4.08 acres at the time of the investigation and net wetland area comprised 0.06 acre. Wetlands have increased 0.03 acre since 2005.

Functional assessment results are summarized in **Table 5** below. The mitigation site was rated a Category III wetland in 2006, a decrease from the Category II wetland score it was given the last three years. The primary reason for this decrease is the lack of wildlife observations that have been noted in five years of monitoring visits and low percentage of actual vegetated wetland at the site in 2006. In addition, the water remained very cloudy with sediment, but may have been the result of a recent storm event. High levels of suspended sediment may be having a negative effect on the development of aquatic species, both vegetative and invertebrate, although nearby wetlands exhibited the same turbidity and were well-vegetated. Functional units decreased approximately 4.6 points since 2005, from 19.7 to 15.1 FU, as a result of these adjustments.

No maintenance issues were noted; the outflow culverts were free on the inlet end.

**Table 5: Summary of 2002 (initial) and 2006 wetland function/value ratings and functional points at the American Colloid Wetland Mitigation Project.**

Function and Value Parameters From the 1999 MDT Montana Wetland Assessment Method	2002	2006
Listed/Proposed T&E Species Habitat	Low (0)	Low (0)
MTNHP Species Habitat	Mod (.6)	Mod ( 0.7)
General Wildlife Habitat	Mod (.4)	Mod (.5)
General Fish/Aquatic Habitat	NA	NA
Flood Attenuation	Mod (.4)	NA
Short and Long Term Surface Water Storage	High (.8)	Mod (.4)
Sediment, Nutrient, Toxicant Removal	Mod (.6)	Low (.3)
Sediment/Shoreline Stabilization	Mod (.7)	Low (.3)
Production Export/Food Chain Support	Mod (.6)	Mod (.4)
Groundwater Discharge/Recharge	NA	NA
Uniqueness	Low (.3)	Mod (.4)
Recreation/Education Potential	Mod (.5)	Mod (.7)
Actual Points/Possible Points	4.9/10	3.7/9
% of Possible Score Achieved	49%	41%
Overall Category	III	III
<b>Total Acreage of Assessed Wetlands within Monitoring Area</b>	<b>0.69</b>	<b>4.08 (max)</b>
<b>Total Functional Units (acreage x actual points)</b>	<b>3.38</b>	<b>15.1 (max)</b>
<b>Net Acreage Gain (“new” wetlands)</b>	<b>0.69</b>	<b>4.08 (max)</b>
<b>Net Functional Unit Gain (new acreage x actual points)</b>	<b>3.38</b>	<b>15.1 (max)</b>

### 2.3 Batavia Waterfowl Production Area (Missoula District, Year 6)

The Batavia Waterfowl Production Area (WPA) mitigation project is located in the Smith Valley, approximately five miles southwest of Kalispell, MT in Flathead County. The Batavia WPA mitigation project was developed to mitigate wetland impacts associated with MDT roadway projects that have been or will be constructed in the Flathead Watershed (watershed #4). Specifically, the mitigation pertains to impacts on the Missoula County Line North, Somers to Whitefish, Swan River Bridge, and future projects.

The entire WPA is influenced by a high groundwater table and by surface water diverted out of nearby Ashley Creek. Over time, the existing dike structure and water delivery system became degraded to a point where the dike was no longer holding water at the desired elevation. The intent of the project was to raise the water level approximately 2 feet to increase the area of inundation. This was to be achieved by reconstructing the degraded dike system. Construction was completed in January 1998 with the goal of creating and enhancing wetlands. In addition to reconstructing the dike, several defunct culverts were removed, three new control devices were installed, and open water was restored in the vicinity of several small islands, essentially enhancing the site by creating habitat diversity.

According to MDT project files, mitigation credits were determined by assigning credit ratios for creation and enhancement across the entire site. A total of 28.72 acres of credit was agreed upon by MDT, the U.S. Fish & Wildlife Service (USFWS), and U.S. Army Corps of Engineers (COE),

with the potential for an additional 6.8 acres to be credited following post-project monitoring. Credits were broken down as follows:

Wetland Creation minus impacts from new dike:	18.2 acres credited at 2:1 =	9.10 acres
North Cell enhancement:	76.8 acres credited at 8:1 =	9.60 acres
South Cell enhancement:	60.0 acres credited at 6:1 =	<u>10.0 acres</u>
		Total =28.72 acres

The WPA encompasses two primary hydrologic areas referred to as the North Cell (76.8 acres) and South Cell (60.3 acres). Due to the immense size of the WPA and the enormous effort required to monitor the entire site, three monitoring areas were selected by MDT to serve as representations of the larger site. The three monitoring areas are located: 1) at the southwest corner of the South Cell (Wetland D); 2) between the North Cell and South Cell on the western end (Wetlands B and C); and 3) on the northwest side of the North Cell (Wetland A). Borrow material was removed from each of these areas for construction of the new dike and wetland creation was expected at each location.

In March of 2005, Ducks Unlimited (DU) lowered the four borrow areas through excavation to ensure inundation and future wetland establishment in these areas. The delineated areas in 2006 were similar to those observed in 2005, except around the perimeter of the excavated areas, where a narrow (1' – 4') fringe has begun to develop. For the most part, the remaining open water areas created in 2005 remained unvegetated, with just individual scattered plants noted.

The original goal of the project was to create approximately three acres of wetland in the borrow areas and 5.9 acres up to the designed full pool elevation in the north and south cells combined. It was also anticipated that an additional 13.6 acres of wetland would develop beyond the full pool elevation through capillary action in the soil. When added together, a gross total of 22.5 acres of creation was expected across the site. Subtract from this the 4.3 acres of impact from the new dike structure and the net wetland gain was to be 18.2 acres. An eventual delineation of the north and south cells is necessary in order to determine if the anticipated periphery wetlands have developed.

Approximately 19.6 acres of enhancement has occurred in the north and south cells through the creation of more open water habitat around the many small islands. The COE concurred with this determination in early 2004. Creating habitat diversity by adding open water areas has likely attracted more wildlife species and potentially encouraged the establishment different emergent and submergent plant communities. These areas would be even further enhanced with increased water levels across the site.

Current creation credit that has developed at the site consists of 1.60 acres wetland creation + 4.93 acres open water creation minus the 4.3 acres from dike construction leaves 2.23 acres of net creation. Credited at a 2:1 ratio, this equals 1.11 acres. Adding the 1.11 acres of creation credit to the 19.6 acres enhancement credit equals **20.71 acres** of net aquatic habitat credit. As mentioned, wetlands may well develop in the newly excavated open water areas. Future monitoring will document wetland establishment in these areas. Additional credits may be available in the north and south cells; however, a full delineation of the cells would be necessary to make that determination.

Functional assessment results are summarized in **Table 6** below. In order to compare pre and post project functional assessment, the entire site was considered including the active Ashley Creek channel. Although direct comparisons cannot be made between the two assessments because different versions of the form were used, general comparisons can be made. A comparison of the two assessments shows similarities, although the most recent functional assessment produced higher ratings based on MTNHP species habitat (Forster's [past USFWS observations] and black terns [2005 observations]), groundwater discharge/recharge, and recreation/education potential. The original functional assessment rated the wetland as a Category II with 65% of possible points, while the current assessment rated the wetland as a Category II with 80% of possible points. This assessment is unchanged from 2005.

In order for this site to reach its full potential, it is critical that the designed water elevation of 3,128.5 feet be attained, especially during the spring and early growing season. During years of average or above average runoff, enough water should be available to successfully recharge the site through diversion out of Ashley Creek. It appears as though the desired full pool elevation of 3,128.5 has never been met at this site because the diversion structure is limited to a full pool elevation of 3,126.6 (Urban pers. comm.). The water elevation was at 3,126.3 during the mid-season visit in 2006. Drought conditions in the Flathead Valley are also having an influence on water levels at Batavia.

Spoils piles created in 2005 were generally well vegetated in 2006 with native upland grasses seeded in these areas. However, the spoil pile adjacent to wetland "A" contained significant weed infestation in 2006. Spotted knapweed and thistle are common in this area and are out-competing the seeded grasses. According to the USFWS, weed mapping at the Batavia WPA in 2005 showed 60 acres of musk thistle at a low density, 13 acres of Canada thistle at a low density, and 10 acres of spotted knapweed at a low density. Approximately eight acres of Canada thistle were sprayed using a mixture of curtail and milestone on 6/6/06. The USFWS intends to have the remaining thistle and knapweed infestations sprayed in 2007 through the Fish and Wildlife Service Weed Striketime.

**Table 6: Summary of 1996 (baseline) and 2006 wetland function/value ratings and functional points at the Batavia Wetland Mitigation Project.**

Function and Value Parameters From the 1999 MDT Montana Wetland Assessment Method	1996 Baseline Assessment <sup>1</sup>	2006 Assessment
Listed/Proposed T&E Species Habitat	Low (0.3)	Low (0.3)
MTNHP Species Habitat	Low (0.1)	High (1)
General Wildlife Habitat	High (1.0)	Exceptional (1.0)
General Fish/Aquatic Habitat	Mod (0.7)	Low (0.3)
Flood Attenuation	Mod (0.5)	Mod (0.6)
Short and Long Term Surface Water Storage	High (1.0)	High (1.0)
Sediment, Nutrient, Toxicant Removal	High (1.0)	High (1.0)
Sediment/Shoreline Stabilization	High (1.0)	High (0.9)
Production Export/Food Chain Support	High (0.9)	High (0.9)
Groundwater Discharge/Recharge	Low (0.1)	High (1.0)
Uniqueness	Mod (0.5)	Mod (0.6)
Recreation/Education Potential	Mod (0.7)	High (1.0)
Actual Points/Possible Points	7.8/12	9.6 / 12
% of Possible Score Achieved	65%	80 %
Overall Category	II	II
Total Acreage of Assessed Wetlands within Easement (north and south cells)	137.00	138.60
Functional Units (acreage x actual points)	1069	1331
Net Acreage Gain (ac)	NA	1.60
Net Functional Unit Gain (fu)	NA	262
Total Functional Unit Gain (fu)	NA	262

<sup>1</sup> Baseline assessment was performed by MDT using the Montana Field Evaluation Form (Revised 7/1/96).

## 2.4 Beaverhead Gateway Ranch (Butte District, Year 6 – Final Year)

The Beaverhead Gateway Ranch Wetland Mitigation Site was developed to mitigate wetland impacts associated with MDT roadway projects in the Upper Missouri Watershed (watershed #6). Some of these projects were completed and some have yet to be constructed. The mitigation site is located 13 miles northeast of Dillon, MT and 14 miles southwest of Twin Bridges on Highway 41. Elevations range from approximately 4,825 to 4,830 feet above mean sea level. The western portion of the site is in Beaverhead County and the eastern portion is in Madison County.

The project is located adjacent to the Beaverhead River and Highway 41. Upwelling groundwater and springs with surface retention behind a constructed dike provides wetland hydrology. Precipitation and surface runoff provide minor contributions to wetland hydrology at this site. The site is in private ownership and occurs within a conservation easement. The wetland easement area is not fenced exclusively; however, portions of the easement are fenced for cattle management and the larger property containing the easement is fenced. A pre-project construction wetland delineation documented 5.2 acres of wetlands at the site.

Construction was completed in 1997 with the goal of creating at least 52 acres of wetland. The site includes a dike constructed to retain stormwater and groundwater collected in two prior-existing drainage ditch systems. A control structure was completed in the northwest portion of the impoundment located where the two former drainage ditches converged. This control structure can be used to adjust impoundment water levels. The impoundment was designed to inundate approximately 26 acres with water depths of 0 to 3 feet.

The site was designed to mitigate for specific wetland functions impacted by MDT roadway projects, including: stormwater retention, roadway runoff filtration, sediment and nutrient retention, water quality, groundwater recharge, waterfowl and wildlife habitats and riparian restoration. In addition to creating 52 acres of new wetland, a primary goal is to use an ephemeral creek channel entering the southeastern quadrant of the site to capture stormwater flows from nearby farmland and allow silts/suspended sediments to settle out within the wetland.

As of 2006, approximately 118.2 acres of wetland and open water occur within the monitoring area. Subtracting the pre-existing 5.2 wetland acres yields a net of 113 acres, of which 106.5 acres is wetland and 6.5 acres is open water. This includes portions of the monitoring area both above (net of 86.2 wetland acres and 6.5 open water acres) and below (20.3 wetland acres) the dike. MDT has opted not to purchase the credits that have developed below the dike. Consequently, available credit at the site (above the dike) as of 2006 is 92.7 aquatic habitat acres, well in excess of the original 52-acre goal. Aquatic habitat features have remained constant in size at the site over the past six years and seem unlikely to change significantly in future years. The functional assessment numbers for 2006 are similar to those from past years, although a slightly higher recreation/education score was afforded in 2004-2006 as the landowner clarified that permission has and can be granted for birding and scientific research (**Table 7**). The Beaverhead Gateway mitigation site is currently rated as a Category II (high value) site, primarily due to high wildlife habitat, threatened/endangered species habitat, MTNHP species habitat, surface water storage, sediment/nutrient removal, food chain support, and groundwater discharge ratings.

Weed control and revegetation of disturbed sites is still needed to prevent further weed spread, reduce the risk of new weeds invading, reduce wind and water erosion and reduce sediment input to surface waters. Several noxious weeds are present including Canada thistle, hound's-tongue, and spotted knapweed. Spoil piles left from ditch excavation continue to create a weed problem, a wind and water erosion hazard and a sedimentation source. This same issue applies to portions of the dike and other poorly vegetated sites. A possible remedy would entail chemically treating weeds and re-seeding the spoil piles with desirable grasses.

Dike erosion and sediment production from the poorly vegetated shoreline could be monitored more closely by installing permanent markers or by periodic surveys. The dike was examined by a DNRC dam inspector in 2005, and the erosion was considered to be a maintenance issue, but not a dam safety concern. The DNRC recommended periodically adding fill to the face of the dike where breaching is taking place and vertical slopes are developing. Fill was added to the face of the dike in 2004 to replace eroded material, but has not yet vegetated. Additional examples of potential solutions to erosion problems include shoreline reinforcement, off-shore

wave protection, protected off-shore plantings, shoreline plantings, and placement of vegetated sod mats.

**Table 7: Summary of 2006 wetland function/value ratings and functional points at the Beaverhead Gateway Ranch Mitigation Project.**

Function and Value Parameters From the 1999 MDT Montana Wetland Assessment Method	2006
Listed/Proposed T&E Species Habitat	Mod (0.7)
MTNHP Species Habitat	High (1.0)
General Wildlife Habitat	High (0.9)
General Fish/Aquatic Habitat	Mod (0.5)
Flood Attenuation	Mod (0.5)
Short and Long Term Surface Water Storage	High (1.0)
Sediment, Nutrient, Toxicant Removal	High (1.0)
Sediment/Shoreline Stabilization	Low (0.3)
Production Export/Food Chain Support	High (0.9)
Groundwater Discharge/Recharge	High (1.0)
Uniqueness	Low (0.3)
Recreation/Education Potential	Mod (0.5)
Actual Points/Possible Points	8.6 / 12.0
% of Possible Score Achieved	72%
Overall Category	II
<b>Total Acreage of Assessed Wetlands and Other Aquatic Habitats</b>	<b>118.2</b>
<b>Functional Units (acreage x actual points)</b>	<b>1016.52</b>
<b>Net Acreage Gain</b>	<b>113</b>
<b>Net Functional Unit Gain</b>	<b>971.8</b>

## 2.5 Camp Creek (Missoula District, Year 5)

The Camp Creek Mitigation Site was developed to mitigate wetland impacts associated with the MDT proposed Sula-North and South project. Camp Creek is located in Ravalli County, MT in the Lower Clark Fork Watershed (watershed #3). The mitigation site is located approximately three miles south of Sula, Montana, and occurs on an MDT-owned parcel, as well as a privately-held parcel (Grasser). Elevations of the site range from 4,600 feet at the north boundary to 4,730 feet at the south boundary.

The project is located within the Sula Basin and along the historic Camp Creek floodplain. Camp Creek flows across the valley bottom, until eventually draining into East Fork of the Bitterroot River. Seasonal flooding and perennial creek flow provide the primary hydrology source within the new channel/floodplain margins. Local groundwater systems serve as a secondary hydrology source, flowing through the deep alluvial substrate contained within the Sula Basin. Several smaller creeks drain into Camp Creek, including Andrews, Praine, Waugh and Dick creeks.

Construction at the Camp Creek mitigation site was completed during the spring of 2002. The overall goals of this project were restoration of Camp Creek channel bottom, associated wetland

functional restoration/enhancement and creation, and enhancement of heavily grazed and cleared riparian vegetation.

Project details for each of the three main goals are included in the following list:

### **Functional Restoration**

- Return Camp Creek to its historic channel and establish a new channel.
- Restore hydrology and vegetation, recreating high value wetland habitat along the Camp Creek riparian corridor.
- Fill existing drainage ditches.

### **Enhancements**

- Riparian shrub and tree plantings throughout the created floodplain margins.
- Planting upland species in drier areas (i.e., created upland slopes).

### **Creation**

- Creation of emergent/scrub shrub wetlands along the floodplain margins of the new channel.

The site was intended to mitigate for specific wetland functions impacted by MDT roadway projects, including: stormwater retention, roadway runoff filtration, sediment and nutrient retention, water quality, groundwater recharge, and wildlife habitat. Per COE recommendations, a shallow flood channel connecting Camp Creek and the large emergent complex on the MDT parcel was excavated during fall 2005 between the creek and existing swales to enhance the connectivity of these two systems during high water events.

Overall, the project has gained 0.65 stream acre and “lost” an estimated 5.46 wetland acres in comparison to baseline conditions. Cumulatively, approximately 41.77 wetland acres and 2.15 open water acres now occur within the monitoring area, for a total of 43.92 acres of aquatic habitat. Prior to construction, the site contained approximately 47.23 acres of wetlands and 1.5 open water channel acres within the current monitoring limits. Open water channels were located in the extreme south end of the Grasser property and the in the northwest corner of the MDT property. A slight decrease of 0.26 acres in net wetland area was observed between 2005 and 2006 due to knapweed encroachment. The overall cumulative change in aquatic habitat at the site since construction has been approximately  $43.92 - 48.73 = (-4.81)$  acres.

Approximately 160.14 functional units (score x wetland acreage) have been gained thus far at the Camp Creek mitigation site, despite the decrease in wetland acres between pre-project and post-project assessments on the MDT parcel. Approximately 128.44 functional units have been gained at the MDT parcel, and 31.70 have been gained on the Grasser parcel.

The credit allocation method for this site was worked out between MDT and COE in early 2006, and is functional unit-based, whereby wetland acreage for each AA is multiplied by the total score for that AA to arrive at an overall functional unit score. This is done both pre-project and post-project. The difference between these two numbers (the functional unit “gain”) is then divided by the post-project score to arrive at an approximate credit acreage for that AA. Credit acreages from each AA are summed to arrive at a total for the site. This approach is illustrated

below in **Table 8**. Using this approach, a current maximum of approximately 17.34 credit acres is assignable to the Camp Creek site as of 2006.

**Table 8: 2006 functional unit-based credit for the Camp Creek Wetland Mitigation Project.**

Property	2006 Wetland & Channel Acreage	2006 Score	2006 Functional Units	Baseline Functional Units	Functional Unit “Gain”	“Gain” Divided by Current Score (potential credit acres)
MDT	35.79	9.8	350.74	222.30	128.44	13.11
Grasser	8.13	7.5	60.98	29.28	31.70	4.23
<b>Total</b>	<b>43.92</b>	<b>--</b>	<b>411.72</b>	<b>251.58</b>	<b>160.14</b>	<b>17.34</b>

Pre-project and post-project wetland assessment scores are presented in **Table 9** below.

Planted woody species survival rates within the upland areas were similar to those observed during 2004 and 2005 monitoring. In 2003, a majority of the survival rates ranged from 70% to 100%. Survival data recorded in 2004-2006 showed most upland species had a survival rate below 50%. These included such species as woods rose, ponderosa pine, snowberry, shrubby potentilla and red-osier dogwood. Almost all the Douglas-fir observed had died after initial planting. In 2006, the wetter species planted along the streambank and floodplain margins had a survival rate ranging from 60% to 90%. These included alder, aspen, cottonwood and willows. The willow sprigs are spreading out along the banks, continuing to increase in sizes and density each growing season. Several other wetter planted shrubs had increased in overall stature and exhibited vigorous growth.

The excavated channel between the creek and the large emergent complex on the MDT parcel was examined during 2006 monitoring, and is functioning according to design.

Several noxious weeds are present on both MDT and Grasser parcels including bull thistle, Canada thistle, houndstongue and spotted knapweed. The MDT parcel has the least amount of invasive species and distribution is limited to upland areas not affected during construction efforts. The Grasser parcel supports the majority of the noxious weed species with extensive distribution along the floodplain corridor. Weed control and re-vegetation of disturbed sites is needed to prevent further weed spread, reduce the risk of new weeds invading, reduce wind and water erosion and reduce sediment input to surface waters. Areas of invading spotted knapweed located along floodplain margins should be controlled and reseeded or planted with appropriate wetland species to help control further spread of invasive species.

**Table 9: Summary of 2001 (baseline) and 2006 wetland function/value ratings and functional points at Camp Creek.**

Function and Value Parameters From the 1999 MDT Montana Wetland Assessment Method	2001 Type I, MDT Property	2001 Type III, MDT Property	2001 Type I, Grasser Property	2001 Type II, Grasser Property	2001 Type III, Grasser Property	2006 Grasser Property	2006 MDT Property
Listed/Proposed T&E Species Habitat	Mod (0.8)	Mod (0.8)	Mod (0.8)	Mod (0.8)	Mod (0.8)	Mod (0.8)	Mod (0.8)
MTNHP Species Habitat	Low (0.1)	Low (0.1)	Low (0.1)	Low (0.1)	Low (0.1)	High (0.8)	High (0.8)
General Wildlife Habitat	Low (0.3)	Mod (0.5)	Low (0.3)	Mod (0.5)	Mod (0.5)	Mod (0.7)	Mod (0.7)
General Fish/Aquatic Habitat	Low (0.1)	Mod (0.5)	Low (0.1)	Low (0.1)	Mod (0.5)	Mod (0.7)	Mod (0.7)
Flood Attenuation	Mod (0.6)	Mod (0.4)	Mod (0.6)	Mod (0.5)	Mod (0.4)	Mod (0.4)	Mod (0.6)
Short and Long Term Surface Water Storage	Low (0.3)	High (0.8)	Low (0.3)	Low (0.3)	High (0.8)	Mod (0.6)	High (1.0)
Sediment, Nutrient, Toxicant Removal	Mod (0.7)	Mod (0.6)	Mod (0.7)	Mod (0.7)	Mod (0.6)	Mod (0.6)	High (0.9)
Sediment/Shoreline Stabilization	Low (0.2)	Low (0.3)	Low (0.2)	Mod (0.6)	Low (0.3)	Mod (0.7)	High (1.0)
Production Export/Food Chain Support	Mod (0.7)	High (0.9)	Mod (0.7)	Mod (0.7)	High (0.9)	High (0.9)	High (0.9)
Groundwater Discharge/Recharge	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)
Uniqueness	Low (0.1)	Low (0.2)	Low (0.1)	Low (0.3)	Low (0.2)	Low (0.2)	Mod (0.4)
Recreation/Education Potential	Low (0.2)	Low (0.1)	Low (0.2)	Low (0.3)	Low (0.1)	Low (0.3)	High (1.00)
Actual Points/Possible Points	5.1 / 12	6.2 / 12	5.1 / 12	5.9 / 12	6.2 / 12	7.7 / 12	9.8 / 12
% of Possible Score Achieved	42%	52%	42%	49%	52%	64%	82%
Overall Category	III	III	III	III	III	III	I
<b>Total Acreage of Assessed Wetlands and Open Water within Easement</b>	<b>42.3</b>	<b>1.06<sup>a</sup></b>	<b>3.51<sup>a</sup></b>	<b>0.50<sup>a</sup></b>	<b>1.36<sup>a</sup></b>	<b>8.13</b>	<b>35.79</b>
<b>Functional Units (fu) (acreage x actual points)</b>	<b>215.73</b>	<b>6.57</b>	<b>17.90</b>	<b>2.95</b>	<b>8.43</b>	<b>60.98</b>	<b>350.74</b>
<b>Functional Unit Gain to Date by Ownership (fu)</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>31.70<sup>b</sup></b>	<b>128.44<sup>b</sup></b>
<b>Total Functional Unit Gain to Date (fu)</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>160.14</b>	

<sup>a</sup> Baseline acreages adjusted per subsequent aerial photograph study.

<sup>b</sup> Baseline Functional Units used to determine the 2006 Functional Unit Gain included the combined totals for the 2001 MDT (222.30 fu) and Grasser (29.28 fu) properties.

Survival of plantings will continue to be monitored, and supplemental planting may need to be implemented if success of current plantings is low. Planted upland areas within the MDT parcel which were observed to have a low survival rates should be replanted with appropriate native plant stock, and irrigated.

## 2.6 Cloud Ranch (Billings District, Year 3)

The Cloud Ranch stream and wetland restoration project was constructed in the spring of 2003 to mitigate wetland impacts associated with proposed MDT roadway improvement projects in the Upper Yellowstone watershed (watershed #13). The site is located in Sweetgrass County approximately 12 miles northwest of Big Timber, MT. Elevations within the assessment area range from approximately 4,840 to 4,900 feet above mean sea level. The surrounding land uses include pastures and residential areas.

The project is intended to develop approximately 5.5 acres of wetland credit within a 15.5 acre conservation easement on private land. The project goals are to restore a degraded reach of Big Timber creek by narrowing the channel and revegetating the over bank areas with riparian trees, shrubs, wetland grasses and forbs. Restoration and creation activities for the off-channel wetland sites include pond and embankment removal, with subsequent grading adjacent to restored or existing wetlands which were formerly inundated with water. All disturbed areas were revegetated with native wetland species.

The 2003 baseline wetland delineation conducted by Aquatic Design and Construction Inc. (ADC) identified 1.00 acre of wetlands within the project area. Approximately 0.28 acre was later determined to be outside of the project area, reducing pre-existing wetland acreage to 0.72 acre. The COE approved allocation of 1:1 credit ratio for creation and restoration, as well as 4:1 ratio for the maintenance of a buffer zone around the wetland and riparian areas. More specifically, the wetland credit breakdown approved by the COE is as follows: 0.61 acre for off-channel wetland creation, 1.41 acres for off-channel wetland restoration, 2.0 acres for riparian wetland restoration along Big Timber Creek, 0.58 acre for emergent wetland restoration along Big Timber Creek, and a 0.89 acre upland buffer (4:1 ratio) for a total of 5.5 acres of wetland credit.

**Table 10** outlines the target wetland credits and ratios from the COE (2002) and the net acres delineated during the 2006 wetland monitoring. In 2006, the new net off-channel wetland/open water acreage is 2.21 acres (2.69 acres total wetland +0.24 acre open water – 0.72 acre of pre-existing wetlands = 2.21 acres). Wetland expansion was noted primarily in the southeastern corner of the project area. The Big Timber Creek wetland acreage is 0.71 acre which is a slight reduction of 0.05 acre compared to 2005 due to high water flows. Riparian wetlands comprise 0.53 acre along Big Timber Creek with 0.18 acre of emergent wetlands (compared to 0.23 acre in 2005). The Big Timber Creek channel itself is not included in acreage totals.

In 2006 the mitigation efforts have so far resulted in a total of 2.68 wetland credit acres, 0.24 shallow open water credit acres, and 0.89 credit acre of wetland/upland buffer. The grand total for the Cloud Ranch to date is 3.81 credit acres or 69 percent of the 5.49-acre goal.

**Table 10: 2006 credit acreages and ratios for the Cloud Ranch Wetland Mitigation Site.**

Wetland Mitigation	Current Net Acres	Ratio	2006 Credit Acres	Target Credit Acres	Comments
<b>Off-channel</b> Creation and restoration wetlands and open water	2.21	1:1	2.21	2.02	
<b>Subtotal</b>	<b>2.21</b>		<b>2.21</b>	<b>2.02</b>	
<b>Big Timber Creek</b> Riparian wetland restoration	0.53	1:1	0.53	2.00	Riparian wetland community represented by Type 2.
Emergent wetland restoration	0.18	1:1	0.18	0.58	Emergent wetland restoration represented by Type 3.
<b>Subtotal</b>	<b>0.71</b>		<b>0.71</b>	<b>2.58</b>	
<b>Upland and Wetland Buffer</b>	3.56	4:1	0.89	0.89	Credited only if livestock grazing is prohibited on wetland sites.
<b>Subtotal</b>	<b>3.56</b>		<b>0.89</b>	<b>0.89</b>	
<b>GRAND TOTAL</b>	<b>6.48</b>		<b>3.81</b>	<b>5.49</b>	<b>69% of goal</b>

It may be difficult to attain the 2.58-acre wetland development goal along the creek in the short term. Minor wetland acreage was lost in this area in 2006 due to a high-water scour event. This event left much of the non-wetland creek area dominated by gravel/cobbles which may take a considerable amount of time to collect sediment and establish wetland vegetation.

Functional assessment results for 2004 and 2006 are summarized in **Table 11**. Pre-construction functional assessments were completed for the wetlands by ADC (2003) but have thus far not been received for use in monitoring reports. The creek corridor wetlands currently rate as a Category II community, primarily due to wildlife habitat, while the off-channel wetlands were assigned a Category III rating. The ratings have been consistent over the monitoring period to date. An erroneous rating for surface water storage in 2004 and 2005 at both sites resulted in incorrect Category II designations for the off-channel wetlands in those years, which was corrected for 2004-2006 as shown on **Table 11**.

The site supports three State of Montana-listed noxious weeds: Canada thistle, hounds tongue, and spotted knapweed. Canada thistle, hounds tongue and a few spotted knapweed plants were observed along Big Timber Creek. Canada thistle and hounds tongue were observed within the off-channel wetland assessment area. The spotted knapweed, hounds tongue and Canada thistle appeared to have been sprayed in 2006 (as requested by MDT) in the upland areas adjacent to the off-channel wetlands. Continued chemical or biological control measures are recommended for Canada thistle, hounds tongue, and spotted knapweed.

The water level control structures within the off-channel wetlands were functioning and in good working order at the time of the August monitoring. Big Timber Creek channel migration resulting in bank loss, gravel bars and new deposition areas will continue to be monitored to track riparian wetland gains or losses, and negative or undesirable changes in vegetation. The project designer observed similar channel movements on other reaches of Big Timber Creek resulting from the same 6 inch/4 hour rainfall event. Based on his August 2006 review, the upper end of the lowest reach is likely to continue shifting before it stabilizes and some minor intervention in this area may eventually be warranted. If ultimately considered necessary by the

**Table 11: Summary of 2004 to 2006 wetland function/value ratings and functional points at the Cloud Ranch Wetland Mitigation Project.**

Function and Value Parameters From the 1999 MDT Montana Wetland Assessment Method	2004 Post-Construction Off-Channel Wetlands	2004 Post-Construction Big Timber Creek	2005 Off-Channel Wetlands	2005 Big Timber Creek	2006 Off-Channel Wetlands	2006 Big Timber Creek
Listed/Proposed T&E Species Habitat	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)
MTNHP Species Habitat	Low (0.1)	Mod (0.6)	Low (0.1)	Mod (0.6)	Low (0.1)	Mod (0.6)
General Wildlife Habitat	Mod (0.7)	High (0.9)	Mod (0.7)	High (0.9)	Mod (0.7)	High (0.9)
General Fish/Aquatic Habitat	NA	Mod (0.7)	NA	Mod (0.7)	NA	Mod (0.7)
Flood Attenuation	Mod (0.5)	Mod (0.4)	Mod (0.5)	Mod (0.4)	Mod (0.5)	Mod (0.4)
Short and Long Term Surface Water Storage	Mod (0.6)	Mod (0.6)	Mod (0.6)	Mod (0.6)	Mod (0.6)	Mod (0.6)
Sediment, Nutrient, Toxicant Removal	High (1.0)	Mod (0.6)	High (1.0)	Mod (0.6)	High (1.0)	Mod (0.6)
Sediment/Shoreline Stabilization	High (1.0)	Mod (0.7)	High (1.0)	Mod (0.7)	High (1.0)	Mod (0.7)
Production Export/Food Chain Support	Mod (0.7)	Mod (0.7)	Mod (0.7)	Mod (0.7)	Mod (0.7)	Mod (0.7)
Groundwater Discharge/Recharge	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)
Uniqueness	Mod (0.4)	Mod (0.4)	Mod (0.4)	Mod (0.4)	Mod (0.4)	Mod (0.4)
Recreation/Education Potential	Mod (0.7)	Mod (0.7)	Mod (0.7)	Mod (0.7)	Mod (0.7)	Mod (0.7)
Actual Points/Possible Points	7/11	7.6/12	7/11	7.6/12	7/11	7.6/12
% of Possible Score Achieved	64%	63%	64%	63%	64%	63%
Overall Category	III	II	III	II	III	II
<b>Total Acreage of Assessed Wetlands and Open Water within Easement (ac)</b>	<b>2.19</b>	<b>2.65</b>	<b>2.75</b>	<b>2.93</b>	<b>2.93</b>	<b>2.88</b>
<b>Baseline Acreage of Assessed Wetlands and Open Water within Easement (ac)</b>	<b>0.72</b>	<b>2.17 (ow)</b>	<b>0.72</b>	<b>2.17 (ow)</b>	<b>0.72</b>	<b>2.17 (ow)</b>
<b>Functional Units (acreage x actual points) (fu)</b>	<b>15.33</b>	<b>20.14</b>	<b>19.25</b>	<b>22.27</b>	<b>20.51</b>	<b>21.89</b>
<b>Net Acreage Gain (ac)</b>	<b>1.47 (1.2 wetland, 0.27 ow)</b>	<b>0.48 (wetland)</b>	<b>2.03 (1.79 wetland, 0.24 ow)</b>	<b>0.76 (wetland)</b>	<b>2.21 (1.97 wetland, 0.24 ow)</b>	<b>0.71 (wetland)</b>
<b>Net Functional Unit Gain<sup>1</sup></b>	<b>Presently unavailable</b>	<b>Presently unavailable</b>	<b>3.92 (since 2004)</b>	<b>2.13 (since 2004)</b>	<b>5.18 (since 2004)</b>	<b>1.75 (since 2004)</b>
<b>Total Functional Unit Gain<sup>1</sup></b>	<b>Presently unavailable</b>		<b>6.05 (since 2004)</b>		<b>6.93 (since 2004)</b>	

<sup>1</sup> Baseline functional assessment information was unavailable as of the writing of this report.

designer, landowner, and MDT, any such intervention should be completed within the monitoring period.

## 2.7 Hoskins Landing (Missoula District, Year 5)

The Hoskins Landing Wetland Mitigation Site was developed to mitigate wetland impacts associated with the MDT proposed Dixon-West and Paradise-East highway reconstruction projects along Highway 200. Hoskins Landing is located in Sanders County, in the Lower Clark Fork Watershed (watershed #3). The mitigation site is located approximately one quarter mile north of Dixon, adjacent to the Flathead River. The elevation of the site is approximately 2,500 feet above mean sea level with slight topographic variation throughout. Pre-construction wetland delineation documented 6.67 acres of wetlands at the site.

The project is located adjacent to the Flathead River in an area of historic floodplain heavily impacted from past agriculture activities. Seasonal flooding provides the primary wetland hydrology with inundation of backwater channels. Local groundwater systems moving through alluvium provide a secondary source of hydrology for this site. The site is located on the Flathead Indian Reservation and is managed by the Confederated Salish & Kootenai Tribes. The wetland easement area is mostly fenced with several exclusions on the east and west ends near the river banks.

Initial construction was completed in fall 2002 with the goal of restoring/creating 8.1 acres of wetlands and enhancing vegetation on 5.2 acres of heavily grazed and cleared lands. Revegetation work was conducted during the spring and fall of 2003, 2004 and 2005, and a berm / road crossing of the backwater channel was removed during spring 2005 to reconnect historical flow patterns. The primary components of construction included:

- Excavation and grading of 8.1 acres to facilitate wetland development.
- Enhancement of 5.2 acres of native vegetation, characteristic of the lower Flathead River riparian corridor.
- Filling of inlet channel and removal of headgate in the northeast corner of the site.
- Removal of outlet dam along the remnant channel bordering the southern portion of the site.
- Removal of man-made flood control berm along the Flathead River and grading of excavated ground to 10:1 slopes.
- Removal of a man-made berm along the remnant backwater channel.

The site was designed to mitigate for specific wetland functions impacted by MDT roadway projects, including: stormwater retention, roadway runoff filtration, sediment and nutrient retention, water quality, groundwater recharge, wildlife habitat and riparian vegetation.

Approximately 13.01 acres of wetland occur on the mitigation site. Subtracting the original 6.67 acres of pre-project wetlands from this total yields a current net of approximately 6.35 wetland acres. Over time, additional wetland area may form around the low gradient portions of the current wetland area.

Functional assessment results are summarized in **Table 12** below. The vast majority of wetlands on the Hoskins Landing mitigation site are currently rated as Category III (moderate value),

primarily due to moderate ratings for wildlife/fish habitat, threatened and endangered species habitat, and flood attenuation variables. Based on functional assessment results (**Table 12**), approximately 96.67 functional units occur at the Hoskins Landing mitigation site. Baseline functional assessment results are also provided in **Table 12** for general comparisons. Approximately 65.45 functional units have been gained at the site, although pre- and post-construction functional assessment methods differed slightly.

Three upland plantings areas were evaluated; these areas include the upland islands, river bank terrace and along the upper banks of the backwater (side) channel. During 2006 monitoring, species survival remained similar to those observed in 2005 with an overall estimate of moderate to high rating. Woods rose and snowberry, which had the highest survival following the initial plantings, were healthy with vigorous new growth. The other species including hawthorn, chokecherry, serviceberry, ponderosa pine and American plum were less healthy and had low occurrences.

One wetland planting area was evaluated; along the south slopes of the excavated wetland. Survival rates for the wetland plantings were high with sandbar willow and cottonwood having the highest overall estimated rates. Several other species including Bebb's willow, red osier dogwood and alder were present but at lower counts. Several woody species that had low survival rates during the 2003 monitoring were replanted in 2004. The replacement plants are doing well and exhibited an overall estimated high survival rate in 2006. Approximately 2000 willow cuttings were installed around the fringe of excavated wetland and show vigorous seasonal growth.

Several Category 1 noxious weeds were still present but at low cover values: Canada thistle, Dalmatian toadflax, hound's-tongue, oxeye daisy, St. John's wort, and spotted knapweed. Category 3 yellowflag iris and Eurasian water-milfoil were also present within the mitigation site. The Confederated Salish and Kootenai Tribes are diligently following a five year (2005 to 2010) vegetation management plan that includes invasive weed control and revegetation efforts. Weed control activities were observed during the mid-season visits including herbicide applications, minor grazing and mowing. Weed control activities seem to be working with observations of lower cover values for previous weedy areas.

Evidence of livestock accessing the site was observed during a fall 2006 visit. An electric fence was periodically put into place, running parallel with the river setback from the shoreline. Fences were removed prior to seasonal flows and re-installed during August to exclude livestock (Price 2006). The drier upland grass meadows were grazed and trampling within the wetlands was observed. Minor browse on the woody plantings within the wetland area was also observed.

**Table 12: Summary of 1999 (baseline<sup>a</sup>) and 2006 wetland function/value ratings and functional points at the Hoskins Landing Wetland Mitigation Project.**

Function and Value Parameters From the 1999 MDT Montana Wetland Assessment Method	Evaluation Year/Assessment Area							
	1999 Baseline 1A	1999 Baseline 1B	1999 Baseline 3	1999 Baseline 8	1999 Baseline 2, 9A, 9B, 10, 11, 12, 13	1999 Baseline 5, 6, 7, 14A, 14B	2006 Site 5	2006 Remainder of Wetlands
Listed/Proposed T&E Species Habitat	Low (0.3)	Mod (0.7)	None (0.0)	Mod (0.7)	None (0.0)	None (0.0)	Low (0.0)	Mod (0.8)
MTNHP Species Habitat	Low (0.1)	Low (0.1)	Low (0.1)	Mod (0.7)	None (0.0)	None (0.0)	Low (0.0)	Low (0.2)
General Wildlife Habitat	High (0.9)	Mod (0.5)	Mod (0.5)	High (0.9)	Low (0.1)	Low (0.1)	Low (0.2)	Mod (0.7)
General Fish/Aquatic Habitat	Low (0.2)	Mod (0.7)	NA	High (1)	NA	NA	NA	High (0.8)
Flood Attenuation	Mod (0.5)	Low (0.2)	Low (0.2)	Low (0.1)	Low (0.2)	NA	Low (0.2)	Mod (0.4)
Short and Long Term Surface Water Storage	High (0.8)	NA	Low (0.3)	NA	NA	Low (0.3)	Low (0.3)	High (0.9)
Sediment, Nutrient, Toxicant Removal	High (1.0)	High (1.0)	High (1.0)	Mod (0.5)	High (1.0)	Mod (0.5)	Mod (0.5)	Mod (0.4)
Sediment/Shoreline Stabilization	Mod (0.7)	Mod (0.7)	NA	Mod (0.4)	High (0.9)	NA	NA	Mod (0.6)
Production Export/ Food Chain Support	High (0.8)	Mod (0.6)	Mod (0.6)	Mod (0.7)	Low (0.2)	Low (0.1)	Low (0.2)	High (1.0)
Groundwater Discharge/ Recharge	High (1.0)	High (1.0)	High (1.0)	Low (0.1)	Low (0.1)	High (1.0)	High (1.0)	High (1.0)
Uniqueness	Low (0.2)	Low (0.2)	Low (0.2)	Low (0.2)	Low (0.2)	Low (0.2)	Low (0.3)	Mod (0.5)
Recreation/Education Potential	Low (0.1)	Low (0.1)	Low (0.1)	High (1.0)	Low (0.1)	Low (0.1)	Low (0.1)	Low (0.3)
Actual Points/ Possible Points	6.6 / 12	5.8 / 11	4.0 / 9	6.3 / 11	2.8 / 10	2.3 / 9	2.8 / 10	7.6 / 12
% of Possible Score Achieved	55%	53%	44%	57%	28%	26%	28%	63%
Overall Category	III	III	III	II*	IV	IV	IV	III
Total Acreage of Assessed Wetlands and Open Water within Easement (ac)	2.58	0.86	0.68	0.06	0.75	1.74	0.46	12.55
Functional Units (fu) (acreage x actual points)	17.03	4.99	2.73	0.37	2.10	4.00	1.29	95.38
<b>Total Acreage at Site</b>	<b>6.67</b>						<b>13.01</b>	
<b>Total Functional Units at Site</b>	<b>31.22</b>						<b>96.67</b>	
<b>Net Acreage Gain</b>	<b>NA</b>						<b>6.34</b>	
<b>Net Functional Unit Gain</b>	<b>NA</b>						<b>65.45</b>	

<sup>a</sup>The baseline assessment was performed using the 1996 MDT assessment method, several parameters which were substantially revised during development of the 1999 MDT assessment method, which was applied during monitoring. Thus, direct comparison of pre- and post-project functions is not possible, although some general trends can be noted. \* Did not achieve Category II rating based on functional points, but did achieve Category II rating based on score for fish and wildlife habitat; this narrow fringe wetland was absent during monitoring.

## 2.8 Jack Creek Ranch (Butte District, Year 3)

The Jack Creek Ranch stream and wetland restoration project was completed by Jack Creek Ranch, LLC and ADC in the summer and fall of 2003 to provide MDT with a wetland / stream mitigation reserve in the Upper Missouri Watershed (watershed #6). The highway projects were constructed within the vicinity of Ennis, MT and the Madison River drainage within the MDT Butte District. The site is located in Madison County approximately 2.5 miles northeast of the town of Ennis. Elevations within the mitigation area range from approximately 4,889 to 4,892 feet above sea level. The surrounding land uses include livestock pastures and hay production.

The project was intended to develop approximately 50 acres of wetlands within the 86-acre pasture owned by the Jack Creek Ranch, LLC. The overall goal for restoration consists of two main areas: restoring wetland hydrology to the Horseshoe pasture and restoring a reach of McKee Spring Creek to a naturally functioning stream channel. The objectives are consistent with historical conditions prior to the drainage of the Horseshoe pasture and the creation of in-stream reservoirs within the McKee Creek channel. During the 1940's, ditches were excavated in the Horseshoe pasture as a recommendation from the Soil Conservation Service (SCS) to lower groundwater. Field notes from SCS personnel describe the site as "very wet, hummocky with standing water, sedges and water loving plants." The final drainage system was a horseshoe shaped ditch that averaged 20 feet wide, 6 to 8 feet deep and nearly 1 mile long. In addition to draining wetland areas within the ranch, significant impacts occurred to McKee Spring Creek, such as widening as a result of prolonged cattle grazing and the mechanical excavation of ponds within the creek channel.

In the summer of 2003, the drainage systems along the perimeter of the Horseshoe pasture were filled. Selected areas within the Horseshoe pasture were graded to increase habitat diversity. Disturbed areas were seeded with a wetland seed mix and planted with containerized wetland species. Woody species were planted to restore a scrub-shrub wetland within portions of the pasture. Also, in the summer of 2003, a new channel was constructed for McKee Spring Creek and the over-widened areas (in-stream reservoirs) were filled. Disturbed areas were revegetated with containerized wetland plants and wetland seed. Trees and shrubs were also planted along portions of the channel to restore a scrub-shrub wetland community along the new stream corridor.

The gross wetland boundary increased from 33.44 acres in 2005 to 42.15 acres in 2006. This one-year gain encompasses 8.71 acres and includes 2.13 acres of shallow open water (<4 feet deep). The mitigation efforts have thus far resulted in 42.15 gross wetland acres or 84% of the goal (the 50 acre goal included the pre-existing wetlands). Subtracting the original wetland acreage of 1.99 acres, the new net acreage of aquatic habitats totals 40.16 acres.

Functional assessment results are summarized in **Table 13**. Pre-construction functional assessments were completed for the wetlands as well as the middle reach of McKee Spring Creek by ADC. The results of that assessment are included in **Table 13**. The monitoring area has gained over 175 functional units since 2004 due to the increase in shoreline stabilization and gain of wetland acreage. The site remains a Category II wetland and scores 354 functional units.

**Table 13: Summary of 2002 and 2006 wetland function/value ratings and functional points at the Jack Creek Ranch Wetland Mitigation Project.**

Function and Value Parameters from the 1999 MDT Montana Wetland Assessment Method	2002 <sup>1</sup> Pre-construction	2006 <sup>2</sup> Post-construction
Listed/Proposed T&E Species Habitat	Low (0)	Low (0.3)
MTNHP Species Habitat	Mod (0.6)	Mod (0.6)
General Wildlife Habitat	Low (0.3)	Exc (1.0)
General Fish/Aquatic Habitat	Mod (0.6)	Mod (0.7)
Flood Attenuation	NA	Low (0.1)
Short / Long Term Surface Water Storage	NA	High (0.9)
Sediment, Nutrient, Toxicant Removal	NA	High (0.9)
Sediment/Shoreline Stabilization	NA	High (1.0)
Production Export/Food Chain Support	Low (0.3)	High (0.8)
Groundwater Discharge/Recharge	Low (0.1)	High (1.0)
Uniqueness	Low (0.1)	Mod (0.4)
Recreation/Education Potential	Low (0.1)	Mod (0.7)
Actual Points/Possible Points	2.7/9	8.4/12
% of Possible Score Achieved	30%	70%
Overall Category	III	II
<b>Total Acreage of Assessed Wetland / Open Water Areas within Easement</b>	<b>23.6</b>	<b>42.15</b>
<b>Functional Units (acreage x actual points) (fu)</b>	<b>49.8</b>	<b>354.1</b>
<b>Net Acreage Gain in Mitigation Area (ac)</b>	<b>NA</b>	<b>40.16</b>
<b>Approximate Functional Unit Gain in Mitigation Area (acreage gain x actual points) (fu)</b>	<b>---</b>	<b>337.3</b>

<sup>1</sup> 2002 baseline assessment included the horseshoe wetland as well as the lower and middle reaches of McKee Spring Creek. Approximately 1.99 acres of wetlands occurred in the mitigation area pre-project.

<sup>2</sup> Assessment areas include the horseshoe wetlands and the middle reach of McKee Spring Creek (the mitigation area).

The site has two State of Montana Noxious Weeds (Canada thistle and hounds tongue) and one Madison County-listed noxious weed (musk thistle). Only a few live hounds tongue and musk thistle plants were noted during the July 2006 monitoring visit. Weed control efforts have been effective in significantly reducing these two species. Canada thistle still poses the greatest risk for potential spread in transition and upland areas. Continued spot spraying is recommended in 2007 primarily for Canada thistle; and hounds tongue and musk thistle as needed.

## 2.9 Kleinschmidt Creek (Missoula District, Year 5)

Kleinschmidt Creek is located in the Upper Clark Fork River Basin (watershed # 2) in Powell County. The mitigation site is located approximately six miles east of Ovando and is directly adjacent to MT Highway 200. Elevations of the site range from 4,200 ft. at the eastern boundary to 4,180 ft. at the western boundary. The Kleinschmidt Creek site was developed to mitigate wetland impacts associated with two MDT projects, Clearwater Junction North and Helmville Junction, and to serve as a reserve for future MDT projects in the watershed.

The project was designed by LWC/PBS&J, and is located within a 47-acre perpetual wetland conservation easement. Kleinschmidt Creek flows west until eventually draining into the North Fork of the Blackfoot River. The perennial creek is spring fed, which provides the primary hydrology source. Local groundwater systems serve as a secondary hydrology source, flowing through the deep alluvial substrate contained along Kleinschmidt Flats and eventually discharging along Kleinschmidt Creek corridor. The 1999 pre-construction wetland delineation documented 13.78 acres of wetland and 7.59 acres of over-excavated open water channel.

Construction at the Kleinschmidt Creek Mitigation Site was completed during the summer of 2001. The overall goals of this project were the restoration, creation, and enhancement (high and low intensity) of heavily grazed and degraded creek/wetlands. Primary restoration objectives included channel reconstruction and fish habitat enhancement on approximately 5,000 ft of Kleinschmidt Creek and the creation of additional wetland areas along the spring fed corridor. Project objectives and task details are included in the following list:

**Restoration**

- Narrowing and deepening the existing manipulated stream channel, restoring the portion narrowed as wetland.
- Conversion of degraded channel/open water into wetland on approximately 6 acres.
- Planting woody vegetation at a density of 500 stems per acre.
- Eliminating the existing stock water channel under the highway.

**Creation**

- Converting approximately 1.19 acres of upland area to wetland / shallow open water by adjusting the surface elevation.
- Planting woody vegetation at a density of 500 stems per acre along the perimeter of the shallow open water areas.

**High Intensity Enhancements**

- Planting woody vegetation on approximately 8.05 acres of existing degraded wetlands at a density of 1,500 stems per acre.

**Low Intensity Enhancements**

- Planting woody vegetation on the remaining 3.43 acres of existing degraded wetlands at a density of 500 stems per acre (clumped).

The site was designed to mitigate for specific wetland functions impacted by MDT roadway projects, including: stormwater retention, roadway runoff filtration, sediment and nutrient retention, water quality, groundwater recharge, and wildlife habitat. Mitigation credit goals and credit ratios, approved by the Corps of Engineers are as follows:

<b>Project Component</b>	<b>Total Estimated Acres</b>	<b>Credit Ratio</b>	<b>Credit Acres</b>
Restoration	6.00	1:1	6.00
Creation	1.19	1:1	1.19
High-Intensity Enhancement	8.05	1:2	4.02
Low-Intensity Enhancement	3.43	1:3	1.14
75-Foot Upland Buffer Preservation	12.69	1:4	3.17
<b>Total</b>	<b>31.36</b>		<b>15.52</b>



As of 2006, approximately 23 acres of wetland and 2.41 acres of open water (restored stream channel/portions of excavated wetlands) occur at the Kleinschmidt Creek mitigation site. This represents an approximate increase of 9.22 wetland acres and a 5.18-acre decrease of over-excavated, straightened open water channel as compared to baseline conditions. Open water on the site is currently comprised of 1.75 acres of restored sinuous channel and 0.66 acre of excavated shallow water as a component of wetland creation. Functional units at the site have essentially doubled to over 212 since project construction.

**Table 14** summarizes the maximum credit that could be assigned to the site as of 2006. Target mitigation credit ratios and acres were agreed upon prior to site construction, with the exception of incidental wetland restoration within proposed upland buffer areas, for which no performance standards or ratios were discussed. As these areas are restoring naturally within the easement, a 1:1 credit ratio was assumed.

**Table 14: Maximum Kleinschmidt Creek Mitigation Site credit as of 2006.**

Mitigation Type	Current Acres	Ratio	Current Maximum Credit Acres	Target Credit Acres	Comments
Designed Restoration	6.0	1:1	6.0	6.0	Does not include 1.75 acres of open water stream channel. Extrapolated stem density (1,413) is exceeding performance standard (500).
Designed Creation	1.19	1:1	1.19	1.19	Includes 0.66 acre of designed shallow open water. Extrapolated stem density along upland / wetland border (1,363) is exceeding assumed performance standard (500).
Designed High-Intensity Enhancement	8.05	1:2	4.02	4.02	Extrapolated stem density (2,185) is exceeding performance standard (1,000)
Designed Low-Intensity Enhancement	3.43	1:3	0.0	1.14	Plantings were destroyed by grazing. Actual stem density (46) is not meeting performance standard (500). No credit likely at this time. Recommend re-planting this area if credit is desired.
Incidental Restoration	4.99	1:1	4.99	0.0	4.99 acres of intended 12.69-acre upland buffer within easement reverted to emergent wetland. 1:1 ratio is assumed and has not been verified with the Corps of Engineers.
Designed Upland Buffer	7.7	4:1	1.93	3.17	4.99 acres of intended 12.69-acre upland buffer reverted to wetland.
<b>Grand Total</b>	<b>31.36</b>	<b>--</b>	<b>18.13</b>	<b>15.52</b>	<b>117% of goal</b>

Functional assessment results are summarized in **Table 15** below. The two assessment areas (AA's) evaluated at Kleinschmidt Creek, separated into the channel corridor/wetlands and excavated wetland areas, both rated Category II (high value) and Category III (moderate value) areas, respectively. Functional units at the site have essentially doubled to over 212 since project construction.

**Table 15: Summary of 1998 (baseline) and 2006 wetland function/value ratings and functional points at the Kleinschmidt Creek Wetland Mitigation Project.**

Function and Value Parameters from the 1999 MDT Montana Wetland Assessment Method <sup>a</sup>	Evaluation Year/Assessment Area			
	1998 Channel & Wetlands Lower Section	1998 Channel & Wetlands Upper Section	2006 Channel & Wetlands	2006 Ponds
Listed/Proposed T&E Species Habitat	Low (0.2)	Low (0.2)	Mod (0.8)	Low (0.5)
MTNHP Species Habitat	Low (0.1)	Low (0.1)	High (1.0)	Low (0.1)
General Wildlife Habitat	Mod (0.5)	Mod (0.5)	Mod (0.7)	Mod (0.7)
General Fish/Aquatic Habitat	Low (0.2)	Low (0.2)	Mod (0.7)	NA
Flood Attenuation	NA	NA	NA	NA
Short and Long Term Surface Water Storage	Mod (0.5)	Mod (0.5)	High (1.0)	High (1.0)
Sediment, Nutrient, Toxicant Removal	Mod (0.5)	High (1.0)	High (0.9)	Mod (0.7)
Sediment/Shoreline Stabilization	Mod (0.4)	Mod (0.4)	High (1.0)	Mod (0.7)
Production Export/Food Chain Support	High (0.8)	High (0.8)	High (0.8)	Mod (0.7)
Groundwater Discharge/Recharge	High (1.0)	High (1.0)	High (1.0)	High (1.0)
Uniqueness	Low (0.2)	Low (0.2)	Low (0.3)	Low (0.3)
Recreation/Education Potential	Low (0.1)	Low (0.1)	Low (0.3)	Low (0.3)
Actual Points/Possible Points	4.5/11	5/11	8.5/11	6.0/10
% of Possible Score Achieved	41%	45%	77%	60%
Overall Category	III	III	II	III
Total Acreage of Assessed Wetlands and Open Water within Easement (acre)	10.40	12.90	<b>23.86</b>	<b>1.55</b>
<b>Functional Units (acreage x actual points)</b>	<b>46.80</b>	<b>64.50</b>	<b>202.81</b>	<b>9.30</b>
<b>Total Functional Units At Site</b>	<b>111.30</b>		<b>212.11</b>	
<b>Total Functional Unit "Increase"<sup>aa</sup></b>	<b>NA</b>		<b>100.81</b>	

<sup>a</sup> The baseline assessment (1998) was performed using the 1997 MDT Assessment Method. Several parameters were substantially revised in the 1999 MDT Assessment method, which was used to evaluate 2006 monitoring conditions. Thus, direct comparison of pre- and post-project functions is not possible; although, some general trends can be noted.

Although the landowner treated weeds near upper excavated shallow open water area and other areas in 2004, several noxious weeds are present including Canada thistle, hounds tongue, oxeye daisy and spotted knapweed, which should be controlled. The continued spread of noxious weeds within the dry portion of upland areas within the mitigation area was recorded with an increase in knapweed along the lower section of the project.

To achieve credit in the low intensity sections, the areas impacted by livestock grazing should be revegetated with woody plants. Areas outside the perimeter of the excavated wetlands, which are currently dominated by mostly invasive species, could be treated via mechanical and cultural weed control activities to control invasive species. These include mowing or hand whipping of taller weed species and seeding of bare ground with an appropriate mix suited for the hydrological regime. Mechanical weed control would be recommended due to the woody vegetation already installed in this area. Areas where aggressive reed canarygrass is encroaching on planted woody species could be mechanically controlled to limit disturbance to plantings. Heavy browse from local wildlife has been observed across the entire site. Control measures

such as chemical browse repellants should be considered to avoid further browse damage or eventual mortality to shrub and tree species.

## 2.10 Lame Deer (Glendive District, Year 5)

The Lame Deer - East wetlands, located in the Middle Yellowstone Watershed (watershed #14), were constructed to mitigate in part for the 2.5 acres of wetland impact to the Alderson Creek corridor during the Hwy. 212 reconstruction project. The monitoring site is located in Rosebud County within the town of Lame Deer, MT. There are three mitigation sites within this area: the Lame Deer – East site is adjacent to a school in the center of town and is often referred to as the “school mitigation or reserve site”; and two recreated wetlands are located along Highway 212, Wetland 369 and Wetland 380.

The Lame Deer - East monitoring site wetland (school mitigation site) was constructed in July/August 2001 within the historic floodplain of Lame Deer Creek; fill was historically placed within the current mitigation site to create a ball field for the school. The fill was removed to create and restore wetlands in the area; the intent was to create 1.23 acres and restore 0.56 acres for a total of 1.79 acres. The wetland is bisected by a sewer line that was in place prior to the wetland construction; fill removed from the constructed wetland areas was placed on top of the sewer line to create a thermal barrier and, in effect, an access trail to the creek. The area represented by the sewer line/trail system represents approximately 0.1 acre, which adjusts the intended size of the mitigation wetland to 1.68 acres. The resulting areas within the bisected wetland are referred to as the north and south cell.

The two recreated wetlands along Hwy. 212 are adjacent to Alderson Creek: Wetland 369 is approximately 4.75 miles from the intersection of Hwy. 39 and 212 in Lame Deer, and Wetland 380 is 5.5 miles from the intersection. The intent of these mitigation efforts was to re-create approximately 1.5 acres of wetland.

The 2006 delineation resulted in a total of 0.83 acre of wetland development within the north and south cells of the School Mitigation Site. The estimated gross wetland acreages for the recreated wetlands along Hwy. 212 were 0.7 acre at Wetland 369 and 0.39 acre at Wetland 380. The total gross wetland acreage within the three Lame Deer-East mitigation sites is 1.92 acres, virtually identical to 2005. This represents 60% of the 3.18 total mitigation acreage goal for the Lame Deer-East mitigation site. Given the topographical constraints at all three Lame deer mitigation sites, it appears that additional gross aquatic habitat acreage is unlikely to form. Current open water areas at 369 and 380 may eventually establish wetland vegetation, but the overall footprint of these and the school site seems to have been maximized and appears unlikely to change substantively in subsequent years.

The 2006 functional assessments of the school and creek monitoring sites are summarized in **Table 16**. The 1999 functional assessment is not directly comparable because the AA included 20-30 acres of floodplain on the north and south sides of Highway 212. The 1999 assessment does provide valuable information regarding the baseline characteristics of floodplain wetlands in that area; the general wetland floodplain rated as a Category III wetland in 1999.

**Table 16: Summary of 2006 wetland function/value ratings and functional points at the Lame Deer - East Wetland Mitigation Project.**

Function and Value Parameters from the 1999 MDT Montana Wetland Assessment Method	2006 School Site	2006 W-369	2006 W-380
Listed/Proposed T&E Species Habitat	Low (0)	Low (0)	Low (0)
MTNHP Species Habitat	Moderate (.7)	Low (0)	High (1.0)
General Wildlife Habitat	Moderate (.7)	Moderate (.6)	High (.9)
General Fish/Aquatic Habitat	NA	Moderate (.6)	High (.8)
Flood Attenuation	Low (.2)	Low (.2)	Low (.1)
Short and Long Term Surface Water Storage	Moderate (.6)	High (.8)	High (.8)
Sediment, Nutrient, Toxicant Removal	High (1)	High (1)	High (.9)
Sediment/Shoreline Stabilization	High (.9)	High (1)	High (1.0)
Production Export/Food Chain Support	Mod (.6)	Moderate (.6)	Moderate (.6)
Groundwater Discharge/Recharge	High (1)	High (1)	High (1)
Uniqueness	Mod (.4)	Mod (.4)	Mod (.4)
Recreation/Education Potential	High (1)	High (1)	High (1.0)
Actual Points/Possible Points	7.1/11	7.2/12	8.5/12
% of Possible Score Achieved	65%	60%	71%
Overall Category	II	III	II
<b>Total Acreage of Assessed Wetlands within Monitoring Area</b>	<b>0.83</b>	<b>0.70</b>	<b>0.39</b>
<b>Total Functional Units (acreage x actual points)</b>	<b>5.89</b>	<b>5.04</b>	<b>3.31</b>
<b>Net Acreage Gain (“new” wetlands)</b>	<b>0.83</b>	<b>0.70</b>	<b>0.39</b>
<b>Net Functional Unit Gain (new acreage x actual points)</b>	<b>5.89</b>	<b>5.04</b>	<b>3.31</b>
<b>Total Functional Unit Gain Lame Deer-East Mitigation Sites</b>	<b>14.24</b>		

The school mitigation monitoring site continued to score as a Category III wetland in 2006 (Table 16). Wetland 369 is classified as a Category III as a result of a low number of wildlife observations over five years. Wetland 380 is a Category II site due to the breeding population of the northern leopard frog. Total functional unit gain for all Lame Deer-East Mitigation sites as of 2006 is 14.24, an increase of 11% since 2005.

The stormwater inlet culvert in the southwest corner of the south cell was in working order and required no maintenance. The outflow culvert in Wetland-369 is blocked by sediment and debris; the beaver dam is still present. Although not technically part of the MDT project, water continues to undermine the culvert and has consequently washed soil away from the culvert outflow end. This structure is at a serious risk of being washed out by a major precipitation event, which would result in a large sediment plume entering the downstream reach. The silt fence around the perimeter of wetland 369 is partially submerged or buried by sediment and should be removed.

### 2.11 Little Muddy Creek (Great Falls District, Year 3)

The Little Muddy Creek wetland project is located in the Missouri-Sun-Smith River watershed (watershed #7) on private land approximately 1 mile west of Interstate 15 between the towns of Cascade and Ulm in Cascade County. It was constructed in 2004 by Ducks Unlimited and the property owners. The purpose of the project is to create wetland habitat for migratory birds and to serve as a wetland mitigation bank for MDT. The MDT is willing to acquire approximately all available wetland credit from Ducks Unlimited created by this project. It was anticipated by MDT that approximately 13.57 acres of compensatory wetland mitigation credit may be needed to offset impacts associated with ten different projects within the Missouri-Sun-Smith River watershed (#7) (MDT 2002). An additional 50 acres of reserve credit was also being sought by MDT (MDT 2002). Thus, MDT originally sought a total 63.57 acres of compensatory wetland mitigation credit.

Little Muddy Creek is an intermittent stream that flows directly into the Missouri River. In 2004, an 88 foot-wide diversion dam was built across the entire Little Muddy Creek channel. The central 30 feet of the dam is elevated three feet above the existing channel bottom and the ends of the dam rise up to meet the adjacent stream banks. Water is impounded in the channel of Little Muddy Creek for a distance upstream of 2,700 feet. An inlet channel of approximately 400 feet was excavated from the point of diversion to an inlet water control structure with a headgate, at which point water flows through another excavated channel to the off-channel impoundment. The off-channel impoundment is surrounded by an 11,500-foot long berm.

At the full pool elevation, the off-channel impoundment is anticipated to have a surface area of about 216 acres, a depth of five feet, and a maximum water storage volume of 387 acre-feet. To create this wetland, a maximum of 35 cubic feet per second (cfs) of water can be diverted during spring flows. When Little Muddy Creek is flowing, a minimum of 1 cfs must remain in the channel below the point of diversion. Upon filling the site, all streamflow continues downstream. No diversion of water is allowed after June 1<sup>st</sup> of each year. Further, no diversion is allowed when the combined flow of the Missouri River near Ulm and the Sun River near Vaughn totals less than 7,880 cfs.

Prior to project implementation, no wetland habitat existed within the main project site. Target wetland communities to be produced at the site include open water/aquatic bed and shallow marsh/wet meadow.

In Year 1 (2004), combined flows in the Missouri River at Ulm and the Sun River at Vaughn did not exceed 7,880 cfs by June 1, and therefore, no water was turned into the site and no wetland or other aquatic habitat developed. In 2005, the entire site received water, but hydrophytic vegetation had not yet developed. As of 2006, the Little Muddy site had developed 102.45 acres of Class II wetland and 85.80 acres of transitional open water, for a total of 188.25 acres of aquatic habitat.

Approximately 0.80 acre, 9.97 acres, and 2.80 acres of the originally-anticipated 13.57-acre impacts to be mitigated at this site were projected at Class II, III, and IV wetlands, respectively. The COE approved application of these projected impact acres to the Little Muddy site as

previously “owed” mitigation, with the exception of the Bowman’s Corner project, which comprised 10.7 of the 13.57 projected impact acres. Consequently, 2.87 acres of “owed” mitigation was approved for application against the Little Muddy site, with any additional projects (including Bowman’s Corner) to be applied against the 50-acre “reserve”. Final application of projected or incurred wetland impacts against this mitigation site are subject to ongoing discussions and specific agreements between the COE and MDT. However, as of 2006, the site appears to be developing the anticipated target credits.

In 2006, the Little Muddy Creek Wetland Mitigation Site rated as a Category II wetland because it offered an exceptional wildlife habitat rating (**Table 17**). The site also rated high for short and long term surface water storage and production export/food chain support (**Table 17**).

**Table 17: Summary of 2006 wetland function/value ratings and functional points at the Little Muddy Creek Wetland Mitigation Site.**

Function and Value Parameters from the 1999 MDT Montana Wetland Assessment Method	2006
Listed/Proposed T&E Species Habitat	Mod (0.7)
MTNHP Species Habitat	Low (0.1)
General Wildlife Habitat	Exc (1.0)
General Fish/Aquatic Habitat	Mod (0.4)
Flood Attenuation	Mod (0.6)
Short and Long Term Surface Water Storage	High (1.0)
Sediment, Nutrient, Toxicant Removal	Mod (0.7)
Sediment/Shoreline Stabilization	Low (0.3)
Production Export/Food Chain Support	High (0.9)
Groundwater Discharge/Recharge	Low (0.1)
Uniqueness	Mod (0.4)
Recreation/Education Potential	Mod (0.7)
Actual Points/Possible Points	6.9 / 12
% of Possible Score Achieved	58%
Overall Category	II
<b>Total Acreage of Assessed Wetlands and Other Aquatic Habitats within Site Boundaries (ac)</b>	<b>188.25</b>
<b>Functional Units (acreage x actual points)</b>	<b>1298.93</b>

The berm, diversion structures, excavated channels, and inlet/outlet structures were in good condition during the mid-season visit. Water was let into the mitigation site during phases in order to prevent erosion of the berm. Vegetation on the berm has grown dense and tall. Some wide and deep cracks are beginning to appear in portions of the berm, especially near PP-5, which should continue to be monitored.

## 2.12 Meriwether-East (Great Falls District, Year 1)

The Meriwether-East Wetland Mitigation Site was constructed during 2005 to partially mitigate for wetland impacts associated with MDT project NH 1-3(36)234F (Meriwether-East). The Meriwether-East wetland mitigation project was constructed on-site along Highway 2 in Glacier County. It consists of two areas: Site 1 was built near milepost 236 and encompasses approximately 2.67 acres (ac) and Site 2 was built near milepost 239 and encompasses

approximately 6.62 acres. Combined, the on-site mitigation project was designed to create 9.29 acres of new wetland in an area that had no prior wetlands. Wetland hydrology was designed to be supplied from the neighboring wetlands, interception of the water table, and ponding of direct precipitation. It is anticipated that, over time, vegetation would be comprised of emergent wetland species.

No wetland or other aquatic habitat developed at Site 1 in 2006. Approximately 4.63 acres of wetland and 1.99 acres of mudflat, for a total of 6.62 acres of aquatic habitat, developed at Site 2. Consequently 6.62 acres is the maximum assignable credit at Site 2 as of 2006.

Site 2 rated as a Category III wetland (**Table 18**). Notable functions or values included Short and Long Term Water Storage and Groundwater Discharge/Recharge (**Table 18**).

**Table 18: Summary of 2006 wetland function/value ratings and functional points at Site 2 of the Meriwether-East Wetland Mitigation Site.**

Function and Value Parameters from the 1999 MDT Montana Wetland Assessment Method	2006 Site 2
Listed/Proposed T&E Species Habitat	Low (0.0)
MTNHP Species Habitat	Low (0.0)
General Wildlife Habitat	Mod (0.5)
General Fish/Aquatic Habitat	NA
Flood Attenuation	Mod (0.5)
Short and Long Term Surface Water Storage	High (0.9)
Sediment, Nutrient, Toxicant Removal	Mod (0.7)
Sediment/Shoreline Stabilization	NA
Production Export/Food Chain Support	Mod (0.6)
Groundwater Discharge/Recharge	High (1.0)
Uniqueness	Low (0.3)
Recreation/Education Potential	Low (0.3)
Actual Points/Possible Points	4.8 / 10
% of Possible Score Achieved	48%
Overall Category	III
<b>Total Acreage of Assessed Wetlands and Other Aquatic Habitats within Site Boundaries (ac)</b>	<b>6.62</b>
<b>Functional Units (acreage x actual points)</b>	<b>31.78</b>

The dikes were surveyed for erosion problems in 2006. The dikes were covered evenly with erosion control fabric and no erosion problems were found.

### 2.13 Musgrave Lake (Great Falls District, Year 5 – Final Year)

The Musgrave Lake wetland mitigation project was constructed in late 2000 and early 2001 in Watershed 11 (Milk). It is anticipated that this site will compensate for wetland impacts resulting from several proposed MDT highway and bridge reconstruction projects along the U.S. Highway 2 corridor between Havre and Harlem. Constructed on private land, the mitigation site is located approximately four miles south of Zurich and U.S. Highway 2 within 0.25 mile of the Milk River in Blaine County. The goal of the project is to restore hydrology via construction of ditch plugs in natural drained wetland basins and historic oxbow sections, providing approximately 27 acres of wetland credit within the confines of a 100-acre conservation easement.

The project was originally comprised of two “restoration” sites and two “enhancement” sites. Restoration Site 1 (RS1) occurs in a basin in the northwest corner of the mitigation area. Restoration Site 2 (RS2) occurs within a drained and farmed historic oxbow section of Musgrave Lake located along the south property boundary. Wetland hydrology in these areas is to be supplied by precipitation, surface runoff, and possibly groundwater, and is anticipated to result in maximum depths of 3-3.5 feet and 1-1.5 feet at RS1 and RS2, respectively.

Approximately 4.6 acres of impaired, low-quality wetlands were delineated by MDT at RS1 prior to project implementation. However, given the restoration of hydrology, the COE has approved allocation of 1:1 credit at the two basins, inclusive of these existing impaired wetlands (1:1 ratio). No pre-project wetlands were delineated by MDT at RS2. A target of 24.5 “restoration” credit acres was established in these two basins by the landowner. An additional 0.75 acre of credit was proposed by the landowner and tentatively approved by the COE for maintenance of at least three acres of 75-foot wide upland buffer around all wetland and riparian areas (4:1 ratio).

The project further intended to enhance approximately 11 acres of Musgrave Lake at two areas within the easement. These are referenced as Enhancement Site 1 (ES1) and Enhancement Site 2 (ES2). Although largely consisting of existing wetland, ES1, the “middle” portion of Musgrave Lake, was separated from the lake’s southern arm by an earthen dike and was impacted by a large drainage ditch, a perched culvert causing headcutting & associated sedimentation, and chronic overgrazing. ES2, the northeast end of Musgrave Lake, was also wetland and was thought to be impaired by grazing. The project attempts to remedy these problems by relocating the water control structure, installing a larger culvert, and revising the grazing system. Grazing will be prohibited for five years, after which grazing prescriptions will follow a Natural Resources Conservation Service grazing management plan. Assuming that appropriate increase in wetland functional condition was achieved, a ratio of 3:1 was tentatively approved for enhancement by the COE.

The original wetland credit breakdown proposed by the landowner (MLR 2001) and tentatively approved by the COE (2001), once performance standards are met, is listed in **Table 19**

**Table 19: Original wetland credit breakdown for Musgrave Lake Wetland Mitigation Site.**

Area	Acreage	Ratio	Credit
Restoration Site 1	13.6	1:1	13.60
Restoration Site 2	10.9	1:1	10.90
Enhancement Sites 1 and 2	11.2	3:1	3.70
Upland Buffer	3.0	4:1	0.75
<b>Total<sup>1</sup></b>	<b>38.7 acres</b>		<b>28.95 Credits<sup>1</sup></b>

<sup>1</sup>The agreement between the landowner and MDT specifies that approximately 27.2 acres of wetland credit will be developed; this is the minimum target for the project.

ES2 was dropped from monitoring in 2002-2005 per COE / MDT discussions as it was considered to be a reasonably well-functioning system. However, this area was approved for preservation credit at 6:1 in 2006, as was the reference area wetland within the existing easement. Consequently, ES2 was monitored and the reference wetland was delineated in 2006. Further, the COE approved restoration/rehabilitation credit (1.5:1 ratio), rather than enhancement credit (3:1), for ES1 as this more accurately describes the mitigation activity at this location, given updated Montana COE mitigation definitions.

As a result, the following credit ratios were applied to the project in 2006:

- RS1, RS2, and any additional created or restored wetlands: 1:1
- ES1 (pre-existing wetlands that were rehabilitated): 1.5:1
- ES2 and Reference Wetland (preserved areas): 6:1
- Upland Buffer: 4:1

Approximately 24.63 wetland/aquatic habitat acres have been “restored” or created within the mitigation site easement to date (RS1: 13.29 acres; RS2: 10.21 acres; ES1: 0.97 acre; ES2: 0.16 acre). At 1:1 credit ratio, this equates to 24.63 credit acres.

Approximately 4.8 pre-existing wetland acres have been rehabilitated at ES1. At a 1.5:1 credit ratio, this amounts to 3.2 credit acres.

Approximately 8.93 wetland/aquatic habitat acres have been preserved (ES2: 3.64 acres; Reference wetland: 5.29 acres) within the easement. At a 6:1 credit ratio, this equates to 1.49 credit acres.

Approximately 0.75 acre of credit is associated with the upland buffer surrounding wetlands. Consequently, the maximum assignable credit at this site (RS1, RS2, ES1, ES2, Reference wetland, and upland buffer) as of 2006 is approximately  $24.63 + 3.2 + 1.49 + 0.75 = 30.07$  acres, which exceeds the 27.2 acre goal.

Functional assessment results are summarized in **Table 20** below. For comparative purposes, the functional assessment results for the reference wetland site and baseline conditions prepared by MDT and the landowner are also included. Ratings and scores in 2006 were similar to those calculated in 2005. Scores for enhancement sites increased slightly in 2006 as both ES1 and ES2 are one contiguous wetland and were therefore assessed as one assessment area (ES2 was not functionally assessed in 2002-2005). All four sites remain Category II wetlands in 2006.

Based on the baseline functional assessments conducted by MDT and the landowner, the site has experienced a conservative gain of over 180 functional units (acreage x functional points) at RS1, and RS2, and ES1. This does not include any functional gain that may have occurred at ES2, as no baseline functional assessment was conducted at ES2 with which to compare the 2006 assessment. No pre-project functional assessment was conducted at RS2 due to the absence of pre-project wetlands. The composite score at all sites again exceeded the composite score for the reference wetland (6.6 points) in 2006.

All constructed dikes were in good condition during the spring and mid-season visits. A few small areas in the RS-2 "berm" (spoil pile) between the wetland and the irrigation ditch to the south were cleaving during the mid-season visit, with several small breach areas (some caused by beaver) spilling water from the site to the ditch. The overall water level in RS2 appeared unaffected by the breaches. MDT and the landowner were notified of this potential maintenance issue. Beaver had downed several cottonwoods along the east side of RS1 in 2006 – options (tree protection, trapping, etc.) should be examined to discourage this in the future. Lowering the water level slightly at RS1 may be necessary in the future to prevent drowning of existing mature cottonwoods.

**Table 20: Summary of 1999 (reference and baseline) and 2006 wetland function/value ratings and functional points at the Musgrave Lake Wetland Mitigation Project.**

Function and Value Parameters From the 1999 MDT Montana Wetland Assessment Method	Wetland Numbers					
	Reference Wetland (Stutzman 1999)	Pre-Project RS1 <sup>1</sup> (Stutzman 1999)	Pre-Project ES1 (MDT 1999)	RS1 2006	RS2 2006	ES1/ES2 2006
Listed/Proposed T&E Species Habitat	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)
MTNHP Species Habitat	Mod (0.7)	Low (0.1)	Mod (0.7)	High (1.0)	High (1.0)	High (1.0)
General Wildlife Habitat	High (0.9)	Low (0.1)	Mod (0.7)	Exc (1.0)	High (0.9)	High (0.9)
General Fish/Aquatic Habitat	NA	NA	Low (0.3)	NA	NA	NA
Flood Attenuation	Mod (0.5)	Low (0.1)	Mod (0.5)	Mod (0.6)	Mod (0.6)	Mod (0.6)
Short and Long Term Surface Water Storage	High (1)	Low (0.2)	Low (0.3)	High (0.9)	High (0.9)	High (0.9)
Sediment, Nutrient, Toxicant Removal	Mod (0.7)	Mod (0.4)	Low (0.2)	NA	High (1.0)	High (1.0)
Sediment/Shoreline Stabilization	NA	NA	Low (0.2)	Mod (0.6)	NA	Mod (0.6)
Production Export/ Food Chain Support	High (0.9)	Mod (0.5) [Low 0.2]	Mod (0.7)	High (0.9)	High (0.9)	High (0.9)
Groundwater Discharge/Recharge	High (1)	NA	NA	High (1.0)	High (1)	High (1)
Uniqueness	Low (0.3)	Low (0.2)	Low (0.1)	Mod (0.6)	Mod (0.5)	Mod (0.5)
Recreation/Education Potential	Low (0.3)	Low (0.1)	Low (0.1)	Low (0.1)	Low (0.1)	Low (0.1)
Actual Points/Possible Points	6.6 / 10	2.0 / 9	4.1 / 11	7.0 / 10	7.2 / 10	7.8 / 11
% of Possible Score Achieved	66	22	37	70	72	71
Overall Category	II	III	III	II	II	II
<b>Total Acreage of Assessed Aquatic Habitats within Easement (ac)</b>	<b>6.5 (estimated)</b>	<b>4.59</b>	<b>4.8</b>	<b>13.29</b>	<b>10.21</b>	<b>5.77<sup>2</sup></b>
<b>Functional Units (acreage x actual points) (fu)</b>	<b>42.90</b>	<b>9.18</b>	<b>19.68</b>	<b>93.03</b>	<b>73.51</b>	<b>45.01<sup>2</sup></b>
<b>Net Acreage Gain (ac)</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>8.7</b>	<b>10.21</b>	<b>0.97<sup>2</sup></b>
<b>Net Functional Unit Gain (fu)</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>83.85</b>	<b>73.51</b>	<b>25.33<sup>2</sup></b>
<b>Total Functional Unit Gain over baseline</b>				<b>182.69<sup>3</sup></b>		

<sup>1</sup> Production Export rating was corrected based on size of vegetated component in the AA and shown in bold; this resulted in site rating as Category III.

<sup>2</sup> Calculations pertain to acreage associated with ES1 only, as no baseline functional assessment was completed for ES2. Thus, functional unit gains are conservative.

## 2.14 Norem Ranch (Billings District, Year 3)

This project was constructed in the fall of 2002 by the landowner and Maxim Technologies, Inc. (Maxim) to provide MDT with wetland mitigation credits that offset wetland impacts associated with proposed road and bridge reconstruction projects in the vicinity of Big Timber, MT and the middle reaches of the Upper Yellowstone River Basin (watershed #13). The Norem wetland project site is located in Sweetgrass County approximately two miles northeast of Big Timber. The Yellowstone River borders the southern project boundary and to the east is it bounded by Big Timber Creek. Fenced pastures delineate the western and northern project boundaries. The surrounding land uses include pastures, hay production and residential areas.

The project was intended to develop approximately 14.71 acres of wetland credit within a 26.88-acre conservation easement on property owned by Mark Norem. The overall wetland development objectives are to enhance existing wetlands, create emergent wetlands and shallow open water ponds, as well as establish a buffer zone around the majority of the project site. More specifically, primary goals are to create contiguous, Palustrine emergent and shrub/scrub wetlands within the project boundaries.

Approximately 6.98 acres of pre-existing wetlands were delineated on the Norem property by Maxim Technologies, Inc. in 2001. The COE has approved allocation of 2.32 credit acres (3:1 ratio) for the enhancement of these existing wetlands. Enhancement is being achieved by several methods including: the removal of high impact grazing; the addition and subsequent maturation of herbaceous and woody plants to increase species diversity; and by increasing the depth and period of inundation. An additional 1.50 acres of credit was approved by the COE for dedication and maintenance of an upland buffer zone around the perimeter of the wetlands (4:1 ratio).

The project further intends to create 9.46 acres of wetlands and 1.58 acres of shallow open water ponds (1:1 ratio approved by COE). Construction activities included the placement of a low berm in the southeast portion of the site to impound irrigation water and groundwater in addition to the four shallow open water ponds. The berm construction impacted approximately 0.15 acre of existing wetlands, which was subtracted from the 14.86 proposed credit total, resulting in the 14.71-acre credit figure. An outflow culvert located through the berm in the far eastern corner of the project diverts excess water to the wetlands east of the berm. The shallow open water ponds have standing water with depths ranging from 12 inches to 3 feet.

The majority of the project site is within the 100-year floodplain of the Yellowstone River; a historic meander channel of the Yellowstone River forms the majority of the existing wetlands on the property. Springs/seeps exist along the northern perimeter of the existing wetlands and are likely the result of irrigation water that has infiltrated at up-gradient locations and is migrating toward the Yellowstone River. Site hydrology appears strongly related to river surface and subsurface hydrology. Late in the year, a small portion of water may be irrigation influenced.

As of 2006 the gross wetland boundary encompasses 12.54 acres, including 1.50 acres of shallow open water (<4 feet deep). However, it should be noted that this total does not include two small pre-existing wetland lobes (totaling 0.05 acre) within the easement that extend to the

southeast outside of the MDT-defined monitoring area in the northeast corner of the site. Pre-existing wetland acreage totaled 6.98 acres, which did include the two wetland lobes outside of the current monitoring area. Therefore, pre-existing wetland within the current monitoring area was approximately  $6.98 - 0.05 = 6.93$  acres. Wetland / shallow open water acreage within the shown monitoring area has therefore increased by approximately  $12.54 - 6.93 = 5.61$  acres since construction (2002). Credit is assigned for enhancement of the original 6.98 wetland acres on the property, as well as the open water (1.5 acres) and wetland creation (4.11 acres) achieved within the monitoring area to date. As of 2006, the approximate assignable wetland credit at the site is 9.43 acres or 64% of the goal, as outlined in **Table 21**.

**Table 21: 2006 Norem Ranch Wetland Mitigation Site monitoring results.**

Wetland Mitigation Type	2006 Net Acres	Ratio	2006 Credit Acres	Target Credit Acres	Comments
Wetland Enhancement	6.98	3:1	2.32	2.32	Grazing removal, hydrological enhancement, and planting completed, with plants developing.
Wetland Creation	4.11	1:1	4.11	9.46	43% of the wetland creation area has been converted to wetlands.
Open Water Creation	1.50	1:1	1.50	1.58	98% of the intended open water has developed.
Buffer Zone Implementation	6.00	4:1	1.50	1.50	2006 net buffer area was assumed within easement.
Berm impact	--	--	---	-0.15	
<b>Total</b>	<b>18.59</b>	<b>--</b>	<b>9.43</b>	<b>14.71</b>	<b>64% of goal</b>

Functional assessment results are summarized in **Table 22** below. Pre-construction functional assessments were completed for the wetlands by Maxim in 2001 and results of that assessment are included in **Table 22**. The site rated as an overall Category II wetland and scores 84.02 functional units. This represents an increase of approximately 50.76 units since 2001.

In 2005, the site had four State of Montana Noxious Weeds (Canada thistle, leafy spurge, whitetop and spotted knapweed). During the 2006 monitoring trip very few leafy spurge, whitetop and spotted knapweed plants were noted. Most of these weed species had been sprayed and were not viable at the time of the monitoring. Canada thistle is still present, typically in the transition zones between wetlands and uplands. The landowner has implemented biological, mechanical and chemical control and has significantly reduced the population of Canada thistle. Due to the difficulty in controlling this noxious weed, continued weed control measures are recommended.

**Table 22: Summary of 2001 (baseline) and 2006 wetland function/value ratings and functional points at the Norem Ranch Wetland Mitigation Project.**

Function and Value Parameters From the 1999 MDT Montana Wetland Assessment Method	2001 Baseline Assessment	2006
Listed/Proposed T&E Species Habitat	Low (0)	Low (0.3)
MTNHP Species Habitat	Low (0.1)	Mod (0.6)
General Wildlife Habitat	Moderate (0.5)	Exc (1.0)
General Fish/Aquatic Habitat	Low (0.1)	NA
Flood Attenuation	Moderate (0.5)	Mod (0.5)
Short and Long Term Surface Water Storage	Moderate (0.6)	Mod (0.6)
Sediment, Nutrient, Toxicant Removal	High (1.0)	High (0.9)
Sediment/Shoreline Stabilization	NA	NA
Production Export/Food Chain Support	Moderate (0.7)	Mod (0.7)
Groundwater Discharge/Recharge	High (1.0)	High (1.0)
Uniqueness	Low (0.2)	Mod (0.4)
Recreation/Education Potential	Low (0.1)	Mod (0.7)
Actual Points/Possible Points	4.8/11	6.7/10
% of Possible Score Achieved	50	67
Overall Category	III	II
Total Acreage of Assessed Wetlands within Easement	7.0	<b>12.54</b>
Functional Units (acreage x actual points)	33.6	<b>84.02</b>
Net Acreage Gain	NA	<b>5.61</b>
Net Functional Unit Gain	NA	<b>50.76</b>

### 2.15 Perry Ranch (Great Falls District, Year 5)

The Perry Ranch wetland mitigation site was constructed during early summer 2001 to mitigate wetland impacts associated with the Browning-Meriwether and Browning East & West MDT projects. These two projects resulted in a combined projected wetland loss of approximately 14.7 acres. Constructed in the Marias Watershed (watershed #8), the mitigation site is located approximately 13 miles west of Browning, MT and 4 miles north of U.S. Highway 2 in Glacier County. The entire site occurs within the confines of the tribally-owned Perry Ranch on the Blackfeet Indian Reservation.

The intent of the project was to create, via dike placement and shallow excavation, two wetland impoundments within historic oxbows located in the Cut Bank Creek floodplain. The inner oxbow impoundment, located adjacent to Cut Bank Creek, was designed to provide approximately 6.1 wetland acres with a maximum water depth of 2.6 feet. The outer oxbow impoundment, located immediately north of the inner oxbow and west of the creek, was designed to provide approximately 21.5 wetland acres with a maximum water depth of three feet. Approximately 2.3 acres of wetland occurred at the inner oxbow prior to construction, while approximately 1.1 acres occurred at the outer oxbow. The 27.6-acre target mitigation figure is inclusive of these 3.4 acres of existing wetlands.

Wetland hydrology at the inner oxbow is to be provided via overbank flood flows, alluvial flow, and precipitation; flood flows and precipitation will source the outer oxbow. It is anticipated that, over time, vegetation at the inner oxbow will be comprised of scrub-shrub and emergent communities with occasional cottonwoods scattered throughout. The outer oxbow will likely be dominated by emergent communities. No specific performance criteria were required to be met at this site in order to document its success.

No specific performance criteria were required to be met at this site in order to document its success. In general, the site appears to be developing as designed, subject to the limitations of dry and wet years. Approximately 18.97 acres of wetlands presently occur on the site. Approximately 3.4 acres of wetland occurred at the site prior to construction. The 27.6-acre mitigation goal is inclusive of these 3.4 acres of pre-existing wetlands. Consequently, the net goal for this project is to create 24.2 acres. As of 2006 the site has netted 15.57 wetland acres, or 64% of the project target.

Several dike problems were noted during the 2002 summer visit, repaired during 2003, and have been stable into 2006. No problems with the dike were found in 2006. It is recommended that an integrated weed plan be developed and implemented for the Perry Ranch site. An integrated weed plan would use a combination of chemical, mechanical, and biological controls to contain the leafy spurge and Canada thistle infestations. In 2006, leafy spurge was found to be prevalent in portions of the inner oxbow and upland floodplain adjacent to Cut Bank Creek. Leafy spurge occurs at the site as small patches of developing monocultures and in conjunction with snowberry shrub patches.

As wetlands have developed within the oxbows and northern excavated area, so have their associated functions and values (**Table 23**). In 2006, the inner oxbow rating went from Category III to Category II. This was in large part to the increasing percentage of scrub-shrub (willow) and emergent plant development within Type 4. In 2006, the outer oxbow maintained its 2005 Category II status. In 2006 the northern excavated area achieved wetland status and rated as a Category III. It rated lower primarily because of its lower value associated with rare and general wildlife species and production export/food chain support. It is assumed that if soils continue to saturate that the wetland vegetation component will continue to develop. As of 2006, a total of 114.21 functional units have been gained at the Perry Ranch Wetland Mitigation Site

**Table 23: Summary of baseline and 2006 wetland function/value ratings and functional points at the Perry Ranch Wetland Mitigation Project.**

Function and Value Parameters from the 1999 MDT Montana Wetland Assessment Method <sup>1</sup>	Pre-Construction (1997 method)		Post-construction (1999 method)		
	Inner Oxbow	Outer Oxbow	2006 Inner Oxbow	2006 Outer Oxbow	2006 Northern Excavated Area
Listed/Proposed TE Species Habitat	Low (0.1)	Low (0.1)	Low (0.3)	Low (0.3)	Low (0.3)
MTNHP Species Habitat	None (0.0)	None (0.0)	Mod (0.7)	Mod (0.7)	Mod (0.6)
General Wildlife Habitat	Mod (0.4)	Low (0.1)	Mod (0.7)	Mod (0.7)	Mod (0.4)
General Fish/Aquatic Habitat	NA	NA	NA	NA	NA
Flood Attenuation	Mod (0.5)	Low (0.2)	Mod (0.5)	Mod (0.5)	Mod (0.5)
Short and Long Term Surface Water Storage	--	--	High (0.9)	High (0.9)	High (0.9)
Sediment, Nutrient, Toxicant Removal	Mod (0.5)	Mod (0.5)	High (1.0)	High (1.0)	High (1.0)
Sediment/Shoreline Stabilization	NA	NA	NA	NA	NA
Production Export/Food Chain Support	Mod (0.7)	Mod (0.6)	Mod (0.7)	Mod (0.6)	Mod (0.6)
Groundwater Discharge/Recharge	High (1.0)	Low (0.1)	High (1.0)	High (1.0)	High (1.0)
Uniqueness	Low (0.3)	Low (0.2)	Mod (0.4)	Mod (0.4)	Mod (0.4)
Recreation/Education Potential	Low (0.1)	Low (0.1)	Mod (0.7)	Mod (0.7)	Mod (0.7)
Actual Points/Possible Points	4.4 / 10	2.7 / 10	6.9 / 10	6.8 / 10	6.4 / 10
% of Possible Score Achieved	44%	27%	69%	68%	64%
Overall Category	III	IV	II	II	III
<b>Total Acreage of Assessed Wetlands and Other Aquatic Habitats within Site Boundaries (ac)</b>	<b>2.30</b>	<b>1.10</b>	<b>5.92</b>	<b>7.40</b>	<b>5.65</b>
<b>Functional Units (acreage x actual points)</b>	<b>10.12</b>	<b>2.97</b>	<b>40.85</b>	<b>50.32</b>	<b>36.16</b>
<b>Net Acreage Gain (ac)</b>	<b>NA</b>	<b>NA</b>	5.92 – 2.30 <b>= 3.62</b>	7.40 – 1.10 <b>= 6.30</b>	5.65 – 0.00 <b>= 5.65</b>
<b>Net Functional Unit Gain (fu)</b>	<b>NA</b>	<b>NA</b>	40.85-10.12 <b>= 30.73</b>	50.32 – 2.97 <b>= 47.32</b>	36.16 – 0.00 <b>= 36.16</b>
<b>Total Functional Unit Gain</b>	<b>114.21</b>				

## 2.16 Peterson Ranch (Missoula District, Year 5)

The Peterson Ranch is located in Granite County, in the Upper Clark Fork watershed (watershed #2), south and east of Hall, MT. The elevation of the site is approximately 4,200 feet with slight topographic variation throughout the project area. The Peterson Ranch wetland mitigation site was developed to mitigate wetland impacts associated with the MDT reconstruction of Highway 1 between Maxville and Drummond, MT.

This mitigation site occurs in the Flint Creek Valley floodplain consisting of areas of low topography, small side channels (irrigation ditches) and ponds. The main source of hydrology is seasonal flooding by Flint Creek. Another primary source of hydrology is the high groundwater table influenced by irrigation ditches and persistent upwelling and lateral movement of groundwater through the floodplain alluvium. The pre-construction wetland delineation reported 90 acres of wetland and no open water acres throughout the entire 135-acre conservation easement. The mitigation site encompasses only 48 acres of this larger total. The site was

designed to mitigate for specific wetland functions including sediment and nutrient retention, water quality, groundwater recharge, and waterfowl/wildlife habitat.

Project goals for the Peterson Ranch wetland mitigation site include the following:

- Creation of a protective easement.
- Creation of 17.5 acres of wetlands.
- Grazing management plan developed to enhance 80.6 acres.
- Enhancement of riparian vegetation through plantings and seeding.
- Creation of new wetlands with open water habitat.
- Improved functions and values ratings.

Construction was completed in the spring of 2002. The primary components of construction include:

- Construction of existing uplands into 8.2 acres of four shallow water pools and adjoining emergent wetlands.
- Construction of degraded wet meadow into 9.4 acres of shallow open water and emergent/scrub-shrub wetlands.

Large excavated (proposed) wetland cells west of the main ditch bisecting the property do not appear to be receiving water as originally intended. With the exception of the small ponds, most of these areas were completely dry during all site visits. This is apparently due to the lack of directly applied irrigation water as originally proposed. The use of irrigation water for these sites was denied by the DNRC as a result of the water rights permitting process.

In 2006, approximately 22.74 acres of wetland and 1.08 acres of open water were mapped on the mitigation site, for a total of 23.82 acres of aquatic habitat. Subtracting the original 22.6 acres of pre-project wetlands from this total yields a current net of approximately 1.22 wetland/open water acres. Additional acreage may form with additional time and more normal precipitation; however, as the originally designed water source (irrigation water) was unable to be implemented, additional wetland development is not likely to be substantive.

The Peterson Ranch was separated into three AAs for purposes of functional assessment. These areas included the created wetland OW/pond # 1, 2 and associated emergent wet meadow west of the irrigation ditch (AA 1), scrub-shrub/emergent wetlands along the irrigation ditch (AA 2), and the created wetland OW/ponds #3, 4 and 5 with associated emergent vegetation east of the irrigation ditch (AA 3). A complete breakdown of ratings for each assessment area and pre-project AAs are presented in **Table 24** below.

Functional assessment ratings in 2006 were identical to those derived in 2005 (**Table 24**). Based on functional assessment results, approximately 164.80 functional units occur at the Peterson Ranch mitigation site. Baseline functional assessment results are also provided in **Table 24** for general comparative purposes. However, it should be noted that direct comparison between the baseline and 2005 functional assessments are not possible, as they were completed using different versions of the MDT functional assessment method; assessments can still be compared

**Table 24: Summary of 1998 (baseline) and 2006 wetland function/value ratings and functional points at the Peterson Ranch Wetland Mitigation Project.**

Function and Value Parameters From the 1999 MDT Montana Wetland Assessment Method	Evaluation Year/Assessment Area			
	1998 Baseline <sup>a</sup>	2006 AA 1	2006 AA 2	2006 AA 3
Listed/Proposed T&E Species Habitat	Low (0.3)	Low (0.3)	Low (0.5)	Low (0.5)
MTNHP Species Habitat	Low (0.1)	Low (0.0)	Mod (0.7)	Mod (0.7)
General Wildlife Habitat	Low (0.1)	Mod (0.7)	Mod (0.7)	Mod (0.7)
General Fish/Aquatic Habitat	NA	NA	NA	NA
Flood Attenuation	NA	Mod (0.5)	Low (0.3)	Mod (0.5)
Short and Long Term Surface Water Storage	High (1.0)	High (0.8)	High (0.8)	High (0.8)
Sediment, Nutrient, Toxicant Removal	Mod (0.5)	Mod (0.7)	High (1.0)	Mod (0.7)
Sediment/Shoreline Stabilization	NA	Low (0.3)	High (1.0)	High (1.0)
Production Export/Food Chain Support	Mod (0.7)	High (0.9)	High (0.8)	High (0.9)
Groundwater Discharge/ Recharge	UNK	High (1.0)	High (1.0)	High (1.0)
Uniqueness	Low (0.2)	Low (0.3)	Low (0.3)	Low (0.3)
Recreation/Education Potential	Low (0.1)	Low (0.3)	Low (0.3)	Low (0.3)
Actual Points/ Possible Points	3.0 / 8	5.8 / 11	7.4 / 11	7.4 / 11
% Of Possible Score Achieved		53%	67%	67%
Overall Category	38%	III	II	II
Total Acreage of Assessed Wetlands and Open Water within Easement by AA	III (borderline IV)	<b>7.17</b>	<b>3.0</b>	<b>13.65</b>
Functional Units by AA (acreage x actual points)	22.6 ac	<b>41.59</b>	<b>22.20</b>	<b>101.01</b>
Total Acreage of Assessed Wetlands and Open Water on Site	67.8	<b>23.82</b>		
Total Functional Units on Site	22.6 ac	<b>164.8</b>		
Net Acreage Gain (assessed wetlands and open water only)	67.8 fu	<b>1.22</b>		
Net Functional Unit Gain	NA	<b>97</b>		

<sup>a</sup>The baseline assessment was performed using the 1996 MDT assessment method, several parameters which were substantially revised during development of the 1999 MDT assessment method, which was applied during 2006 monitoring. Thus, direct comparison of pre- and post-project functions is not possible, although some general trends can be noted.

qualitatively. The baseline assessment was completed using the 1996 version, while the 2002 – 2005 assessments were conducted using the most current (1999) version.

Woody species survival data were collected for the Peterson Ranch. Plantings were difficult to find during the 2004, 2005 and 2006 monitoring due to extensive herbaceous cover of upland grass species and heavy browse by livestock. The pond # 1 & 2 areas west of the irrigation ditch experienced the heaviest grazing this summer; potential for shrub development in these areas has been greatly reduced due to grazing. Most or all plantings observed in this area prior to 2004 have been removed by livestock. Willow species within this area also had a low survival rate due to either grazing effects or low water levels. OW/ponds # 3, 4 & 5 showed the best survival with higher rates. OW/pond # 3 had the majority of the willows that showed vigorous growth and spread. No silverberry, red osier dogwood, woods rose, or golden current were observed in 2006, and only nine chokecherry were observed.

Several noxious weeds are present including Canada thistle, hound's tongue, oxeye daisy, and spotted knapweed. These generally consist of scattered individuals with very low coverage. However, weed control and revegetation of disturbed sites would prevent further weed spread, and reduce the risk of new weeds invading. A large population of Canada thistle occurs just outside the north property boundary that could facilitate spread of this species on the site.

The general lack of water at the majority of this site continues preclude wetland development in many areas. Continued livestock grazing within the pond # 1 & 2 areas also continue to slow development of wetlands.

### **2.17 Ridgeway Complex (Glendive District, Year 6)**

The Ridgeway wetland complex was created to provide wetland mitigation credits for MDT impacts in the Little Missouri Watershed (watershed #16). The complex, comprised of sixteen constructed impoundments, is located in Carter County, MT.

Eight wetlands were created during the summer of 2000 and an additional eight were completed in January 2001. The objective for the Ridgeway Complex was to maximize the surface acres of each individual project to create a total of 50 acres of shallow waterfowl habitat. Several construction designs were employed to create the impoundments; 15 of the 16 impoundments were originally intended to have a surface area of 3.5 acres and one impoundment (#3) 22 surface acres.

As of July 2006, the gross aquatic habitat area within the Ridgeway Complex, which includes open water and net wetland acreage, totaled 55.03 acres, a 69% increase since 2005. The net wetland area (gross aquatic habitat minus unvegetated open water) increased from 26.53 acres in 2005 to 41.94 acres in 2006; a 58% increase. As of the 2006 field season, approximately 110% (55.03 acres) of the 50-acre (gross) wetland creation goal had been accomplished. Given continued adequate hydrology, all open water areas should continue to transition to vegetated wetland over time.

In 2003, seven of the Ridgeway Complex constructed pond sites had not developed into wetlands. In 2004, the number of undeveloped sites decreased to five. In 2005, the number of undeveloped sites decreased to three: W-1, W-15 and W-16. In 2006, only sites 14, 15, and 16 did not qualify as wetlands due to a lack of hydrophytic vegetation.

Total gross aquatic habitat acreage gain (excluding 100% open water sites that do not qualify as wetlands: 14, 15, 16, and which were therefore not functionally assessed) for the Ridgeway Complex is 49.28 acres with a gain of over 414 functional units (**Table 25**).

There is a breach in the dam at W-16. On the day of the mitigation monitoring, water was observed within the constructed pond, in the channel through the dam breach, and had flowed into the area south of the dam. The dam is not safe for vehicular traffic.

**Table 25: Summary of 2006 wetland function/value ratings and functional points for all Ridgeway Complex Wetland Mitigation Sites.<sup>1</sup>**

Function and Value Parameters From the 1999 MDT Montana Wetland Assessment Method	Wetland 4	Wetland 11	Wetlands 1, 3, 5, 12, 13	Wetlands 2, 6, 7, 8, 9, 10
Listed/Proposed T&E Species Habitat	Low (0.0)	Low (0.0)	Low (0.0)	Low (0.0)
MTNHP Species Habitat	High (1.0)	High (1.0)	High (1.0)	High (1.0)
General Wildlife Habitat	Mod (0.4)	High (0.9)	High (0.9)	High (1.0)
General Fish/Aquatic Habitat	NA	NA	NA	NA
Flood Attenuation	Low (0.2)	Low (0.2)	Mod (0.5)	Mod (0.5)
Short and Long Term Surface Water Storage	Mod (0.5)	Mod (0.7)	Mod (0.7)	High (1.0)
Sediment, Nutrient, Toxicant Removal	Mod (0.7)	Mod (0.7)	High (1.0)	High (1.0)
Sediment/Shoreline Stabilization	Low (0.2)	Mod (0.7)	High (1.0)	High (1.0)
Production Export/Food Chain Support	Low (0.2)	Mod (0.4)	Mod (0.7)	High (0.8)
Groundwater Discharge/Recharge	NA	High (1.0)	High (1.0)	High (1.0)
Uniqueness	Mod (0.4)	Mod (0.4)	Mod (0.4)	Mod (0.4)
Recreation/Education Potential	Low (0.1)	High (1.0)	High (1.0)	High (1.0)
Actual Points/ Possible Points	3.7/10	7.0/111	8.2/11	8.7/11
% of Possible Score Achieved	37%	64%	75%	79%
Overall Category	II	II	II	II
<b>Total Acreage of Assessed Wetlands within Easement</b>	<b>0.89</b>	<b>0.97</b>	<b>17.16</b>	<b>30.26</b>
<b>Functional Units (acreage x actual points)</b>	<b>3.29</b>	<b>6.79</b>	<b>140.71</b>	<b>263.26</b>
<b>Net Acreage Gain</b>	<b>0.89</b>	<b>0.97</b>	<b>17.16</b>	<b>30.26</b>
<b>Net Functional Unit Gain</b>	<b>3.29</b>	<b>6.79</b>	<b>140.71</b>	<b>263.26</b>
<b>Grand Total Functional Unit “Gain” for Ridgeway Complex Wetland</b>	<b>414.05</b>			

<sup>1</sup> Sites 14, 15, and 16 are not included because they do not qualify as wetland.

## 2.18 Ringling (Butte, Year 6)

The Ringling/Galt wetland mitigation project was constructed in 2000 to provide partial mitigation for projected wetland impacts resulting from MDT’s Ringling–North highway reconstruction project. Constructed in Watershed 7 (Missouri-Sun-Smith), the 20-acre mitigation site is located approximately 7 miles north of Ringling in Meagher County. The site occurs on private land (Galt Ranch) located northeast of US Hwy 89, in the Agate Creek drainage.

Design features included minor excavation and placement of a dike across Agate Creek to retain surface water drainage. A primary water control structure was built near the north end of the dike, with an emergency spillway constructed around the north end of the dike. Wetland hydrology is to be primarily provided by surface water from Agate Creek, and supplemented by precipitation. Following construction, the dike and other disturbed areas were seeded with a graminoid seed mix. In May 2000, the COE determined that this site could not be used as permanent mitigation for the Ringling – North project due to the lack of a perpetual conservation easement.

No wetland habitat occurred at the site prior to project implementation. Target wetland communities to be produced at the site included open water/aquatic bed and shallow marsh/wet meadow. Target wetland functions to be provided at the site included habitat diversity, flood

control & storage, general wildlife habitat, sediment filtration, and nutrient cycling. The site was formally monitored in 2001, 2003, and 2004, but was not monitored in 2002 or 2005 due to extreme drought conditions and lack of surface water.

Prior to project implementation, MDT did not document any wetland habitat in the analysis area. Despite the fact that water was retained on-site in 2003 and again in 2006, the site has not had sufficient hydrology to begin wetland development and thus no wetlands were delineated within the monitoring area. To date, the site has yet to create any wetland habitat and therefore no credit, COE approved or otherwise, for wetland creation can be attributed to this project. At its maximum in 2006, the site supported 2.54 acres of non-wetland aquatic habitat (open water). Through evaporation and infiltration, the amount of open water decreased to 0.82 acres at the time of the mid-season site visit on August 15<sup>th</sup>.

Given the lack of wetland development since the project was constructed in 2000, MDT has decided to suspend monitoring at this site until 2009.

## **2.19 Rock Creek Ranch (Glendive District, Year 2)**

The Rock Creek Ranch is located in Valley County, approximately three miles east of Hinsdale along the north side of U.S. Highway 2. The ranch is situated east of Rock Creek and north of the Milk River in Watershed 11. The MDT sought to purchase up to 50 wetland credit acres in Watershed 11 (Milk River) to offset current and potential future wetland impacts resulting from proposed highway construction projects within the watershed. Potential highway impacts have not been quantified or characterized at this time. However, it is expected that impacts will primarily involve emergent wetlands with occasional impacts to scrub-shrub and possible minor impacts to forested wetlands along the Milk River corridor.

Constructed in fall 2004, the Rock Creek Ranch wetland mitigation project seeks to create / restore (re-establish) up to 75 acres of primarily emergent and, as an added component, scrub/shrub wetlands, within an approximate 116.75-acre perpetual conservation easement in the southeast corner of the ranch property. The first 50 acres of successfully established credits would be allocated to MDT, and MDT would have the option of purchasing additional wetland credits developing within the easement. Approximately 1.08 acres of wetlands occurred in the project area prior to construction. This does not include pre-existing wetlands in an excavated east-west trench within the easement just north of U.S. Highway 2, which were not part of the Rock Creek Ranch project, but were previously constructed by MDT to mitigate wetland impacts associated with the Hinsdale East and West project.

The proposed wetlands are designed to collect water from irrigation and natural seasonal flow down Long Coulee, as well as irrigation return flow and precipitation. As the low point on the ranch, all irrigation return water flows through the wetland mitigation area with the exception of water flowing in the U.S. Highway 2 roadside ditch. Water is retained on the site by two low dikes in the southeast property corner

Credit ratios and approximate associated credit acreages agreed to by the COE are listed below. While up to 76 acres of credit may eventually develop, the short term current MDT credit goal at the site is 50 acres.

Wetland Creation / Re-Establishment (1:1 ratio):	75 acres created / re-established 75 acres wetland mitigation credit
Upland Buffer (3,100 x 50 feet along south and southwest wetland borders; 1:4 ratio):	3.6 acres of buffer established 0.9 acre wetland mitigation credit
Wetland Enhancement (1,000 x 15 feet, 1:3 ratio):	0.34 acre enhanced 0.11 acre wetland mitigation credit
Total Projected Wetland Mitigation Credit:	76.01 acres

Approximately 81.52 acres of wetlands and 1.25 acres of open water were delineated on the mitigation site in 2006, for a total of 82.77 acres of aquatic habitat. Approximately 1.08 acres of wetlands occurred on the site prior to project implementation. Consequently, the net aquatic habitat created / restored to date is  $82.77 - 1.08 = 81.69$  acres. This is credited at a 1:1 ratio. Additionally, the pre-existing 1.08 acres were enhanced at a credit ratio of 1:3, resulting in 0.36 acre of credit. Finally, approximately 3.6 acres of upland buffer were included in the easement at a credit ratio of 1:4, resulting in 0.9 acre of credit.

As of 2006, the maximum assignable credit at the Rock Creek Ranch mitigation site is  $81.69 + 0.36 + 0.9 = 82.95$  acres, or 166% of the initial 50-acre goal. Additional wetland communities are likely to form and stabilize with consistent inundation from year to year

Functional assessment results are summarized in **Table 26**. For comparative purposes, the functional assessment results for baseline conditions are also included in **Table 26**. The site currently rates as a Category II wetland, a substantial improvement over baseline Category IV ratings. More significantly, the site has gained over 510 functional units over baseline conditions. Prominent functions include general wildlife habitat, surface water storage, sediment/nutrient/toxicant removal, documented MTNHP species habitat (northern leopard frog, scarlet ammannia), and production export.

All dikes were in good condition during the spring, mid-season, and fall visits with no indications of seepage observed during 2006.

**Table 26: Summary of 2003 and 2006 wetland function/value ratings and functional points at the Rock Creek Ranch Wetland Mitigation Project.**

Function and Value Parameters From the 1999 MDT Montana Wetland Assessment Method	Wetland Numbers		
	Pre-Project Wetland Ditches (2003)	Pre-Project Isolated Wetland Patches (2003)	Post-Project 2006
Listed/Proposed T&E Species Habitat	Low (0.3)	Low (0.0)	Low (0.5)
MTNHP Species Habitat	Low (0.1)	Low (0.1)	High (1.0)
General Wildlife Habitat	Low (0.3)	Low (0.1)	High (0.8)
General Fish/Aquatic Habitat	NA	NA	NA
Flood Attenuation	Low (0.2)	NA	Moderate (0.6)
Short and Long Term Surface Water Storage	Low (0.3)	Low (0.3)	High (0.9)
Sediment, Nutrient, Toxicant Removal	Low (0.3)	Mod (0.5)	High (1.0)
Sediment/Shoreline Stabilization	Low (0.2)	NA	NA
Production Export/ Food Chain Support	Low (0.3)	Low (0.2)	Moderate (0.7)
Groundwater Discharge/Recharge	Low (0.1)	Low (0.1)	Low (0.1)
Uniqueness	Low (0.1)	Low (0.1)	Low (0.3)
Recreation/Education Potential	Low (0.1)	Low (0.1)	Low (0.3)
Actual Points/Possible Points	2.3 / 11	1.5 / 9	6.2 / 10
% of Possible Score Achieved	21	17	62
Overall Category	IV	IV	II
<b>Total Acreage of Assessed Wetlands within Easement (ac)</b>	<b>0.77</b>	<b>0.31</b>	<b>82.77</b>
<b>Functional Units (acreage x actual points) (fu)</b>	<b>1.77</b>	<b>0.47</b>	<b>513.17</b>
<b>Net Acreage Gain (ac)</b>	<b>NA</b>	<b>NA</b>	<b>81.69</b>
<b>Net Functional Unit Gain (fu)</b>	<b>NA</b>	<b>NA</b>	<b>510.93</b>
<b>Total Functional Unit Gain over baseline</b>		<b>510.93</b>	

## 2.20 Roundup (Billings District, Year 6)

The Roundup wetland site was created to provide wetland mitigation credits for MDT's reconstruction of U.S. Highway 12 in the Musselshell Watershed (watershed #10). The site is located in Musselshell County, MT, immediately south of U.S. Highway 12 and approximately one mile east of the town of Roundup. Elevations range from approximately 3,169 to 3,175 feet above mean sea level. The mitigation site is located at the site of the former wastewater lagoons for the city of Roundup. This former two-celled treatment facility, covering approximately 26 acres, contained sludge of varying depths with concentrations of nitrates, and possibly heavy metals of which portions were capped during construction modification. Five monitoring wells were installed around the lagoon to monitor any possible groundwater contamination from the sludge. After a review of groundwater quality sampling data, both the MT Department of Environmental Quality (DEQ) and the U.S. Environmental Protection Agency (EPA) agreed that there was not a groundwater contamination problem associated with the lagoons. The organic "sludge" was left in the west end of the southern end of the wetland bed and capped with one foot of soil during construction to prevent potential biohazards risks. The dike between cells was breached to allow water to access both cells.

Construction was completed in April of 2000 with a goal of creating at least 24 acres of wetlands with a diverse vegetative community. The site was designed to develop a hemi-marsh emergent wetland system with standing water depths no greater than three feet. Water depths vary within the wetland due to the natural topography behind the dike. Water was designed to enter the wetland mitigation system through two methods and locations.

One source of hydrology is through a channel, which funnels stormwater runoff from the northeastern section of the city of Roundup and U.S. Highway 12 into the southwestern end of the wetland. The estimated runoff volume for this system is 12,700 m<sup>3</sup>, and 17,825 m<sup>3</sup> of water for the 5- and 25-year event, respectively. Treated wastewater from the new Roundup sewage treatment facility is also discharged into the wetland to maintain the design water level elevation. There is no physical "outlet" designed for the system; water leaves only through evaporation and evapotranspiration. The site has been filling with the wastewater and stormwater since July of 2001.

Groundwater elevations were generally higher during 2006 than 2005, although static water level in Well 1 was lower during the 2006 sampling event. Concentrations of nutrient parameters were generally lower during the 2006 sampling event than in 2005, especially for nitrogen parameters, although several increases were noted. Most nutrient parameters were within acceptable ranges; however, the concentration of nitrate + nitrite in Well 1 exceeded the human health standard of 10 mg/L for groundwater during 2006, as it did during 2005.

The 2006 delineation showed a total of 22.07 acres of gross wetland area; 6.04 acres of open water and 16.03 acres of net wetland. The net wetland area has oscillated over the six years of mitigation monitoring as a result of water availability and subsequent affect on open water and mud flat acreage, not as a result of the change in desirable wetland vegetation species coverage. Preferred, non-weedy hydrophytic species have comprised less than 1% of the Net Wetland acreage since the site was constructed.

The Roundup wetland continues to rate as a Category II wetland with little change in overall area since 2002. Functional assessment results are summarized in Table 27 below. The site rated as an overall Category II wetland and scores 158.9 Functional Units. There has been very little change in functional units since 2004. The functional units will continue to remain the same unless the wetland starts to develop a more preferred wetland vegetation community and includes higher structural diversity. The list of avian species has increased since monitoring began and has consequently increased the General Wildlife Habitat rating to high (0.9) which qualifies the wetland as a Category II wetland. Wildlife use, particularly by migratory songbirds, would further increase with the survival and proliferation of a willow shrub community.

**Table 27: Summary of 2001 and 2006 wetland function/value ratings and functional points at the Roundup Wetland Mitigation Project.**

Function and Value Parameters From the 1999 MDT Montana Wetland Assessment Method	2001	2006
Listed/Proposed T&E Species Habitat	Low (0.0)	Low (0.0)
MTNHP Species Habitat	Low (0.0)	High (0.8)
General Wildlife Habitat	Low (0.3)	High (0.9)
General Fish/Aquatic Habitat	NA	NA
Flood Attenuation	High (1.0)	Mod. (0.6)
Short and Long Term Surface Water Storage	High (0.8)	High (1.0)
Sediment, Nutrient, Toxicant Removal	Mod. (0.7)	Mod. (0.7)
Sediment/Shoreline Stabilization	NA	High (1.0)
Production Export/Food Chain Support	Mod. (0.6)	High (0.8)
Groundwater Discharge/Recharge	Low (0.1)	Low (0.1)
Uniqueness	Low (0.2)	Low (0.3)
Recreation/Education Potential	Low (0.2)	High (1.0)
Actual Points/ Possible Points	3.9/10	7.2/11
% of Possible Score Achieved	39%	65%
Overall Category	III	II
<b>Total Acreage of Assessed Wetlands within Easement</b>	<b>18.51</b>	<b>22.07</b>
<b>Functional Units (acreage x actual points)</b>	<b>72.21</b>	<b>158.90</b>
<b>Net Acreage Gain</b>	<b>18.51</b>	<b>22.07</b>
<b>Net Functional Unit Gain</b>	<b>72.21</b>	<b>158.90</b>

All dikes and inlet structures were functioning satisfactorily. All located bird boxes were in good condition. Kochia (*Kochia scoparia*) control is recommended.

A wetland seed mix, which includes a rhizomatous hydrophytic mix (i.e.: *Deschampsia cespitosa*, *Distichlis spicata*, *Scirpus maritimus*, *S. pungens*, *Juncus balticus*, *Eleocharis palustris*, etc.) and a cover crop (i.e. spring wheat) could be hand-seeded and raked into the circumference and wetter zones, and spreading/harrowing the seed mechanically in the drier central areas between the north and south lagoons would expedite species colonization. Western wheatgrass (*Agropyron smithii*), a fast-growing cover crop, and other desirable upland species could be seeded onto the upland berms, islands, and uplands around the entire site circumference.

## 2.21 South Fork Smith (Butte District, Year 5)

Located in the Missouri-Sun-Smith drainage basin (watershed #7), the approximate 2-mile long stream restoration area is located approximately seven miles north of Ringling in Meagher County. The site occurs on private land (Galt Ranch) located west of U.S. Highway 89. In conjunction with its Ringling–North highway reconstruction project, MDT shifted a portion of the South Fork Smith River from its channelized location on the east side of U.S. Highway 89 to its historic channel on the west side of the roadway. It is estimated from aerial photos and topographic maps that approximately 8,900 feet of river channel length was eliminated with the relocation of the South Fork to the east side of the highway in 1910. The MDT, with restoration of the river to its former channel, is anticipating that various lost functions such as floodplain, fisheries and wetland habitat will be restored to previous conditions.

Highway reconstruction was completed during the 2001 field season, and water was returned to the historic channel in early fall 2001. The MDT did not propose or conduct any in-stream or bank construction prior to returning water to the channel, but rather elected to allow the stream to reach its own equilibrium through natural processes over time.

A baseline wetland delineation and functional assessment was completed during the 2001 field season prior to reactivation of the historic channel. MDT not only anticipates the restoration of high quality in-stream fish habitat, but the restoration of moderate to high quality floodplain wetlands as well, which will be monitored over time. Target wetland communities to be produced at the site include shallow marsh/wet meadow and scrub-shrub. Target wetland functions to be provided at the site include habitat diversity, flood control & storage, general wildlife habitat, fish habitat, sediment filtration, and nutrient cycling.

The historic channel and adjacent habitats have been heavily grazed in recent years, thus limiting the establishment of woody riparian vegetation. MDT anticipates that many of the woody species would establish with protective fencing and/or planting by MDT forces. At this time, no formal revegetation plan is proposed. Prior to project construction, MDT approached the landowner about enacting a conservation easement along the entire corridor. The landowner originally agreed, in concept, to fencing and placing the area within an easement, but rescinded late in the planning process.

The historic channel of the South Fork Smith River was primarily influenced by groundwater prior to reactivation in the fall of 2001. Flowing surface water was present in all reaches of the stream within the analysis area during the 2006 monitoring effort. Water depths varied within the channel depending upon channel geometry. The water tends to be shallow (1”-6”) as it spreads out across widened sections of channel and deeper (6”-36”) in narrow sections of channel and in pools. Water levels within the channel were significantly lower during the 2006 monitoring than in the 2005 season which may have been a result of conducting the field visit approximately 3 weeks later in 2006 than in 2005.

Drift lines, on fences adjacent to and across the stream, indicated that the S.F. Smith River received flood flows during the spring or early summer of 2006. 2003 was the only other year since the historic channel was re-activated that this occurred. Examination of the streambanks

and bank pins showed no lateral movement of the banks in these areas. No other signs of instability of the stream channel were noted in spite of heavy grazing on the site in 2006.

Prior to reactivation of the historic channel through the project area, wetland habitat was groundwater fed, with 8.32 acres of wetland habitat and 0.57 acre of open water occurring on-site, for a total of 8.87 acres of aquatic habitat. Slight wetland expansion was noted in 2006 in one location as a result of normal or above normal precipitation in the project area, resulting in a net gain of 0.03 acre across the site between 2005 and 2006. 2006 delineation results show that there are 8.79 acres of wetland and 0.57 acre of open water, thereby, providing a total of 9.36 acres of aquatic habitat. Net wetland gain across the site since project inception is 0.46 acre. Additionally, minor shifts in vegetation community types are occurring, as emergent habitat transitions to aquatic bed within the channel. Additional wetland expansion seems probable over time, but will be limited by the deeply incised S.F. Smith River channel.

As the site has been monitored for a five-year period, MDT has decided to suspend further monitoring and possibly pursue stream mitigation credits with the Corps of Engineers at a later date, once the stream mitigation crediting procedures are finalized.

Functional assessment results are summarized in **Table 28** below. The wetland habitat associated with the South Fork Smith River rated as a Category III (moderate value), primarily due to high ratings for surface water storage, food chain support and groundwater discharge. All other ratings were low or moderate. Actual functional points increased slightly over the baseline, as perennial flow was reintroduced to the site as well as a fisheries resource.

**Table 28: Summary of 2001 (baseline) and 2006 wetland function/value ratings and functional points at the South Fork Smith River Wetland Mitigation Project.**

Function and Value Parameters From the 1999 MDT Montana Wetland Assessment Method	Evaluation Year/Assessment Area	
	2001	2006
	Historic Channel	Reactivated Channel
Listed/Proposed T&E Species Habitat	Low (0.3)	Low (0.3)
MTNHP Species Habitat	Low (0.1)	Low (0.1)
General Wildlife Habitat	Low (0.3)	Mod (0.5)
General Fish/Aquatic Habitat	Low (0.1)	Mod (0.4)
Flood Attenuation	Mod (0.4)	Mod (0.4)
Short and Long Term Surface Water Storage	High (0.9)	High (1.0)
Sediment, Nutrient, Toxicant Removal	Mod (0.4)	Mod (0.4)
Sediment/Shoreline Stabilization	Low (0.2)	Mod (0.7)
Production Export/Food Chain Support	High (0.8)	High (0.9)
Groundwater Discharge/Recharge	High (1.0)	High (1.0)
Uniqueness	low (0.3)	Low (0.2)
Recreation/Education Potential	Low (0.1)	Low (0.1)
Actual Points/Possible Points	4.9 / 12	6.0/ 12
% of Possible Score Achieved	41%	50%
Overall Category	III	III
<b>Total Acreage of Assessed Wetlands and Other Aquatic Habitats within Site Boundaries (ac)</b>	<b>8.9</b>	<b>9.36</b>
<b>Functional Units (acreage x actual points) (fu)</b>	<b>43.61</b>	<b>56.16</b>

At this time, cattle grazing within the South Fork Smith River channel, its banks, and the surrounding uplands is limiting the extent to which restoration can occur on the site. Fencing of the stream corridor would allow for the re-establishment of woody vegetation along the creek, help protect stream banks from trampling, and improve the overall health of the system. Function and value ratings would also increase substantially, thus generating considerably more functional units from the site.

## **2.22 Wagner Marsh (Billings District, Year 2)**

The Wagner Marsh site occurs at an elevation of approximately 3,240 feet above mean sea level and is located on the west edge of Billings, just north and east of the intersection of Danford Road and 56<sup>th</sup> Street. This mitigation site was constructed during the spring of 2005 in the eastern portion of the Upper Yellowstone River Watershed (watershed #13). Wagner Marsh was constructed on MDT property originally purchased in 1954 and used as a borrow area (gravel mining) for construction of the Interstate 90 (I-90) corridor. For this reason the Wagner Marsh is also known as the ‘Wagner Pit’. The goal of the project is to create wetland hydrology at the site, and thereby ultimately provide approximately 21.59 acres of palustrine emergent and scrub-shrub wetland within the confines of the 39 acre site. Prior to construction approximately 2.12 acres of palustrine emergent and scrub-shrub wetland and 1.75 acres of open water had been incidentally created by MDT via pit excavation. It is anticipated that this site will compensate for wetland impacts resulting from MDT highway and bridge reconstruction projects in the watershed.

The project incorporates the two incidentally created wetland/open water areas totaling 3.87 acres and seven wetland creation areas (i.e., wetland cells) totaling approximately 17.72 acres for a total projected aquatic habitat size of 21.59 acres. Wetland hydrology is supplied primarily through interception of the groundwater table, with some minimal contributions from precipitation. No surface outlet exists at the site. To ensure sufficient water for the wetland creation areas into the future, MDT previously secured groundwater rights. The establishment of an upland buffer is also a part of this project and will be tied into the crediting for the project.

Based on documentation provided by MDT, approximately 2.12 acres of wetland and 1.75 acres of open water (3.87 acres total of aquatic habitat) were incidentally created on the site via pit excavation prior to formal mitigation project implementation in 2005. MDT is receiving credit for these wetlands as they were originally created in association with the 2000-2001 Shiloh Road interchange project and protected from disturbance by MDT. As of 2006, a total of approximately 11.49 acres of open water and wetland habitat (including the original 3.87 acres) occur within the monitoring area. This is a decrease of approximately 0.35 acre from 2005 totals (11.84 acres) and is attributed primarily to lower water levels in 2006.

Of the 11.49-acre 2006 total, approximately 4.96 acres are currently open water habitat and the remaining 6.53 acres are vegetated wetland areas. Much of the newly formed open water habitat is expected to become vegetated with emergent hydrophytic species over time. An additional 2.31 acres of the ‘disturbed-moist’ vegetation type is expected to convert to wetland over the next few years if site hydrology stabilizes and is more constant at the beginning of the growing season. If this occurs then it would increase the total acreage of open water and wetland to 13.8

acres. In 2005 the site’s open water/wetland potential was estimated to be 15.88 acres. This was reduced in 2006 because, overall, the site appeared to be drier than in 2005. This may be in part due to gravel mine operations on the west side of 56<sup>th</sup> Street intercepting groundwater flows.

The Corps of Engineers will determine which crediting ratios are applicable to the site. However, using the credit ratios listed in MDT/COE correspondence regarding crediting at the site, **Table 29** summarizes compensatory mitigation credits developed to date at the Wagner Marsh. Using these assumed credit ratios for wetlands, open water, and upland buffer, approximately 9.14 acres of credit are currently available.

**Table 29: 2006 mitigation credit summary for the Wagner Marsh Wetland Mitigation Site.**

Credit Category	Acreage	Assumed Credit Ratio <sup>a</sup>	Credit <sup>1</sup>
Total Scrub/Shrub and Emergent Wetland	6.53	1:1	6.53
Total Open water	4.96	20% of wetland acreage	1.31
50-foot wide upland buffer	5.19	4:1	1.30
<b>TOTAL</b>	<b>16.68</b>		<b>9.14</b>

<sup>1</sup> The Corps of Engineers is the regulatory authority and will determine the actual mitigation ratios.

A total of 550 woody plantings were installed as part of the overall revegetation plan for the site. As of August 1, 2006, the overall survival rate is estimated at 64 percent, with a total of 173 individuals observed to be dead and an additional 25 that were not located and presumed dead. This is down from the 92 percent survival rate reported in 2005. Juniper plantings continue to do well; mortality of the other species is likely due to a lack of available water during the summer months.

The created wetlands at Wagner Marsh were ranked as Category II wetlands in 2006 as compared to Category IV in 2001 (**Table 30**). Functions that increased substantially over 2001 baseline conditions include general wildlife habitat, short and long term surface water storage, production export, uniqueness, and recreation/education potential. The pre-project site provided about 16.6 functional units within the monitoring area, and the post-project site currently provides about 77.0 functional units, for a conservative gain of at least 60 functional units.

The wetlands at Wagner Marsh were ranked as Category III wetlands in 2005 as compared to Category IV in 2001. Functions that increased substantially over 2001 baseline conditions include general wildlife habitat, short and long term surface water storage, production export, and uniqueness. The pre-project site provided about 17.2 functional units within the monitoring area, and the post-project site currently provides about 68.7 functional units, for a conservative gain of at least 51.5 functional units.

Tamarisk eradication measures were undertaken by MDT in September 2006. This effort should continue to ensure the complete eradication of this noxious weed species from the site before it becomes well established. The majority of tamarisk seedlings/saplings were observed in the north end of the site, and particularly in the palustrine scrub-shrub wetland area. Spotted knapweed is well established on the berm on the east side of the site, and in upland communities.

Canada thistle is prevalent in the cattail area in the northwestern portion of the site. The managers of the WJH bird facility are aware of these noxious weed issues.

Water levels in 2005 at the end of September were considerably higher than in August of that year, which was attributed to irrigation return flows and the end of the irrigation season. This was expected to happen in 2006, but did not. Water levels were higher in August than in September. For this reason it appears that the hydrology of the site may be affected by the gravel mining operations on the west side of 56<sup>th</sup> Street. Specifically that the gravel mine is

**Table 30: Summary of 2001 (baseline) and 2006 wetland function/value ratings and functional points at the Wagner Marsh Wetland Mitigation Site.**

Function and Value Parameters From the 1999 MDT Montana Wetland Assessment Method	Evaluation Year	
	2001 Baseline Assessment	2006
Listed/Proposed T&E Species Habitat	Low (0.5)	Low (0.5)
MTNHP Species Habitat	Low (0.2)	Low (0.2)
General Wildlife Habitat	Low (0.3)	Moderate (0.7)
General Fish/Aquatic Habitat	N/A	N/A
Flood Attenuation	N/A	N/A
Short and Long Term Surface Water Storage	Moderate (0.6)	High (1.0)
Sediment, Nutrient, Toxicant Removal	Moderate (0.7)	Moderate (0.7)
Sediment/Shoreline Stabilization	N/A	Moderate (0.7)
Production Export/Food Chain Support	Moderate (0.6)	High (0.9)
Groundwater Discharge/Recharge	High (1.0)	High (1.0)
Uniqueness	Low (0.2)	Moderate (0.5)
Recreation/Education Potential	Low (0.2)	Moderate (0.5)
Actual Points/Possible Points	4.3/9	6.7/10
% of Possible Score Achieved	48%	67%
Overall Category	IV	II
<b>Total Acreage of Assessed Aquatic Habitat within AA Boundaries</b>	<b>3.87</b>	<b>11.49</b>
<b>Functional Units (acreage x actual points)</b>	<b>16.64</b>	<b>77.0</b>
<b>Net Acreage Gain</b>	<b>NA</b>	<b>7.62</b>
<b>Net Functional Unit Gain</b>	<b>NA</b>	<b>60.36 (2001) 8.3 (2005)</b>

intercepting groundwater flows and thereby causing substantially less water to be reaching the mitigation area. The effects of the gravel mining operation appear to have less affect on water levels in wetlands further away from the quarry.

## 2.23 Wigeon Reservoir (Glendive District, Year 6 – Final Year)

The Wigeon Reservoir mitigation site is located in Carter County, approximately 22 miles directly north of Alzada. The Wigeon wetland was created to provide mitigation credits for wetland impacts associated with MDT roadway projects that have been constructed in the Little Missouri Watershed (watershed #16). Elevations range from approximately 3,169 to 3,175 feet above mean sea level.

Construction was completed on this site in October of 1997 with the goal of creating a reservoir to provide nesting and brood rearing habitat for waterfowl and other wildlife species. An impoundment was constructed to collect surface water runoff from an intermittent tributary of Prairie Dog Creek. This wetland was designed by the Bureau of Land Management (BLM) in association with MDT to provide specific wetland functions including: nesting and brood rearing habitat for waterfowl; water for wildlife habitat; increased habitat diversity; water storage and retention; and creating open water and emergent wetland types.

The gross aquatic habitat area in 2006 was 8.71 acres, of which 6.64 acres was open water and 2.07 acres were comprised of inundated emergent vegetation. Wigeon Reservoir has a tremendous potential to support a diverse and thriving wetland vegetation community, if the area is protected from grazing pressure. The site size fluctuates naturally with precipitation conditions, similar to a natural pothole system.

The target credit amount at this site was 2.2 acres. No specific performance criteria were required to document project success. However, construction was completed in October of 1997 with the goal of providing specific wetland functions including: nesting and brood rearing habitat for waterfowl; water for wildlife habitat; increased habitat diversity; water storage and retention; and creation of open water and emergent wetland types. These functions have clearly been provided by the project. The maximum assignable credit to this site as of 2006 is 8.71 acres of wetlands and shallow open water, all of which constitute valuable habitat in this arid section of Montana; however, the Corps and MDT will need to determine whether credits for all or part of this total acreage are allocated.

Functional assessment results are summarized in **Table 31** below. Functional units have increased to 61.84 in 2006 because of full-pool conditions and the re-emergence of desirable hydrophytic vegetation. The wetland continues to rank as a Category II wetland as it provides primary habitat for an MTNHP species of special concern, the northern leopard frog. The diversity of water-loving wildlife that use the reservoir is high as evidenced by the diversity of waterfowl, amphibians and reptiles observed.

**Table 31: Summary of 2001 and 2006 wetland function/value ratings at the Wigeon Reservoir Wetland Mitigation Project.**

<b>Function and Value Parameters From the 1999 MDT Montana Wetland Assessment Method</b>	<b>2001</b>	<b>2006</b>
Listed/Proposed T&E Species Habitat	Low (0.0)	Low (0.0)
MTNHP Species Habitat	High (1.0)	Mod (0.7)
General Wildlife Habitat	Mod (0.5)	High (0.9)
General Fish/Aquatic Habitat	Mod (0.6)	Mod (0.5)
Flood Attenuation	Mod (0.5)	Mod (0.5)
Short and Long Term Surface Water Storage	High (1.0)	High (1.0)
Sediment, Nutrient, Toxicant Removal	Mod (0.7)	Mod (0.7)
Sediment/Shoreline Stabilization	Mod (0.7)	Low (0.3)
Production Export/Food Chain Support	Mod (0.6)	Mod (0.7)
Groundwater Discharge/Recharge	High (1.0)	High (1.0)
Uniqueness	Low (0.3)	Low (0.3)
Recreation/Education Potential	Low (0.1)	Mod (0.5)
Actual Points/Possible Points	7.0 / 12	7.1 / 12
% of Possible Score Achieved	58%	59%
Overall Category	II	II
<b>Total Acreage of Assessed Wetlands within Easement</b>	<b>8.20</b>	<b>8.71</b>
<b>Functional Units (acreage x actual points)</b>	<b>57.40</b>	<b>61.84</b>
<b>Net Acreage Gain</b>	<b>8.20</b>	<b>8.71</b>
<b>Net Functional Unit Gain</b>	<b>57.40</b>	<b>61.84</b>

Fencing the monitoring boundary prior to the decrease of water levels is recommended to protect the reestablishing wetland community from cattle grazing. Given the drought-prone location of Wigeon Reservoir, the wetland community is particularly sensitive to extirpation from grazing pressure when water levels decrease as a result of yearly precipitation variability. When grazing pressure is high, as it was during the drought, the wetland community was dramatically reduced and consequently may require several years to rebound from rootstock, where not damaged. In the absence of grazing pressure, the community would remain intact during drought cycles and therefore simply oscillate through stages of robustness rather than having to regenerate. Several water access points could be incorporated for cattle if the stream below the dam did not provide enough water to support the herd.

## **Appendix A**

---

### **TABLE 1: SUMMARY INFORMATION FOR MDT WETLAND MITIGATION SITES**

---

*MDT Wetland Mitigation Monitoring  
2006 Executive Summary*

Table 1: Summary of MDT Wetland Mitigation Sites monitored during 2001 to 2006.

Site	Year Built	Major Montana Watershed Basin	Pre-Project Wetland Acreage and MDT Category	Target Wetland Credit	2006 Wetland / Open Water Acreage and MDT Category	Enhancement Credit (ratio)	Upland Credit (ratio)	Total Acreage Gain / Credit and Functional Unit Gain as of 2006	Comments
<b>MISSOULA DISTRICT</b>									
Batavia	1998	4 – Flathead	137 ac Category II 1069 fu	28.72 acre(see comments)	138.60 ac Category II 1331 fu	See comments	NA	Unknown pending full site delineation. So far have gained (accounting for dike impacts) net of 1.11 ac creation plus 19.6 ac enhancement = 20.71 ac  Gain of 262 fu	2006 sixth year of monitoring. Similar results as 2002 - 2005. Gained 19.6 acres enhancement credit. Project Goals: wetland creation of 18.2 ac. @ 1:2 ratio = 9.1 ac north cell enhancement 76.8 ac @ 1:8 ratio = 9.6 ac south cell enhancement 60 ac @ 1:6 ratio = 10 ac Excavation of cells increased open water area. Only monitored new borrow areas. Water delivery from Ashley Creek appears to be a problem at this site (diversion not maintained). Desired pool elevation of 3,128.5 not achieved; was 2.2 ft below this elevation during August 2006.
Camp Creek	2002	3 – Lower Clark Fork	48.73 ac Category III 251.58 fu	11.4 acre minimum (see comments)	41.77 ac wetland 2.15 ac channel Category II & III 411.72 fu	None specified	None specified	Loss of 4.81 ac aquatic habitat Gain of 160.14 fu  FU-based credit approach = 17.34 ac credit	Fifth monitoring year. Intended to mitigate for Sula N&S (11.4 acres) and possibly other projects. Goals: overall goals of this project were restoration of Camp Creek channel bottom, associated wetland functional restoration/enhancement and creation, and enhancement of heavily grazed and cleared riparian vegetation. Corps agreed to functional unit-based crediting approach in 2006. This currently yields up to 17.34 acres of credit to date.
Creston	1998	4 – Flathead	2 ac Category and fu unknown	6 acre (4 created, 2 enhanced)	5.4 ac Category II 36.72 fu	2 acre; no ratio specified.	NA	3.4 ac created <u>2.0 ac enhanced</u> 5.4 ac total credit fu gain at pre-existing 2 ac unknown; 23.12 fu gain at created wetlands	2005 final year of monitoring. Similar results as 2001 - 2004. No baseline delineation or functional assessment available. No performance criteria for enhancement. If functional enhancement achieved, then currently at 90% of goal.
Hoskins Landing	2002	3 – Lower Clark Fork	6.67 ac (total) Category II (0.06 ac) Category III (4.12 ac) Category IV (2.49 ac) 31.22 fu	8.1 acre (restore & create) 5.2 acre (upland enhance)	13.01 ac Category III (12.55 ac) Category IV (0.46 ac) 96.67 fu	None specified	None specified	6.34 ac created 65.45 fu	Fifth monitoring year. Gain of 0.89 wetland acre since 2002. Planting at adjacent uplands was accomplished in 2003 and 2004. Currently at 78% of wetland acreage goal. Weed control is ongoing by Tribes.
Kleinschmidt Creek	2001	2 – Upper Clark Fork	13.78 ac wetlands 7.59 ac open water Category III 111.3 fu	15.52 acre	23.0 ac wetland 2.41 ac open water Category II & III 222.9 fu	1:2 on 8.05 = 4.02 1:3 on 3.43 = 1.14 Total Acres = 5.16	1:4 on 7.7 = 1.93 ac. 4.99 ac of upland buffer reverted to wetland	10.99 ac. restored 1.19 ac created 4.02 enhancement <u>1.93 buffer</u> 18.13 total credit 100.81 fu	Fifth monitoring year; third within MDT program. No credit for low intensity enhancement due to accidental grazing impacts; recommend re-planting in this zone. Currently at 117% of goal due to additional “incidental” wetland restoration within easement. 1:1 ratio assumed for “incidental” restoration, but needs to be approved by Corps.
Lawrence Park	1998	4 – Flathead	0 ac	Up to 2 acre	1.04 ac (2001) Category II 6.63 fu	NA	NA	1.04 ac (2001) 6.6 fu	Monitoring completed in 2001. Wetland creation ability limited by size of mitigation site. Currently at 52% of “maximum” goal.
Peterson Ranch	2002	2 – Upper Clark Fork	22.6 ac Category III 67.8 fu	17.5 acre (created)	22.74 ac wetland 1.08 ac open water Category II 164.8 fu	None specified	None specified	1.22 ac created 97 fu	Fifth monitoring yearCurrently at 7% of project goal. Grazing control recommended. Water rights problematic and may prevent site from functioning as designed.

Table 1 (continued): Summary of MDT Wetland Mitigation Sites monitored during 2001 to 2006.

Site	Year Built	Major Montana Watershed Basin	Pre-Project Wetland Acreage and MDT Category	Target Wetland Credit	2006 Wetland / Open Water Acreage and MDT Category	Enhancement Credit (ratio)	Upland Credit (ratio)	Total Acreage Gain / Credit and Functional Unit Gain as of 2006	Comments
<b>BUTTE DISTRICT</b>									
<b>Beaverhead Ranch</b>	1997	6 – Upper Missouri	5.2 ac Category and fu unknown	52 ac	97.9 ac Category II 841.94 fu	NA	NA	92.7 ac 797.22 fu	Sixth and final monitoring year. Essentially same results as 2001 - 2005. Excellent site with heavy wildlife use. Project is currently at 178% of goal. MDT opted not to purchase additional credits outside the current easement (below the dike). Some erosion occurring along dike face; new fill was placed on dike face in 2004. Total credit “gain” includes 6.5 acres of open water.
<b>Brown’s Gulch</b>	2000	2 – Upper Clark Fork	0 ac	0.24 ac	0.17 ac Category IV 0.48 fu	NA	NA	0.17 ac 0.48 fu	Monitoring completed in 2004. Achieved 71% of project goal.
<b>Cow Coulee</b>	1997	7 – Missouri-Sun-Smith	0.07 ac Category and fu unknown	4.5 ac	2.94 ac Category III 15.88 fu	NA	NA	2.87 ac 15.5 fu	Monitoring suspended after 2004 season due to water delivery problems. Monitoring to be reinstated when delivery issues are addressed.
<b>Jack Creek Ranch</b>	2003	6 – Upper Missouri	1.99 ac Category III 49.8 fu (see comments)	50 ac	40.02 ac wetland 2.13 ac open water Category II 354.1 fu	None specified	None specified	42.15 ac restored 337.3 fu	Third monitoring year. The 50-acre goal includes pre-existing wetlands; currently at 84% of goal. Baseline functional units included stream reaches outside of project area, so functional unit gain to date is considered a minimum.
<b>Rey Creek</b>	1999	6 – Upper Missouri	0 ac	1.2 ac	0.52 ac Category III 3.38 fu	NA	NA	0.52 ac 3.38 fu	Monitoring completed in 2003. Project at 45% of “maximum” project goal of 1.2 acres. However, project exceeds specific 0.27-acre replacement goal associated with Highway 10 bridge and culvert project. Therefore, the project resulted in an “excess” of 0.25 acre of mitigation credit.
<b>Ringling Galt</b>	2000	7 – Missouri-Sun-Smith	0 ac	20 ac	2.54 acres open water	NA	NA	0 ac	Site monitored in 2001, 2003, 2004, and 2006. No wetlands have developed to date. Site contains no conservation easement.
<b>South Fork Smith</b>	2001	7 – Missouri-Sun-Smith	8.32 ac wetland 0.57 ac open water Category III 43.61 fu	Not specified	8.79 ac wetland 0.57 ac open water Category III 56.16 fu	NA	NA	0.47 ac created wetland 12.55 fu	Fifth monitoring year. Slight increase in wetland acreage (0.03 ac) over 2005. No change open water, but flow now perennial (increased functional score). Site contains no conservation easement, and grazing impacts are extensive. No specific project acreage target was established.

Table 1 (continued): Summary of MDT Wetland Mitigation Sites monitored during 2001 to 2006.

Site	Year Built	Major Montana Watershed Basin	Pre-Project Wetland Acreage and MDT Category	Target Wetland Credit	2006 Wetland / Open Water Acreage and MDT Category	Enhancement Credit (ratio)	Upland Credit (ratio)	Total Acreage Gain / Credit and Functional Unit Gain as of 2006	Comments
<b>GREAT FALLS DISTRICT</b>									
Alkali Lake	2005	8 - Marias	0 ac	COE: 154.48 ac Tribe: 81.61 ac	38.7 ac wetland 118.61 ac open water Category II 849.47	NA	COE: 1:4 ratio on 22.56 ac = 5.64 ac  Tribe: 1:4 ratio on 45.12 ac = 11.28 ac	153.31 ac 84.04 ac COE credit 74.2 ac Tribal credit 849.47 fu	First monitoring year. COE credits = 38.7 ac wetlands @ 1:1, 118.61 ac open water @ 1:1 (but limited to amount matching wetland credit), 22.56 ac buffer @ 1:4 = 84.04 ac total credit. Tribal credits = 38.7 ac wetlands @ 1:2.5, 118.61 ac open water @ 1:2.5, 45.12 ac buffer @ 1:4 = 74.2 ac total credit. Ratios applied to credit, therefore impacts can be debited at 1:1.
Big Sandy	1991	11 - Milk	0 ac	9.44 ac	13.79 ac (2001) Category II 106.9 fu	NA	NA	13.79 ac (2001) Category II 106.9 fu	Monitoring completed in 2001. Very good site; excellent hydrology despite drought conditions. Project goals exceeded. Currently at 146% of project goal.
Jack Johnson	1994	8 - Marias	2.5 ac Category and fu unknown	25 to 29 ac	22.63 ac Category II (16.99 ac), Category III (5.05 ac), Category IV (0.59 ac) 122 fu	NA	NA	22.63 ac 107 fu	Monitoring completed in 2003. 2.5-ac pre-existing wetlands not subtracted from total as this area was likely "enhanced", per agency agreements. No baseline functional assessment performed. Project goal not clear (25 to 29 acres). Currently at 78% to 91% of project goal.
Little Muddy Creek	2004	7 - Missouri-Sun-Smith	0 ac	63.57 ac	102.45 ac wetland 85.80 ac open water Category II 1298.93 fu	NA	NA	102.45 ac wetland 85.80 ac open water 1298.93 fu	Third monitoring year. Essentially exceeding original 63.57-ac credit goal in 2006. Wetlands are likely to continue development.
Meriwether-East Onsite	2005	8 - Marias	0 ac	9.29 ac	4.63 ac wetland 1.99 ac mudflat Category III 31.78 fu	NA	NA	4.63 ac wetland <u>1.99 ac mudflat</u> 6.62 ac Category III 31.78 fu	First monitoring year. No wetland development to date at Site 1. Currently at 71% of goal.
Musgrave Lake	2000-2001	11 - Milk	RS1: 4.59 ac Category III 9.2 fu RS2: 0 ac ES1: 4.8 ac Category III 19.6 fu	27.2 ac minimum; 28.95 ac maximum (see comments)	RS1: 13.29 ac Category II 93.03 fu RS2: 10.21 ac Category II 73.51 fu ES1: 5.77 ac Category II 45.01 fu ES2: 3.8 ac Category II Ref Area: 5.29 ac	NA	1:4 ratio on 3 ac = 0.75 ac	24.63 ac restored 3.2 ac rehab. 1.49 ac preserved <u>0.75 ac buffer</u> 30.07 ac total credit  182.69 fu (minimum - does not include ES-2)	Monitoring year 6; 2006 is final monitoring year. 2006 approved ratios: Restoration Site 1, Restoration Site 2, and any additional or restored wetlands: 1:1 ratio Rehabilitation of pre-existing wetlands at Enhancement Site 1: 1:1.5 ratio Preservation of original Enhancement Site 2 and Wetland Reference Area: 1:6 ratio Upland buffer: 1:4 ratio  Previous column applies these ratios to 2006 acreages to arrive at 2006 credits. Landowner committed to providing a minimum of 27.2 acres wetland credit. Currently at 111% of project goal.
Perry Ranch	2001	8 - Marias	3.4 ac Category III (2.3 ac) and IV (1.1 ac), 13.09 fu	27.6 ac total - 3.4 ac existing = 24.2 ac	18.87 ac wetland Category II and III 127.33 fu	NA	NA	15.47 ac 114.21 fu	Fifth monitoring year. Currently at about 64% of project goal.

Table 1 (continued): Summary of MDT Wetland Mitigation Sites monitored during 2001 to 2006.

Site	Year Built	Major Montana Watershed Basin	Pre-Project Wetland Acreage and MDT Category	Target Wetland Credit	2006 Wetland / Open Water Acreage and MDT Category	Enhancement Credit (ratio)	Upland Credit (ratio)	Total Acreage Gain / Credit and Functional Unit Gain as of 2006	Comments
<b>GLENDIVE DISTRICT</b>									
American Colloid	2001	16 – Little Missouri	0 ac	4.4 ac	4.08 ac Category III 15.1 fu	NA	NA	4.08 ac 15.1 fu	Fifth monitoring year. Site primarily open water in 2005 and 2006, with minor (0.06 acre) wetlands in 2006. Functional units slightly decreased. Counting open water, currently at 93% of project goal.
Circle	1999	12 – Lower Missouri	2.98 ac Category and fu unknown	1.7 ac	7.6 ac Category II 65.4 fu	NA	NA	4.62 ac 39.73 fu	Monitoring completed in 2004. Project goals satisfied. Achieved 155% of project goal.
Crackerbox Creek	1997	15 – Lower Yellowstone	0 ac	1.2 ac	1.6 ac (2001) Category III 7.2 fu	NA	NA	1.6 ac (2001) 7.2 fu	Monitoring completed in 2001. Project goals satisfied. Currently at 133% of project goal.
Fourchette Creek Reserve	1992-1995	9 – Middle Missouri	0 ac	10-22 ac	7.87 ac Category II, III, IV 34.17 fu	NA	NA	7.87 ac 34.17 fu	Monitoring completed in 2004. Consists of 5 reservoirs. Puffin reservoir excavated too deep and supports minimal wetland. Grazing is impacting most sites. Extensive northern leopard frog use at Penguin and Flashlight reservoirs. Achieved 79% of minimum 10-acre project goal.
Lame Deer	2001	14 – Middle Yellowstone	0 ac	1.68 ac (school) 1.5 ac (creek) 3.18 ac total	0.83 ac (school) <u>1.09 ac (creek)</u> 1.92 ac total Category II & III 14.24 fu	NA	NA	1.92 ac 14.24 fu	Fifth monitoring year. Site consists of school site and two Alderson Creek sites. Currently at approximately 60% of project goal.
Plentywood-North	2000	12 – Lower Missouri	0 ac	2.7 ac	0.32 ac (2001) Category III 1.1 fu	NA	NA	0.32 ac (2001) 1.1 fu	Numerical values shown are from 2001. Not monitored in 2002, 2003, or 2004 – removed from monitoring contract.
Ridgeway	2000-2001	16 – Little Missouri	0	50 total ac	41.94 ac wetland <u>13.09 ac open water</u> 55.03 ac total Category II 441.05 fu	NA	NA	55.03 ac Category II 441.05 fu	2006 is sixth monitoring year. One of the 16 ponds in this complex (W-9) was intensively sampled / monitored in 2001-2006, although all ponds were delineated and functionally assessed in 2006. Counting shallow open water development, the project is at approximately 110% of project goal. Total includes 13.09 acres of open water.
Rock Creek Ranch	2004	11 - Milk	1.08 ac Category IV 2.24 fu	50 ac	81.52 ac wetland 1.25 ac open water Category II 513.17 fu	1:3 on 1.08 ac = 0.36 ac	1:4 on 3.6 ac = 0.9 ac	81.69 ac creation 0.36 ac enhancement <u>0.9 ac buffer</u> 82.95 ac total credit 510.93 fu	2006 is second monitoring year. Site is currently at 166% of 50-acre goal. Shrub planting proposed in 2007.
Vida	1995	12 – Lower Missouri	0.2 ac	3.9 ac	0.11 ac (2001) Category III 0.32 fu	NA	NA	0 ac (wetlands lost to dike construction) (2001)	Monitoring completed in 2001. Water delivery to the site has been cut off by upstream users.
Wigeon Reservoir	1997	16 – Little Missouri	0 ac	2.2 ac	2.07 ac wetland <u>6.64 ac open water</u> 8.71 ac total Category II 61.84 fu	NA	NA	8.71 ac 61.84 fu	2006 is sixth and final monitoring year. Project goal exceeded by 6.51 acres. Drought impacted this site in 2004 and 2005, which decreased size. Includes 6.64 acres of open water.

Table 1 (continued): Summary of MDT Wetland Mitigation Sites monitored during 2001 to 2006.

Site	Year Built	Major Montana Watershed Basin	Pre-Project Wetland Acreage and MDT Category	Target Wetland Credit	2006 Wetland / Open Water Acreage and MDT Category	Enhancement Credit (ratio)	Upland Credit (ratio)	Total Acreage Gain / Credit and Functional Unit Gain as of 2006	Comments
<b>BILLINGS DISTRICT</b>									
Big Spring Creek	1998 - 1999	9 – Middle Missouri	7.86 ac wetland, 1.3 ac stream Category III 29.1 fu	7.21 ac total, create 1.5 ac wtln d creation, enh exist. wtln d and str m	11.97 ac wetland, 2.41 ac stream Category II and III 103.03 fu	NA	NA	Gained 4.11 ac wetland, 1.11 ac stream, and 73.98 fu  Minimum 7.21 acres credit	2005 is final monitoring year. Site gained additional 1.53 wetland acres and 12.83 functional units in 2005. Maximum Corps-allowable credit at this site is 7.21 ac (no performance standards, etc.), based subjectively on overall site improvement. About 4.11 wetland and 1.11 stream acres have been created (5.22 ac of aquatic habitat) and the site has been enhanced. How this equates to allowable credit is undetermined, but at least 7.21 acres of credit was assumed at this site. Fish habitat greatly enhanced.
Cloud Ranch	2003	13 – Upper Yellowstone	0.72 ac Category and fu unknown	5.5 ac total	Off-chan: 2.21 ac Creek fringe: 0.76 ac Category II and III 42.4 fu	NA	1:4 on 3.56 ac = 0.89 ac	2.92 ac restoration <u>0.89 ac buffer</u> 3.81 ac total 6.93 fu gain since 2004	Third monitoring year. Site currently at 69% of goal. Actual acreage of restored Big Timber Creek is not included in acreage totals. Goals (total 5.5 ac): Off-Channel Wetland Creation: 0.61 ac @ 1:1 = 0.61 ac Off-Channel Wetland Restoration: 1.41 ac @ 1:1 = 1.41 ac Riparian Wetland Restoration – Big Timber Creek: 2.0 ac @ 1:1 = 2.0 ac Emergent Wetland Restoration – Big Timber Creek: 0.58 ac @ 1:1 = 0.58 ac Buffer: 3.56 ac @ 1:4 = 0.89 ac
Lavina	1987	10 - Musselshell	0.45 ac Category and fu unknown	1 ac total	1.75 ac (2001) Category III 12.3 fu	NA	NA	1.3 ac (2001) 9.1 fu	Monitoring completed in 2001. Site functioning well. Intended to be combined with Ryegate mitigation site to mitigate for 1.3 acres of highway impact. Currently at 130% of project goal.
Norem Ranch	2002	13 – Upper Yellowstone	6.93 ac Category III 33.6 fu	14.71 ac total	11.09 ac wetland <u>1.5 ac open water</u> 12.59 total Category II 84.02	1:3 on 6.98 ac =2.32 ac	1:4 on 6 ac = 1.5 ac	2.32 ac enhancement 4.11 ac creation 1.5 ac open water creation <u>1.5 ac buffer</u> 9.43 ac total 50.76 fu	Third monitoring year. Site currently at 64% of goal. Goals (total 14.71 ac): Enhancement: 6.98 ac @ 1:3 = 2.32 ac Wetland Creation: 9.46 ac @ 1:1 = 9.46 ac Open Water Creation: 1.58 ac @ 1:1 = 1.58 ac Buffer: 6 ac @ 1:4 = 1.5 ac
Roundup	2000	10 - Musselshell	0 ac	24 ac	16.03 ac wetland <u>6.04 ac open water</u> 22.07 ac developing Category II 158.9 fu	NA	NA	22.07 ac total 158.9 fu	2006 is sixth monitoring year. Site currently at 92% of goal. Some die off of kochia due to inundation and burning.
Ryegate	1987	10 - Musselshell	0.3 ac	1 ac	2.22 ac (2001) Category II 16.9 fu	NA	NA	2.22 ac (2001) 16.9 fu	Monitoring completed in 2001 Site functioning well. Intended to be combined with Lavina mitigation site to mitigate for 1.3 acres of highway impact. Currently at 220% of project goal.
Stillwater River	1999	13 – Upper Yellowstone	3.77 ac Category III 15 fu	10.69 ac total	4.16 ac wetland 5.56 ac open water 9.72 ac Category I 101.88 fu	1:1 on 3.77 ac = 3.77 ac	NA	5.95 ac creation <u>3.77 ac enhancement</u> 9.72 ac total credit 86.88 fu	2005 is final monitoring year. Results similar to 2002 - 2005. 10.69-ac goal included existing wetlands. Currently at 91% of goal.
Vince Ames	1992 - 1994	13 – Upper Yellowstone	2.39 ac Category III Category IV fu unknown	9.8 ac	15.24 ac (2001) Category III 117.3	NA	NA	12.85 ac (2001) 98.94 fu	Monitoring completed in 2001. Consists of 4 ponds. Acreage and functional goals met. Currently at 131% of project goal.
Wagner Marsh	2005	13 – Upper Yellowstone	2.12 ac wetland 1.75 ac open water 3.87 ac total Category IV 16.64 fu	21.59 ac total	6.53 ac wetland <u>4.96 ac open water</u> 11.49 ac total Category II 77 fu	NA	1:4 on 5.19 ac = 1.3 ac	6.53 ac (total wetland) 1.31 ac (open water) <u>+1.3 ac (buffer)</u> 9.14 ac credit 60.36 fu	Second monitoring year. Open water credit limited to 20% of wetland credit. Much of the open water habitat observed in 2006 is expected to become vegetated with emergent hydrophytic species over time. An additional 2.31 acres of the ‘disturbed-moist’ vegetation type is expected to convert to wetland over the next few years.
Wyola-Sunlight Ranch	1996	13 – Upper Yellowstone	1 ac (visual est.) Category II fu unknown	2.2 ac	0.85 ac (2001) Category II 7.3 fu	NA	NA	Unknown (2001)	Monitoring completed in 2001. Pre-project wetland acreage was estimated by MDT; no delineation map available. Site has experienced functional gain, but application of this to crediting is unknown at this time. From an acreage standpoint, currently at 39% of project goal.
<b>TOTAL<sup>1</sup></b>				<b>757.34 ac</b>				<b>690.48 ac 5,380.86 fu</b>	<sup>1</sup> The target figure for Batavia was included, although the actual current wetland extent has not yet been determined. No target or credit figures were included for the South Fork Smith site.

## Appendix B

---

### TABLE 32: 2006 MAINTENANCE SUMMARY/UPDATE

---

*MDT Wetland Mitigation Monitoring  
2006 Executive Summary*

**Table 32: 2006 maintenance summary and update for each MDT Wetland Mitigation Site.**

Mitigation Site	2006 Maintenance Summary/Update
<b>MISSOULA DISTRICT</b>	
<b>Batavia</b>	<p>The berm and associated water control structures were in good condition during the mid-season visit.</p> <p><i>Noxious Weeds</i>            Spoils piles created in 2005 were generally well vegetated in 2006 with native upland grasses seeded in these areas. However, the spoil pile adjacent to wetland "A" contained significant weed infestation in 2006. Spotted knapweed and thistle are common in this area and are out-competing the seeded grasses. According to the USFWS, weed mapping at the Batavia WPA in 2005 showed 60 acres of musk thistle at a low density, 13 acres of Canada thistle at a low density, and 10 acres of spotted knapweed at a low density. Approximately eight acres of Canada thistle were sprayed using a mixture of curtail and milestone on 6/6/06. The USFWS intends to have the remaining thistle and knapweed infestations sprayed in 2007 through the Fish and Wildlife Service Weed Striketime.</p>
<b>Camp Creek</b>	<p>Supplemental planting and irrigation in upland areas within the MDT parcel should be considered.</p> <p><i>Noxious Weeds</i>            Bull thistle, Canada thistle, houndstongue and spotted knapweed are present. The MDT parcel has the least amount of invasive species and distribution is limited to upland areas not affected during construction efforts. The Grasser parcel supports the majority of the noxious weed species with extensive distribution along the floodplain corridor. Areas of invading spotted knapweed located along floodplain margins should be controlled and reseeded or planted with appropriate wetland species to help control further spread of invasive species.</p>
<b>Hoskins Landing</b>	<p>Evidence of livestock accessing the site was observed during a fall 2006 visit. An electric fence has been put into place, running parallel with the river setback from the shoreline. The drier upland grass meadows were heavily grazed and tramping within the wetlands was observed. Minor browse on the woody plantings within the wetland area was also observed.</p> <p><i>Noxious Weeds</i>            Several Category 1 noxious weeds were still present but at low cover values: Canada thistle, Dalmatian toadflax hound's-tongue, oxeye daisy, St. John's wort, and spotted knapweed. Category 3 yellowflag iris and Eurasian water-milfoil were also present within the mitigation site. The Confederated Salish and Kootenai Tribes are diligently following a five year (2005 to 2010) vegetation management plan that includes invasive weed control and revegetation efforts. Weed control activities were observed during the mid-season visits including herbicide applications, minor grazing and mowing. Weed control activities seem to be working with observations of lower cover values for previous weedy areas.</p>
<b>Kleinschmidt Creek</b>	<p>A new jackleg fence was installed at the site in 2004. Bird boxes installed by MDT at the site were in good condition. Areas disturbed by livestock grazing in the low intensity sections should be revegetated with woody plants. Heavy browse from local wildlife has been observed across the entire site. Control measures such as chemical browse repellants should be considered to avoid further browse damage or eventual mortality to shrub and tree species.</p> <p><i>Noxious Weeds</i>            Although the landowner treated weeds near upper excavated shallow open water area and other areas in 2004, several noxious weeds are present including Canada thistle, hounds tongue, oxeye daisy and spotted knapweed, which should be controlled. The continued spread of noxious weeds within the dry portion of upland areas within the mitigation area was recorded with an increase in knapweed along the lower section of the project. Areas outside the perimeter of the excavated wetlands, which are currently dominated by mostly invasive species, could be treated via mechanical and cultural weed control activities to control invasive species. These include mowing or hand whipping of taller weed species and seeding of bare ground with an appropriate mix suited for the hydrological regime. Mechanical weed control would be recommended due to the woody vegetation already installed in this area. Areas where aggressive reed canarygrass is encroaching on planted woody species could be mechanically controlled to limit disturbance to plantings.</p>
<b>Peterson Ranch</b>	<p>The general lack of water at the majority of this site continues preclude wetland development in many areas. Continued livestock grazing within ponds # 1 &amp; 2 also continue to slow development of wetlands and preclude shrub development.</p> <p><i>Noxious Weeds</i>            Several noxious weeds are present including Canada thistle, hound's tongue, oxeye daisy, and spotted knapweed. These generally consist of scattered individuals with very low coverage. However, weed control and revegetation of disturbed sites would prevent further weed spread, and reduce the risk of new weeds invading. A large population of Canada thistle occurs just outside the north property boundary that could facilitate spread of this species on the site.</p>

**Table 32 (continued): 2006 maintenance summary and update for each site.**

Mitigation Site	2006 Maintenance Summary/Update
<b>BUTTE DISTRICT</b>	
<b>Beaverhead Ranch</b>	<p>Dike erosion and sediment production from the poorly vegetated shoreline could be monitored more closely by installing permanent markers or by periodic surveys. The DNRC recommended periodically adding fill to the face of the dike where breaching is taking place and vertical slopes are developing. Fill was added to the face of the dike in 2004 to replace eroded material, but has not yet vegetated. Additional examples of potential solutions to erosion problems include shoreline reinforcement, off-shore wave protection, protected off-shore plantings, shoreline plantings, and placement of vegetated sod mats.</p> <p><i>Noxious Weeds</i> Weed control and revegetation of disturbed sites is still needed to prevent further weed spread, reduce the risk of new weeds invading, reduce wind and water erosion and reduce sediment input to surface waters. Several noxious weeds are present including Canada thistle, hound's-tongue, and spotted knapweed. Spoil piles left from ditch excavation will continue to create a weed problem. This same issue applies to portions of the dike and other poorly vegetated sites. A possible remedy would entail chemically treating weeds and re-seeding the spoil piles with desirable grasses.</p>
<b>Jack Creek Ranch</b>	<p><i>Noxious Weeds</i> The site has two State of Montana Noxious Weeds (Canada thistle and hounds tongue) and one Madison County-listed noxious weed (musk thistle). Only a few live hounds tongue and musk thistle plants were noted during the July 2006 monitoring visit. Weed control efforts have been effective in significantly reducing these two species. Canada thistle still poses the greatest risk for potential spread in transition and upland areas. Continued spot spraying is recommended in 2007 primarily for Canada thistle; and hounds tongue and musk thistle as needed.</p>
<b>Ringling-Galt</b>	No maintenance issues identified.
<b>South Fork Smith River</b>	At this time, cattle grazing within the South Fork Smith River channel, its banks, and the surrounding uplands is limiting the extent to which restoration can occur on the site. Fencing of the stream corridor would allow for the re-establishment of woody vegetation along the creek, help protect stream banks from trampling, and improve the overall health of the system. Function and value ratings would also increase substantially, thus generating considerably more functional units from the site.
<b>GREAT FALLS DISTRICT</b>	
Alkali Lake	Water flowed through a dip in the berm/road that occurs along the west project boundary, and flooded the property (south Alkali Lake) west of the site. This area will be examined in future monitoring years and recommendations may ultimately be made to raise the berm in this confined location. The dip is narrow and shallow, and may not affect water retention in the site under normal fill conditions.
Little Muddy Creek	The berm, diversion structures, excavated channels, and inlet/outlet structures were in good condition during the mid-season visit. Some wide and deep cracks are beginning to appear in portions of the berm, especially near PP-5, which should continue to be monitored.
Meriwether-East	The dikes were covered evenly with erosion control fabric and no erosion problems were found.
Musgrave Lake	All constructed dikes were in good condition during the spring and mid-season visits. A few small areas in the RS-2 "berm" (spoil pile) between the wetland and the irrigation ditch to the south were cleaving during the mid-season visit, with several small breach areas (some caused by beaver) spilling water from the site to the ditch. The overall water level in RS2 appeared unaffected by the breaches. MDT and the landowner were notified of this potential maintenance issue. Beaver had downed several cottonwoods along the east side of RS1 in 2006 – options (tree protection, trapping, etc.) should be examined to discourage this in the future. Lowering the water level slightly at RS1 may be necessary in the future to prevent drowning of existing mature cottonwoods.
Perry Ranch	<p>Several dike problems were noted during the 2002 summer visit, repaired during 2003, and have been stable into 2006. No problems with the dike were found in 2006.</p> <p><i>Noxious Weeds</i> It is recommended that an integrated weed plan be developed and implemented for the Perry Ranch site. An integrated weed plan would use a combination of chemical, mechanical, and biological controls to contain the leafy spurge and Canada thistle infestations. In 2006, leafy spurge was found to be prevalent in portions of the inner oxbow and upland floodplain adjacent to Cut Bank Creek. Leafy spurge occurs at the site as small patches of developing monocultures and in conjunction with snowberry shrub patches.</p>
<b>GLENDIVE DISTRICT</b>	
American Colloid	No maintenance issues were noted; the outflow culverts were free of debris on the inlet end.
Lame Deer	The stormwater inlet culvert in the southwest corner of the south cell was in working order and required no maintenance. The outflow culvert in Wetland-369 is blocked by sediment and debris; the beaver dam is still present. Although not technically part of the MDT project, water continues to undermine the culvert and has consequently washed soil away from the culvert outflow end. This structure is at a serious risk of being washed out by a major precipitation event, which would result in a large sediment plume entering the downstream reach. The silt fence around the perimeter of wetland 369 is partially submerged or buried by sediment and should be removed.
Ridgeway	There is a breach in the dam at W-16. On the day of the mitigation monitoring, water was observed within the constructed pond, in the channel through the dam breach, and had flowed into the area south of the dam. The dam is not safe for vehicular traffic.
Rock Creek Ranch	All dikes were in good condition during the spring, mid-season, and fall visits with no indications of seepage observed during 2006.
Wigeon Reservoir	Fencing the monitoring boundary prior to the decrease of water levels is recommended to protect the reestablishing wetland community from cattle grazing. In the absence of grazing pressure, the community would remain intact during drought cycles and therefore simply oscillate through stages of robustness rather than having to regenerate. Several water access points could be incorporated for cattle.

**Table 32 (continued): 2006 maintenance summary and update for each site.**

Mitigation Site	2006 Maintenance Summary/Update
<b>BILLINGS DISTRICT</b>	
Cloud Ranch	<p>The water level control structures within the off-channel wetlands were functioning and in good working order at the time of the August monitoring. Big Timber Creek channel migration resulting in bank loss, gravel bars and new deposition areas will continue to be monitored to track riparian wetland gains or losses, and negative or undesirable changes in vegetation. The project designer observed similar channel movements on other reaches of Big Timber Creek resulting from the same 6 inch/4 hour rainfall event. Based on his August 2006 review, the upper end of the lowest reach is likely to continue shifting before it stabilizes and some minor intervention in this area may eventually be warranted. If ultimately considered necessary by the designer, landowner, and MDT, any such intervention should be completed within the monitoring period.</p> <p><i>Noxious Weeds</i> Canada thistle, hounds tongue, and spotted knapweed are present. Canada thistle, hounds tongue and a few spotted knapweed plants were observed along Big Timber Creek. Canada thistle and hounds tongue were observed within the off-channel wetland assessment area. The spotted knapweed, hounds tongue and Canada thistle appeared to have been sprayed in 2006 (as requested by MDT) in the upland areas adjacent to the off-channel wetlands. Continued chemical or biological control measures are recommended for Canada thistle, hounds tongue, and spotted knapweed.</p>
Norem Ranch	<p>All outflow structures were functioning and the fence around the wetland was intact.</p> <p><i>Noxious Weeds</i> During the 2006 monitoring trip very few leafy spurge, whitetop and spotted knapweed plants were noted. Most of these weed species had been sprayed and were not viable at the time of the monitoring. Canada thistle is still present, typically in the transition zones between wetlands and uplands. The landowner has implemented biological, mechanical, and chemical control and has significantly reduced the population of Canada thistle. Due to the difficulty in controlling this noxious weed, continued weed control measures are recommended.</p>
Roundup	<p>All dikes and inlet structures were functioning satisfactorily. All located bird boxes are in good condition.</p> <p><i>Noxious Weeds</i> Invasive species <i>Kochia</i> and <i>Chenopodium sp.</i> are present and control measures are recommended.</p>
Wagner Marsh	<p>It appears that the hydrology of the site may be affected by the gravel mining operations on the west side of 56<sup>th</sup> Street. Specifically that the gravel mine is intercepting groundwater flows and thereby causing substantially less water to be reaching the mitigation area. The effects of the gravel mining operation appear to have less affect on water levels in wetlands further away from the quarry.</p> <p><i>Noxious Weeds</i> Tamarisk eradication measures were undertaken by MDT in September 2006. This effort should continue to ensure the complete eradication of this noxious weed species from the site before it becomes well established. The majority of tamarisk seedlings/saplings were observed in the north end of the site, and particularly in the palustrine scrub-shrub wetland area. Spotted knapweed is well established on the berm on the east side of the site, and in upland communities. Canada thistle is prevalent in the cattail area in the northwestern portion of the site. The managers of the WJH bird facility are aware of these noxious weed issues.</p>