

# MONTANA DEPARTMENT OF TRANSPORTATION STATEWIDE WETLAND MITIGATION SITE MONITORING PROJECT

## EXECUTIVE SUMMARY - 2008 MONITORING RESULTS



*Prepared for:*



**Montana Department of Transportation**

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

*Prepared by:*



**POST, BUCKLEY, SCHUH, & JERNIGAN  
801 N. LAST CHANCE GULCH, STE 101  
HELENA, MONTANA 59601**

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## ABBREVIATIONS AND ACRONYMS

AA	Assessment Area
ADC	Aquatic Design and Construction
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
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 2008 monitoring efforts at 21 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 2008. The following mitigation sites were monitored during 2008:

Alkali Lake	Perry Ranch
Big Hole Grazing	Peterson Ranch
Camp Creek	Rock Creek Ranch
Cloud Ranch	Roundup
DH Ranch	Selkirk Ranch
Hoskins Landing	Sportsman's Campground
Jack Creek Ranch	U.S. Highway 93 Onsite
Little Muddy Creek	Wagner Marsh
Lonepine	West Fork Charley Creek
Meriwether-East	Woodson Creek
Norem Ranch	

Monitoring activities were conducted by Post, Buckley, Schuh, and Jernigan (PBS&J) wetland scientists between April and October 2008 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 in detail in this summary.

As in all past years, wetland delineation was conducted within the monitoring areas according to the 1987 Corps of Engineers (COE) Wetland Delineation Manual. In July 2008, consultation with the U.S. Army Corps of Engineers confirmed that, where the 1987 manual was used to establish baseline wetland conditions at MDT wetland mitigation sites, it should continue to be applied at such sites for the duration of the monitoring period. This approach applied to all 2008 monitoring sites. Consequently, application of the new *Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region* and *Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Great Plains Region* were not required or undertaken at MDT monitoring sites in 2008.

During all past monitoring seasons, wetland functional assessments were conducted at all monitoring sites using the 1999 MDT Montana Wetland Assessment Method. In 2008, use of the 1999 method was discontinued at most sites, as the 2008 MDT Montana Wetland Assessment Method became available and was applied. Use of the 1999 method was continued at sites for which baseline conditions were established using the 1999 method and functional assessment was integrated into credit calculation. These sites included Camp Creek, Selkirk Ranch, Woodson Creek, and all four U.S. Highway 93 onsite mitigation areas.



**Table 1** provides, for each monitored mitigation site: the site name, MDT District, year constructed, major Montana watershed basin, pre-project wetland acreage and functional assessment category, target wetland credit, 2008 wetland acreage and functional assessment category, enhancement credit ratios, upland credit ratios, total wetland acreage gain / credit and functional unit gain as of 2008, and comments (**Appendix A**) .

For reference, **Table 1** includes 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. This table also includes 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. **Table 1** also includes 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; the Creston, Big Spring Creek, and Stillwater sites which were finalized in 2005; the Beaverhead Ranch, Musgrave Lake, and Wigeon Reservoir sites finalized in 2006; and the Batavia, Kleinschmidt Creek, Lame Deer-East, and Ridgeway Complex sites finalized in 2007. The Cow Coulee site is also included, which has not been finalized nor was it monitored in 2006-2008 due to water delivery problems. Similarly, the South Fork Smith and Ringling sites are also included in **Table 1**, although monitoring was suspended at both sites following 2006.

Monitoring summaries for each of the mitigation sites monitored in 2008 are presented in alphabetical order in Section 2.0. Each discussion includes site history and objectives; delineation, crediting, and functional assessment results; and maintenance and other recommendations, where applicable. Supporting materials such as site maps, figures, data forms, photographs, and other information are provided 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 3)**

MDT, in cooperation with the Bureau of Indian Affairs (BIA) and the Blackfeet Nation’s Environmental Office and Fish & Wildlife Department, designed and constructed 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 2008, approximately 57 acres of emergent wetlands were delineated at the mitigation site. These acres satisfied soils, hydrology, and vegetation performance standards. This represents a 66% increase in wetland habitat since 2006. All together, about 187 acres of aquatic habitat were mapped in 2008. The upland buffer also satisfied applicable performance standards. The 2008 credits at the site, applying Tribal and COE credit ratios, are presented in **Table 2**. The key to developing wetland habitat at this site is water level management.

**Table 2: 2008 Tribal and Corps of Engineers credits at the Alkali Lake Wetland Mitigation Site.**

Proposed Feature	2008 Delineated Acres	Tribal Credit Ratio and 2008 Calculated Credit	Tribal Credit Target	Corps Credit Ratio and 2008 Calculated Credit <sup>a</sup>	Corps Credit Target
Primary emergent wetland restoration	56.76	1:2.5 credit ratio 22.70 credit acres	29.77 credit acres	1:1 credit ratio 56.76 credit acres	74.42 credit acres
Shallow open water restoration	130.18	1:2.5 credit ratio 52.07 credit acres	40.56 credit acres	1:1 credit ratio (to a max. matching wetland acres) 56.76 credit acres	74.42 credit acres
100-ft-wide upland buffer	45.12	1:4 credit ratio 11.28 credit acres	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>	186.94 (aquatic only)	<b>86.05 credit acres</b>	81.61 credit acres	<b>119.16 credit acres<sup>a</sup></b>	154.48 credit acres

<sup>a</sup> Maximum credits as of 2008. Final credits are subject to compliance with the performance standards at the end of the monitoring period.

In 2008, the Alkali Lake Wetland Mitigation Site continued to rate as a Category II wetland (**Table 3**). However, the site scored lower in 2008 as a result of revised MWAM application. Despite a gain in total wetland/aquatic habitat, the functional units decreased slightly in 2008. The site continued to rate as exceptional or high for General Wildlife Habitat and Short and Long Term Surface Water Storage (**Table 3**).

The excavated inlet channel was in good condition during all site visits. Fencing, control structures, and the western berm were also in good condition. How water is managed at Alkali Lake is dependent upon availability and the goals set for wetland and wildlife management. Some wetland habitats and wildlife species at the site require opposing amounts and periods of flooding. In 2006 and 2008, the abundance of water promoted the development of bulrush



wetland and the use of the site by waterfowl and shorebirds throughout the entire growing season. In 2007, the site was flooded in the spring and fall, but allowed for a draw-down period from late spring to early fall. This promoted development of other wetland types and potential breeding habitat for the threatened Piping Plover, but limited waterfowl/shorebird use of the site to the early spring and late fall time periods.

**Table 3: Summary of 2008 wetland function/value ratings and functional points at the Alkali Lake Wetland Mitigation Site.**

Function and Value Parameters from the MDT Montana Wetland Assessment Method <sup>1</sup>	2008
Listed/Proposed T&E Species Habitat	Mod (0.8)
MTNHP Species Habitat	Mod (0.5)
General Wildlife Habitat	Exc (1.0)
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 (0.7)
Groundwater Discharge/Recharge	Low (0.1)
Uniqueness	Mod (0.5)
Recreation/Education Potential	Low (0.05)
<b>Actual Points / Possible Points</b>	<b>5.55 / 9.0</b>
<b>% of Possible Score Achieved</b>	<b>62%</b>
<b>Overall Category</b>	<b>II</b>
<b>Total Acreage of Assessed Wetlands and Other Aquatic Habitats within Site Boundaries (ac)</b>	<b>186.94</b>
<b>Functional Units (acreage x actual points) (fu)</b>	<b>1037.52</b>

## 2.2 Big Hole Grazing Association (Butte District, Year 1)

The Big Hole Grazing Association (BHGA) wetland mitigation project was constructed in the fall of 2007 by MDT. The purpose of the project is to restore approximately 45 acres of wetland habitat within a 96-acre easement area owned by the BHGA. The project would provide a wetland mitigation reserve in Watershed #6 - Upper Missouri River Basin. MDT has not yet identified any construction projects in this watershed that would be applied against the Big Hole Grazing Association reserve. This project is located approximately 7 miles southwest of Wisdom and approximately 4 miles west of Secondary Route 278. Specifically, the project is located in the NW ¼ of Section 2, Township 4 South and Range 16 West in Beaverhead County. The site was monitored for the first time in 2008.

Prior to project initiation, the BHGA utilized the project area for grazing and haying operations. Drainage ditches had been utilized for decades to drain the project area, which has a naturally high groundwater table and receives spring flows from the hillside to the north of the site. In addition to the springs and groundwater, Rock Creek, a perennial tributary to the Big Hole River, flows through the southern portion of the easement area.

In an attempt to restore natural hydrology to the site and thus restore wetlands within the easement area, the primary drainage ditch, which flowed northwest to southeast through the easement area, was completely filled and reclaimed. A secondary ditch which runs north to south across the western portion of the site was breached in three locations in an attempt to prevent drainage of the site and re-hydrate former wetlands by raising groundwater levels across the site. Prior to project implementation, MDT documented approximately 31 acres of emergent and scrub/shrub wetland across the entire 96-acre easement area, noting that some wetland areas were likely much larger prior to construction of drainage ditches across the site in the 1960's. According to project files, the goal is to generate 45.8 acres of Corp of Engineers approved credit through the restoration of 42.3 acres of wetland credited at 1:1 and preservation of 14.0 acres credited at a 4:1 ratio (3.5 acres of credit).

Wetland delineation during August 2008 monitoring documented 49.81 acres of wetland for a gain of 18.81 acres over baseline conditions. The largest difference between the two delineations is in the east/northeast corner, where the 2008 delineation revealed 13.45 acres of developing EM/SS wetland in an area previously determined by MDT to be upland. It is probable that restoration of groundwater to this part of the project in the fall of 2007 was already having a positive affect on plant composition and saturated soil conditions in August 2008.

Assuming that restoration credit is granted for all wetlands on the site other than the 14 acres dedicated as "preservation", the maximum 2008 credit breakdown is as follows:

14 acres preservation at 4:1 ratio:	3.5 acres credit
35.81 acres restoration at 1:1 ratio:	<u>35.81 acres credit</u>
Total maximum 2008 credit:	<b>39.31 acres credit</b>

Year 1 of monitoring showed a positive trend toward hydrologic restoration within a large portion of the site as indicated by the raising of groundwater levels at all eight monitoring wells. Over time, it is anticipated that additional wetland will develop, especially towards the center of the project area, where upland grass communities convert to wet meadow and emergent marsh. Overall, the site appears to be on target to meet project goals.

MDT project files indicate that prior to project implementation, wetlands occurring along the Rock Creek corridor and in the northwest corner (fen area) rated as Category II wetlands while all other wetland on the site rated as Category III using the MDT 1999 MDT Montana Wetland Assessment Method.

In 2008, two functional assessments were completed. Wetlands associated with the Rock Creek drainage (Assessment 1) were assessed on one form while all other wetlands were rated together (Assessment 2). In summary, all wetlands within project boundaries rated as Category II, with high ratings for short and long term surface water storage, sediment/nutrient/toxicant removal, and groundwater discharge/recharge (**Table 4**). Wetlands along Rock Creek also received high ratings for fish and wildlife habitat, flood attenuation, short and long term surface water storage, sediment/shoreline protection, and production export / food chain support. The larger wetland area received a high rating for uniqueness because of the fen qualities exhibited in the northwest portion of the easement area.

**Table 4: Summary of 2008 wetland function/value ratings and functional points at the Big Hole Grazing Association Wetland Mitigation Site.**

Function and Value Parameters from the 2008 MDT Montana Wetland Assessment Method	2008 Assessment 1 Rock Creek Wetlands	2008 Assessment 2
Listed/Proposed T&E Species Habitat	Low (0.1)	Low (0.1)
MTNHP Species Habitat	Low (0.2)	Low (0.1)
General Wildlife Habitat	High (0.9)	Mod (0.7)
General Fish/Aquatic Habitat	High (0.8)	NA
Flood Attenuation	High (0.8)	NA
Short and Long Term Surface Water Storage	High (0.8)	High (1.0)
Sediment/Nutrient/Toxicant Removal	High (0.9)	High (1.0)
Sediment/Shoreline Stabilization	High (1.0)	NA
Production Export/Food Chain Support	High (1.0)	Mod (0.6)
Groundwater Discharge/Recharge	High (1.0)	High (1.0)
Uniqueness	Mod (0.4)	High (0.9)
Recreation/Education Potential	Low(0.05)	Low(0.05)
<b>Actual Points / Possible Points</b>	<b>7.95 / 11</b>	<b>5.45 / 8</b>
<b>% of Possible Score Achieved</b>	<b>72%</b>	<b>68%</b>
<b>Overall Category</b>	<b>II</b>	<b>II</b>
<b>Total Acreage of Assessed Wetlands and Other Aquatic Habitats within Site Boundaries (ac)</b>	<b>10</b>	<b>39.81</b>
<b>Functional Units (acreage x actual points)</b>	<b>79.5</b>	<b>217</b>

There were a total of 961 woody plantings counted during the 2008 monitoring, with approximately 79% (756 stems) having survived through the first growing season. Generally speaking, alder and dogwood had a high survival rate, while less than half of the birch survived. Mortality of birch plantings was likely due to wetter than expected conditions in areas where this species was planted.

From a vegetative standpoint, disturbed areas where the ditch was filled were reseeded following construction and appeared to be progressing satisfactorily, as were a majority of the woody plantings. No additional seeding or planting is recommended at this time. One small infestation of Canada thistle was identified. Spraying or pulling may prevent spread to other parts of the site.

### 2.3 Camp Creek (Missoula District, Year 7)

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. Details for each of the three main goals are listed below:

### **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.

During 2008 monitoring, the wetland boundary line was refined in several areas, decreasing the total wetland by approximately 2.4 acres. This decrease was observed in the following areas: southeast corner of the MDT parcel near the Grasser / MDT boundary; an upland island located north of the flood channel; and upstream from the inlet of Andrews Creek within remnant wetlands. These changes in wetland area near the southeast corner are considered permanent, albeit a reversion to natural pre-irrigation conditions, unless irrigation practices change (e.g., resume) on the Grasser parcel. The other areas showing a decrease are also considered permanent due to location on the upper terrace and change in the associated hydrology.

Approximately 148.98 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 111.60 functional units have been gained at the MDT parcel, and 37.38 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 5**. Using this approach, a current maximum of approximately 15.71 credit acres is assignable to the Camp Creek site as of 2008. Pre-project and post-project wetland assessment scores are presented in **Table 6**.

**Table 5: 2008 functional unit-based credit for the Camp Creek Wetland Mitigation Project.**

Property	2008 Wetland & Channel Acreage	2008 Score	2008 Functional Units	Baseline Functional Units	Functional Unit “Gain”	“Gain” Divided by Current Score (potential credit acres)
MDT	33.39	10	333.90	222.30	111.60	11.16
Grasser	8.13	8.2	66.66	29.28	37.38	4.55
<b>Total</b>	<b>41.52</b>	<b>--</b>	<b>400.56</b>	<b>251.58</b>	<b>148.98</b>	<b>15.71</b>

Survival rates within the upland areas were similar to those observed during 2004 to 2007 monitoring. Survival data recorded in 2004-2008 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 2008, 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 planted during the 2002 efforts are spreading out along the banks, continuing to increase in size 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 2008 monitoring, and is functioning according to design.

Several Category 1 noxious weeds are present on both MDT and Grasser parcels including Canada thistle, hound’s-tongue, oxeye daisy, spotted knapweed and yellow toadflax. 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. Survival of plantings will continue to be monitored, and supplemental planting may need to be implemented if success of current plantings is low.

The Grasser parcel supports the majority of the noxious weed species with extensive distribution along the floodplain corridor. A weed management plan for this site should be developed and implemented to control the spread of noxious weeds. Areas of invading spotted knapweed, Canada thistle and yellow toadflax located along floodplain margins should be controlled and reseeded or planted with appropriate wetland species to help control further spread of invasive species. No weed control activity was observed on the Grasser parcel.

**Table 6: Summary of 2001 (baseline) and 2008 wetland function/value ratings and functional points at Camp Creek Wetland Mitigation Site.**

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	2008 Grasser Property	2008 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)	High (0.9)	High (0.9)
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)	High (1.0)	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 (1.0)
Actual Points/Possible Points	5.1 / 12	6.2 / 12	5.1 / 12	5.9 / 12	6.2 / 12	8.20 / 12	10.0 / 12
% of Possible Score Achieved	42%	52%	42%	49%	52%	68%	83%
Overall Category	III	III	III	III	III	II	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>33.39</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>66.66</b>	<b>333.90</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>37.38<sup>b</sup></b>	<b>111.60<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>148.98</b>	

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

<sup>b</sup> Baseline Functional Units used to determine the 2008 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 be needed if success of current plantings is low. Planted upland areas within the MDT parcel which were observed to have low survival rates should be replanted with appropriate native plant stock, and irrigated.

## 2.4 Cloud Ranch (Billings District, Year 5)

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 7** outlines the target wetland credits and ratios from the COE and the net acres delineated during the 2008 wetland monitoring. In 2008, the net off-channel wetland/open water acreage is 2.4 acres (2.85 acres total wetland +0.27 acre open water – 0.72 acre of pre-existing wetlands = 2.4 acres). The Big Timber Creek wetland acreage is 1.42 acre; an increase of 0.32 acre compared to 2007 due to the population of young cottonwood seedlings along the upper reach of the creek. Riparian wetlands comprise 1.27 acre along Big Timber Creek with 0.15 acre of emergent wetlands. The Big Timber Creek channel itself is not included in acreage totals.

As of 2008, the mitigation efforts have resulted in a total of 3.55 wetland credit acres, 0.27 shallow open water credit acres, and 0.89 credit acre of wetland/upland buffer. The grand total for the Cloud Ranch to date is 4.71 credit acres or 86 percent of the 5.49-acre goal.

**Table 7: 2008 credit acreages and ratios for the Cloud Ranch Wetland Mitigation Site.**

Wetland Mitigation	Current Net Acres	Ratio	2008 Credit Acres	Target Credit Acres	Comments
<b>Off-channel</b> <sup>1</sup> Creation and restoration wetlands and open water	2.4	1:1	2.4	2.02	
<b>Subtotal</b>	<b>2.4</b>		<b>2.4</b>	<b>2.02</b>	
<b>Big Timber Creek</b> <sup>2</sup> Riparian wetland restoration	1.27	1:1	1.27	2.00	Riparian wetland community represented by Type 2.
Emergent wetland restoration	0.15	1:1	0.15	0.58	Riparian wetland community
<b>Subtotal</b>	<b>1.42</b>		<b>1.42</b>	<b>2.58</b>	Type 2 has an emergent component at two small locations within mapped CT2. This acreage was calculated separately.
<b>Upland and Wetland Buffer</b>	3.56	4:1	0.89	0.89	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>7.38</b>		<b>4.71</b>	<b>5.49</b>	<b>86% of goal</b>

<sup>1</sup> This acreage correlates to lines 2 and 3 in the October 2, 2002 COE table Appendix G.

<sup>2</sup> This acreage correlates to lines 4, 5 and 6 respectively in the Oct 7, 2002 COE table Appendix G.

As of 2008, the site remains approximately 0.78 acre short of its credit goal. The stream migration in 2006 created a new channel by cutting through a small point bar wetland. Areas adjacent to this channel are developing into wetlands with the establishment of cottonwood seedlings. Upper or high terraces along Big Timber Creek will likely take considerable amount of time to establish wetland vegetation. The lower area will likely continue to serve as an overflow channel or oxbow. In addition, the 2008 inundation near the southern monitoring limits of the off-channel area could potentially add wetland acreage in this area if the inundation continues.

Functional assessment results for 2004 and 2008 are summarized in **Table 8**. 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, while the off-channel wetlands were assigned a Category III rating. The ratings have been fairly consistent over the monitoring period to date. In 2008, there is a slight decrease in the actual points and functional units due to the implementation of the new (2008) assessment form. This does not indicate a loss or reduction of function or value but rather a refinement in the assessment process.

The site supports one State of Montana-listed noxious weed: Canada thistle. Black henbane, a County listed noxious weed, was noted along the upper reach of Big Timber Creek but all plants were dead or declining due to recent application of herbicide. Canada thistle was observed along portions of Big Timber Creek and within the off-channel wetland assessment area. Some infestations of Canada thistle appeared to have been sprayed in 2008 in the upland and wetlands adjacent to the Big Timber Creek channel. Continued chemical or biological control measures are recommended for Canada thistle.

**Table 8: Summary of 2004 to 2008 wetland function/value ratings and functional points at the Cloud Ranch Wetland Mitigation Project.**

Function and Value Parameters from the MDT Montana Wetland Assessment Method	2004 Post-Construction Off-Channel Wetlands	2004 Post-Construction Big Timber Creek	2008 Off-Channel Wetlands	2008 Big Timber Creek
Listed/Proposed T&E Species Habitat	Low (0.3)	Low (0.3)	Low (0.0)	Low (0.0)
MTNHP Species Habitat	Low (0.1)	Mod (0.6)	Low (0.1)	Mod (0.5)
General Wildlife Habitat	Mod (0.7)	High (0.9)	Mod (0.7)	High (0.9)
General Fish/Aquatic Habitat	NA	Mod (0.7)	NA	Mod (0.6)
Flood Attenuation	Mod (0.5)	Mod (0.4)	Mod (0.5)	High (0.9)
Short and Long Term Surface Water Storage	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)	High (0.9)
Sediment/Shoreline Stabilization	High (1.0)	Mod (0.7)	High (1.0)	Mod (0.7)
Production Export/Food Chain Support	Mod (0.7)	Mod (0.7)	High (0.8)	High (0.6)
Groundwater Discharge/Recharge	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)
Recreation/Education Potential	Mod (0.7)	Mod (0.7)	Mod (0.1)	Mod (0.1)
<b>Actual Points / Possible Points</b>	<b>7 / 11</b>	<b>7.6 / 12</b>	<b>6.2 / 10</b>	<b>7.2 / 11</b>
<b>% of Possible Score Achieved</b>	<b>64%</b>	<b>63%</b>	<b>62%</b>	<b>66%</b>
<b>Overall Category</b>	<b>III</b>	<b>II</b>	<b>III</b>	<b>II</b>
<b>Total Acreage of Assessed Wetlands and Open Water within Easement (ac)</b>	<b>2.19</b>	<b>2.65</b>	<b>3.12</b>	<b>3.27</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>Functional Units (acreage x actual points) (fu)</b>	<b>15.33</b>	<b>20.14</b>	<b>19.34</b>	<b>23.54</b>
<b>Net Acreage Gain (ac)</b>	<b>1.47</b> (1.2 wetland, 0.27 ow)	<b>0.48</b> (wetland)	<b>2.85</b> (2.13 wetland, 0.27 ow)	<b>1.42</b> (wetland)
<b>Net Functional Unit Gain<sup>1</sup></b>	Presently unavailable	Presently unavailable	<b>4.01</b> (since 2004)	<b>3.4</b> (since 2004)
<b>Total Functional Unit Gain<sup>1</sup></b>	Presently unavailable		<b>7.41</b> (since 2004)	

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

The water level control structures within the off-channel wetlands were functioning and in good working order at the time of the July monitoring. Big Timber Creek channel migration resulted in minor bank loss in 2008. Gravel bars and new deposition areas will continue to be monitored to track riparian wetland gains or losses, development of the cottonwood communities and/or negative or undesirable changes in vegetation. As mentioned earlier, the project designer commented in 2006 that 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. Intervention does not appear warranted at this time as the stream appears to be adjusting naturally. However, if ultimately considered necessary by the designer, landowner, and MDT, any such intervention should be completed within the monitoring period.

## 2.5 DH Ranch (Billings District, Year 2)

This mitigation site was constructed during the spring of 2007 in the eastern portion of the Upper Yellowstone River watershed (Watershed #13). Approximately 17.4 acres of wetland credit at this site is to be provided to MDT through a credit purchase agreement. It is anticipated that this site will compensate for wetland impacts resulting from MDT highway and bridge reconstruction projects in the watershed. The DH Ranch mitigation site was constructed on private property. The goal of the project is to create wetland hydrology at the site, and thereby ultimately provide up to 23 acres of palustrine emergent and scrub-shrub wetland within the confines of the site. Prior to construction, approximately 0.38 acre of palustrine emergent and scrub-shrub wetland had been incidentally created along irrigation ditches traversing the site.

The project is a wetland creation project and includes a series of wetland cells supplied primarily by irrigation return flow, with some minimal contributions from precipitation. Monitoring occurs on the site in mid-summer when all wetland data are collected. Wetland crediting ratios for the site are 1:1 for wetland creation areas and 4:1 for riparian buffers, and are subject to various performance standards.

The COE will ultimately determine which crediting ratios are applicable to the site. However, using the credit ratios listed, **Table 9** summarizes compensatory mitigation credits developed to date at DH Ranch. As no success criteria pertain to the upland buffer, credits for the upland buffer were assigned in 2008 despite its dominance by clasping pepperweed and that most of the planted shrubs have died. The wetland mitigation design report also includes a credit category for shrubby riparian islands located on the water diversion berms. These berms are generally vegetated by weedy species, such as cheatgrass, and do not have a woody component yet. Some natural recruitment of cottonwoods is occurring on their southern sides, at the base of the berms and will continue to be monitored. No credits were calculated for these berms this year.

Based on this information and assumed credit ratios for wetlands, open water, and upland buffer, approximately 12.73 acres of credit, or 73% of the 17.4-acre MDT credit purchase goal, are currently available at the DH Ranch mitigation site (**Table 9**).

Functional assessment results are summarized in **Table 10**. For comparative purposes, the functional assessment results for baseline conditions prepared by Oasis Environmental in 2005

**Table 9: 2008 mitigation credit summary for the DH Ranch Wetland Mitigation Site.**

Credit Category	Acre	Assumed Credit Ratio <sup>a</sup>	Credit <sup>a</sup>
Emergent wetland creation	11.39	1:1	11.39 <sup>c</sup>
Open water	6.05	Up to 10% of wetland area	1.14
Shrubby riparian islands <sup>b</sup> (i.e. berms)	1.65	1:1	0.00 <sup>c</sup>
Upland buffer <sup>b</sup>	0.80	4:1	0.20
<b>TOTAL</b>	<b>19.17</b>		<b>12.73</b>

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

<sup>b</sup>The shrubby riparian islands and upland/riparian buffer acreage was derived from the design report.

<sup>c</sup>Not all success criteria have not been met. Credits for these areas may be negotiated between MDT and the COE.

are also included in **Table 10**. The created wetlands at DH Ranch were ranked as Category II wetlands in 2007 and 2008 as compared to Category III in 2005. Functions that increased substantially over 2005 baseline conditions include MNHP species habitat, general wildlife habitat, short and long term surface water storage, sediment/nutrient/ toxicant removal, and production export. The pre-project site provided about 1.596 functional units within the monitoring area, and in 2008 provides about 89.82 functional units, for a conservative gain of roughly 88 functional units.

In order to maximize wetland establishment on the site, it may be worthwhile to adjust the distribution of water so that the areas in the southwestern portion of the site, between a berm and an inundated area, are wet for prolonged time periods during the growing season.

The berm areas are intended to be riparian scrub-shrub areas. In 2008 these areas had been colonized by a variety of weedy species and had not been planted with riparian shrubs prior to the mid-season visit, though some cottonwood seedlings had become established. It is likely that these seedlings will continue to grow in subsequent years, however, they occur in a single line near the bases of the berms. If these berm areas are to be counted for credit in future years it may be necessary to plant the upper portions of the berms with shrubby riparian species.

Several infestations of Canada thistle and musk thistle were identified. Canada thistle also generally occurs at low to very low (i.e., trace) densities throughout the southern portion of the project area, particularly in the disturbed-wetland community type. Cheatgrass, clasping pepperweed, and field bindweed are prevalent in the disturbed–upland community type. Control of all these weeds is recommended.

## 2.6 Hoskins Landing (Missoula District, Year 7 – Final Year)

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 5.85 acres of wetlands and 0.82 acre of “extremely marginal”

**Table 10: Summary of baseline and 2008 wetland function/value ratings and functional points at the DH Ranch Wetland Mitigation Site.**

Function and Value Parameters from the MDT Montana Wetland Assessment Method <sup>1</sup>	2005 Baseline Assessment	2008
Listed/Proposed T&E Species Habitat	Low (0.0)	Low (0.0)
MNHP Species Habitat	Low (0.1)	Mod (0.6)
General Wildlife Habitat	Mod (0.5)	High (0.9)
General Fish/Aquatic Habitat	NA	NA
Flood Attenuation	NA	NA
Short and Long Term Surface Water Storage	Low (0.3)	High (1.0)
Sediment, Nutrient, Toxicant Removal	NA	Mod (0.7)
Sediment/Shoreline Stabilization	High (0.9)	Low (0.3)
Production Export/Food Chain Support	Mod (0.5)	High (1.0)
Groundwater Discharge/Recharge	NA	Low (0.1)
Uniqueness	Mod (0.4)	Mod (0.5)
Recreation/Education Potential	Low (0.1)	Low (0.05)
<b>Actual Points/Possible Points</b>	<b>2.8/8</b>	<b>5.15/9</b>
<b>% of Possible Score Achieved</b>	<b>35</b>	<b>57</b>
<b>Overall Category</b>	<b>III</b>	<b>II</b>
<b>Total Acreage of Assessed Aquatic Habitat within AA Boundaries</b>	<b>0.570</b>	<b>17.44</b>
<b>Functional Units (acreage x actual points)</b>	<b>1.596</b>	<b>89.82</b>
<b>Net Acreage Gain</b>	NA	<b>16.87</b>
<b>Net Functional Unit Gain</b>	NA	<b>88.22</b>

reed canarygrass swales at the site. Consequently, definitive baseline wetland acreage was 5.85 acres.

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.

As of 2008, approximately 13.91 wetland acres occur on the mitigation site. The initially-calculated net increase in aquatic habitat acres to date is approximately  $13.91 - 5.85 = 8.06$  acres, essentially at the 8.1-acre goal.

Investigation of the baseline delineation report and MDT mitigation project design plans revealed that approximately 0.6 acre of pre-project wetlands (two small, isolated emergent depressions) occurred within the proposed 8.1-acre “wetland creation” footprint. The two pre-existing wetland patches within the designed wetland creation footprint were isolated, low-quality, grazed reed canarygrass-dominated areas providing little wetland function (Category IV). These sites were converted to part of a single, much larger, and higher-quality Category II wetland upon project implementation. As such, credit may be warranted for these areas (e.g., they would not be counted in the “pre-existing” acreage total, and therefore not subtracted from the 2008 13.91-acre wetland total).

Taking these factors into consideration, the adjusted “pre-existing” acreage total would be  $5.85 - 0.6 = 5.25$  acres. The 2008 credit total would then be  $13.91 - 5.25 = 8.66$  acres, which exceeds the 8.1-acre goal. This potential credit allocation would be subject to COE and CSKT review / approval. Whether or not these considerations are taken into account, the site has essentially achieved the 8.1-acre goal.

Functional assessment results are summarized in **Table 11** below. The vast majority of wetlands on the Hoskins Landing mitigation site are currently rated as Category II. They received moderate ratings for Montana Natural Heritage Program (MTNHP) species habitat, general wildlife habitat, flood attenuation, sediment, nutrient, toxicant removal, and variables. Other factors contributing to their scores were high ratings for fish / aquatic habitat, surface water storage, sediment / shoreline stabilization, production export / food chain support, and groundwater discharge / recharge. Additional factors contributing to their scores were low ratings for threatened and endangered species habitat and recreation / education ratings. Based on functional assessment results (**Table 11**), approximately 103.60 functional units occur at the Hoskins Landing mitigation site. Baseline functional assessment results are also provided in **Table 11** for general comparative purposes.

Three upland planting areas were evaluated; these areas include the upland islands, river bank terrace and along the upper banks of the backwater (side) channel. During 2008 monitoring, species survival remained similar to those observed in 2007 with an overall estimate of moderate to high survival. 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 lower occurrences.

**Table 11: Summary of 1999 (baseline<sup>a</sup>) and 2008 wetland function/value ratings and functional points at the Hoskins Landing Wetland Mitigation Project.**

Function and Value Parameters from the 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	2008 Site 5	2008 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)	Low (0.1)
MTNHP Species Habitat	Low (0.1)	Low (0.1)	Low (0.1)	Mod (0.7)	None (0.0)	None (0.0)	Low (0.0)	Mod (0.6)
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 (0.4)	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 (1.0)
Sediment, Nutrient, Toxicant Removal	High (1.0)	High (1.0)	High (1.0)	Mod (0.5)	High (1.0)	Mod (0.5)	Mod (0.4)	Mod (0.4)
Sediment/Shoreline Stabilization	Mod (0.7)	Mod (0.7)	NA	Mod (0.4)	High (0.9)	NA	NA	High (1.0)
Production Export/ Food Chain Support	High (0.8)	Mod (0.6)	Mod (0.6)	Mod (0.7)	Low (0.2)	Low (0.1)	Low (0.3)	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)	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 (0.1)
<b>Actual Points/ Possible Points</b>	<b>6.6 / 12</b>	<b>5.8 / 11</b>	<b>4.0 / 9</b>	<b>6.3 / 11</b>	<b>2.8 / 10</b>	<b>2.3 / 9</b>	<b>3.0 / 9</b>	<b>7.5/11</b>
<b>% of Possible Score Achieved</b>	<b>55%</b>	<b>53%</b>	<b>44%</b>	<b>57%</b>	<b>28%</b>	<b>26%</b>	<b>33%</b>	<b>69%</b>
<b>Overall Category</b>	<b>III</b>	<b>III</b>	<b>III</b>	<b>II</b>	<b>IV</b>	<b>IV</b>	<b>IV</b>	<b>II</b>
<b>Total Acreage of Assessed Wetlands and Open Water within Easement (ac)</b>	<b>2.58</b>	<b>0.86</b>	<b>0.68</b>	<b>0.06</b>	<b>0.75</b>	<b>1.74</b>	<b>0.46</b>	<b>13.45</b>
<b>Functional Units (fu) (acreage x actual points)</b>	<b>17.03</b>	<b>4.99</b>	<b>2.73</b>	<b>0.37</b>	<b>2.10</b>	<b>4.00</b>	<b>1.38</b>	<b>102.22</b>
<b>Total Acreage at Site</b>	<b>6.67</b>						<b>13.91</b>	
<b>Total Functional Units at Site</b>	<b>31.22</b>						<b>103.60</b>	
<b>Net Acreage Gain</b>	NA						<b>7.24</b>	
<b>Net Functional Unit Gain</b>	NA						<b>72.38</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 2008 MDT assessment method, which was applied during 2008 monitoring.

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 2008. Approximately 2,000 willow cuttings were installed around the fringe of excavated wetland and show vigorous seasonal growth.

Several Category 1 noxious weeds were still present at moderate cover values: Canada thistle, Dalmatian toadflax, hound's-tongue, oxeye daisy, St. John's wort, and spotted knapweed. Category 3 yellowflag iris was 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 not observed during the mid-season visits including herbicide applications, minor grazing and mowing. These proposed weed control applications may have occurred later in the season after the mid-season visit. Evidence of livestock accessing the site was not observed during 2008 visit.

## **2.7 Jack Creek Ranch (Butte District, Year 5)**

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 field 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 middle reach of the McKee Spring Creek and the over-widened areas (in-stream reservoirs) were filled. In the spring of 2003, a new channel was constructed for the lower reach of the McKee creek. The lower McKee Spring Creek construction began by shifting the confluence of McKee creek and Jack Creek west or downstream of the original confluence. Approximately 880 feet of new channel was created between the new confluence and the old confluence. From the original confluence upstream to the first of the middle creek ponds, the new channel was built within the old channel. New channel banks were created by stacking wetland sod mats until a specified finished bank height was achieved. This method allowed for the creation of a narrowed channel and a wide floodplain covering the full width of the old over-widened channel. 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.

In 2008, per MDT request, the 2004-2007 monitoring area limits were extended to include the lower restored reach of McKee Spring Creek, as MDT and ADC (Oasis Engineering) had determined that this area was part of the credit purchase and eligible for credit. In 2008, with the addition of the lower reach of the spring creek, the gross wetland boundary was 65.40 acres and included 2.51 acres of shallow open water (<4 feet deep). MDT anticipates grossing at least 50 acres of wetland at this site. The mitigation efforts have thus far resulted in 65.40 gross wetland acres or 130 percent of the goal (the 50 acre goal included the pre-existing wetlands and open water). Subtracting the original, pre-project wetland acreage of 11.40, the current net acreage of aquatic habitat totals 54 acres.

Functional assessment results are summarized in **Table 12**. Pre-construction functional assessments were completed for the wetlands as well as the lower and middle reaches of McKee Spring Creek by ADC. The results of that assessment are included in **Table 12**. The monitoring area has gained over 460 functional units since construction. The site remains a Category II wetland and scores over 510 functional units.

The fence is not barbed, however the bottom strand does not appear to be high enough to allow the passage of ungulates. It is possible that snow depth would deter deer from traveling under the fence even if suspended 18 inches. There are special post attachments available that would allow the wire to be dropped one level prior to the winter months when snow depth and icy conditions hinder over-fence migration.

The site has three State of Montana Noxious Weeds: Canada thistle, hounds tongue, and orange hawkweed. Live hounds tongue plants were noted during the July 2008 monitoring visit within the McKee Spring Creek floodplain. Weed control efforts have been effective in reducing Canada thistle and hounds tongue. However, Canada thistle still continues to pose the greatest problem in the transition and upland areas. A small isolated patch of orange hawkweed was noted south of the monitoring well in the lower reach of McKee Spring Creek. Spot spraying is recommended in 2008 primarily for Canada thistle, hounds tongue and orange hawkweed.

**Table 12: Summary of 2002 and 2008 wetland function/value ratings and functional points at the Jack Creek Ranch Wetland Mitigation Project.**

Function and Value Parameters from the MDT Montana Wetland Assessment Method	Pre-construction 2002 <sup>1</sup>	Post-construction 2008 <sup>2</sup>
Listed/Proposed T&E Species Habitat	Low (0)	Low (0.1)
MNHP Species Habitat	Mod (0.6)	Mod (0.5)
General Wildlife Habitat	Low (0.3)	Exc (1.0)
General Fish/Aquatic Habitat	Mod (0.6)	Mod (0.6)
Flood Attenuation	NA	Mod (0.5)
Short / Long Term Surface Water Storage	NA	High (0.9)
Sediment/Nutrient/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 (0.1)
<b>Actual Points/Possible Points</b>	<b>2.7 / 9</b>	<b>7.8 / 11</b>
<b>% of Possible Score Achieved</b>	<b>30%</b>	<b>71%</b>
<b>Overall Category</b>	<b>III</b>	<b>II</b>
<b>Total Acreage of Assessed Wetland / Open Water Areas within Easement</b>	<b>11.4</b>	<b>65.40</b>
<b>Functional Units (acreage x actual points) (fu)</b>	<b>30.78</b>	<b>510.12</b>
<b>Net Acreage Gain in Mitigation Area (ac)</b>	NA	<b>54.0</b>
<b>Approximate Functional Unit Gain in Mitigation Area</b>	---	<b>479.34</b>

<sup>1</sup> 2002 baseline assessment employed the 1999 method and included an additional 12.2 acres of wetlands and open water along McKee Spring Creek beyond the current AA. The original acreage of wetlands and open water in this area (23.6 acres) and corresponding functional units were therefore approximated downward in order to match the baseline AA with the current AA.

<sup>2</sup> In 2008 the revised 2008 MDT Montana Wetland Assessment Method was applied. In 2008 the assessment area was expanded to include the horseshoe wetland and the lower and middle reaches of McKee Spring Creek.

## 2.8 Little Muddy Creek (Great Falls District, Year 5)

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). An additional 50 acres of reserve credit was also being sought by MDT. 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.

As of 2008, the Little Muddy site has developed approximately 110 acres of Class II wetland and 71 acres of transitional open water.

Approximately 0.80 acre, 9.97 acres, and 2.80 acres of the originally-anticipated 13.57-acre impacts 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. As of 2008, the site appears to be developing the anticipated target credits.

As in 2006 and 2007, the Little Muddy Creek Wetland Mitigation Site continued to rate as a Category II wetland because it rates as exceptional for wildlife habitat (**Table 13**). The site rated high for Short and Long Term Surface Water Storage; Sediment/Nutrient/Toxicant Removal; and Production Export/Food Chain Support (**Table 13**). The 2008 functional score and units increased from 2007 because water levels promoted wetland development.

The berm, excavated channels, and inlet/outlet structures were in good condition during the mid-season visit. The diversion structures were also found in good condition in 2008. However, the northeast streambank immediately upstream of the diversion structure has been eroding. The existing rock that borders each side of the sheet pile diversion is in good shape, but should not be



extended up the streambank where it is eroding. Flow velocities on the upstream side of the sheet pile diversion are not excessive and indications (i.e. significant scour hole or other erosional feature) that the streambank is at significant risk of failure were not observed.

**Table 13: Summary of 2008 wetland function/value ratings and functional points at the Little Muddy Creek Wetland Mitigation Site.**

<b>Function and Value Parameters from the MDT Montana Wetland Assessment Method</b>	<b>2008</b>
Listed/Proposed T&E Species Habitat	Low (0.0)
MTNHP Species Habitat	Mod (0.6)
General Wildlife Habitat	Exc (1.0)
General Fish/Aquatic Habitat	Low (0.2)
Flood Attenuation	Mod (0.6)
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	Low (0.1)
Uniqueness	Mod (0.4)
Recreation/Education Potential	Mod (0.1)
<b>Actual Points/Possible Points</b>	<b>6.2 / 11</b>
<b>% of Possible Score Achieved</b>	<b>56%</b>
<b>Overall Category</b>	<b>II</b>
<b>Total Acreage of Assessed Wetlands and Other Aquatic Habitats within Site Boundaries (ac)</b>	<b>181.12</b>
<b>Functional Units (acreage x actual points)</b>	<b>1122.94</b>

Based on the aerial photograph and on how flow is diverted southwest toward the wetland, the minor bank erosion is primarily a result of eddy currents that occur when flow is re-directed southwest. The erosion could be mitigated by stabilizing with vegetation. A combination of an erosion control blanket/fabric and vegetation could also be used.

## 2.9 Lonepine (Missoula District, Year 1)

The Lonepine mitigation site was constructed between the summer of 2007 and early summer of 2008 on MDT property in Sanders County, Montana, simultaneously with re-construction of the Lower Dry Fork Reservoir dam. The goals are to develop approximately 23.85 acres of COE-approved wetland credit and 11.86 acres of CSKT-approved wetland credit at this 80-acre site. The project is primarily intended to mitigate for wetland impacts associated with the proposed MDT Lonepine North & East highway reconstruction project, with any leftover wetland credits to be held in reserve for application against future MDT highway projects in the area.

The site occurs at an elevation of approximately 2,840 feet above mean sea level and is located near the west edge of the Flathead Indian Reservation, approximately 1.5 miles west of Lonepine and immediately south of the Lower Dry Fork Reservoir dam. The primary target wetland class to be provided at the mitigation site is emergent, with aquatic bed and scrub-shrub (including non-wetland riparian) classes to be provided at a lesser extent. Primary target wetland functions include wildlife habitat; sediment / nutrient / toxicant removal; surface water storage; and

production export / food chain support. The project includes a series of five wetland cells supplied primarily by Lower Dry Fork Reservoir via the Camas C Canal with some minimal contributions from precipitation. Objectives include the following:

- Maximize emergent wetland development, associated wildlife habitat, nutrient / toxicant removal functions, surface water storage functions, and production export / food chain support on the site by constructing several large interconnected cells that flood to a maximum depth of approximately 1 foot.
- Restore sinuosity and connectivity to ditched and straightened segments of Dry Fork Creek, including reactivation of a cutoff meander loop.
- Provide a riparian scrub-shrub component by revegetating restored Dry Fork Creek channel margins, and inter-cell watercourses, with riparian shrub species.
- Enhance and protect uplands and existing wetlands along Dry Fork Creek by removing grazing from the site, planting upland shrubs, prohibiting development, and fencing.
- Minimize operational maintenance and promote a self-sustaining system by placing permanent spillways at all cell outlets to control water elevations.

Approximately 7.13 acres of essentially pre-existing wetland were delineated on the site in 2008, with an additional 21.58 acres of transitional, inundated communities / areas that had not for the most part yet developed wetland characteristics. These transitional areas were inundated for the first time in June 2008, and are expected to develop into emergent wetlands with continued, consistent inundation. Similarly, vegetation along the new Dry Fork Creek channel segments is developing and banks are stable.

As construction was essentially completed in June 2008, and monitoring commenced in July 2008, the site has had very little chance to develop. The CSKT and Corps will ultimately determine / authorize credit at the site. However, as shown in **Table 14**, up to 12.26 CSKT and 2.6 Corps interim credit-acres have developed on the site in the absence of full ultimate performance standard application.

The functional assessment results for baseline (2003) and 2008 conditions are summarized in **Table 15**. The site was separated into two assessment areas: Dry Fork Creek and inter-connected Cells 1-5. Although very small and technically unmapped, Cells 1-5 contained a trace of wetland that allowed all inundated areas to be considered in the functional assessment. Both AAs currently rate as Category III sites, and although differing functional assessment methods were applied pre- and post-project, the site as a whole has gained aquatic habitat acreage and over 100 functional units. Prominent functions include general wildlife habitat, surface water storage, sediment/nutrient/toxicant removal, and production export / food chain support.

The vegetation plan for this site called for 1,080 woody plantings (shrubs) including 500 willow sprigs (cuttings). A total of 484 woody plantings were identified onsite, mainly willow. Root systems were exposed on many of the planted containerized shrubs, apparently due to soil displacement during watering, and likely resulted in the succumbing of many plants. Subsequent to monitoring, approximately 270 dead willow cuttings were replaced along Dry Fork Creek in November 2008.

**Table 14: 2008 Tribal and Corps of Engineers maximum interim credits at the Lonepine Wetland Mitigation Site.**

PROPOSED FEATURE	2008 DELINEATED ACRES	CSKT CREDIT RATIO 2008 INTERIM CALCULATED CREDIT	CSKT CREDIT TARGET	COE CREDIT RATIO 2008 INTERIM CALCULATED CREDIT <sup>A</sup>	COE CREDIT TARGET	COMMENTS
Wetland cells and excavation	21.58	1:3.04 credit ratio 7.1 credit ac	7.02 credit ac	1:1 credit ratio (OW limited to 10% of wetlands) 0 credit ac	21.35 credit ac	These aquatic habitats are transitional and developing, but not yet “wetlands”. Interim CSKT credit was tentatively assigned, but no Corps credit due to open water limitation.
New Dry Fork channel & wetland fringe	0.3	1:1.54 credit ratio 0.19 credit ac	0.19 credit ac	1:1 credit ratio 0.3 credit ac	0.3 credit ac	Constructed and developing; some shrub replacement implemented in November 2008 subsequent to monitoring.
New Dry Fork Creek channel in pre-existing Wetland 1	0.04	1:1.54 credit ratio 0.03 credit ac	0.03 credit ac	1:1.5 credit ratio 0.03 credit ac	0.03 credit ac	Constructed and developing;.
Dry Fork Creek meander re-activation	0.26	1:1.54 credit ratio 0.17 credit ac	0.17 credit ac	1:1.5 credit ratio 0.17 credit ac	0.17 credit ac	Constructed and developing; some shrub replacement implemented in November 2008 subsequent to monitoring.
Protection / grazing removal at pre-existing wetlands	7.13	1:1.54 credit ratio 4.63 credit ac	4.31 credit ac	1:5 credit ratio 1.43 credit ac	1.33 credit ac	Fencing and grazing exclusion completed.
Riparian swales	0.43	1:3.04 credit ratio 0.14 credit ac	0.14 credit ac	1:4 credit ratio 0.11 credit ac	0.11 credit ac	Constructed and planted; long-term survival of planted shrubs is questionable, but areas may progress to wetlands.
Upland buffer	4.45	0 credit ac (no planting)	0.00 credit ac	1:4 credit ratio (on max. 50-ft width) 0.56 credit ac	1:4 credit ratio on max. 50-ft width (2.23 ac) 0.56 credit ac	Noxious weed cover far less than 10% (few small patches).
<b>TOTAL</b>		<b>12.26 interim credit ac<sup>a</sup></b>	11.86 credit ac	<b>2.6 credit ac<sup>a</sup></b>	23.85 credit ac	Construction completed June 2008; monitoring conducted July 2008 and reflects initial “as-built” conditions.

<sup>a</sup> Maximum credits as of 2008. Final credits are subject to compliance with the performance standards at the end of the monitoring period.

**Table 15: Summary of pre-project and 2008 wetland function/value ratings and functional points at the Lonepine Mitigation Project**

Function and Value Parameters from the MDT Montana Wetland Assessment Method	Pre-Project Dry Fork Ck 2003 <sup>1</sup>	Pre-Project Isolated Wetland Patches 2003 <sup>1</sup>	Post-Project Dry Fork Ck 2008 <sup>2</sup>	Post-Project Cells 1-5 2008 <sup>2</sup>
Listed/Proposed T&E Species Habitat	Low (0.3)	Low (0.0)	Low (0.0)	Low (0.0)
MTNHP Species Habitat	Low (0.1)	Low (0.1)	Mod (0.6)	Mod (0.6)
General Wildlife Habitat	Low (0.3)	Low (0.1)	Mod (0.7)	Mod (0.7)
General Fish/Aquatic Habitat	Mod (0.4)	NA	Mod (0.4)	NA
Flood Attenuation	Mod (0.5)	NA	Mod (0.6)	NA
Short and Long Term Surface Water Storage	Mod (0.6)	Low (0.3)	Mod (0.6)	High (0.9)
Sediment/Nutrient/Toxicant Removal	Mod (0.7)	NA	Mod (0.7)	Mod 0.7
Sediment/Shoreline Stabilization	Mod (0.6)	NA	Mod (0.6)	Low (0.2)
Production Export/ Food Chain Support	High (0.8)	Low (0.1)	High (0.8)	Mod (0.5)
Groundwater Discharge/Recharge	High (1.0)	High (1.0)	Mod (0.7)	Mod (0.4)
Uniqueness	Low (0.2)	Low (0.2)	Mod (0.4)	Mod (0.4)
Recreation/Education Potential	Low (0.1)	Low (0.1)	NA	NA
<b>Actual Points / Possible Points</b>	<b>5.0 / 12</b>	<b>1.9 / 8</b>	<b>6.1 / 11</b>	<b>4.4 / 9</b>
<b>% of Possible Score Achieved</b>	<b>47%</b>	<b>24%</b>	<b>56%</b>	<b>49%</b>
<b>Overall Category</b>	<b>III</b>	<b>IV</b>	<b>III</b>	<b>III</b>
<b>Acreage of Assessed Aquatic Habitats within Easement (ac)</b>	<b>6.87<sup>3</sup></b>	<b>0.31<sup>3</sup></b>	<b>7.13</b>	<b>21.58</b>
<b>Functional Units (acreage x actual points) (fu)</b>	<b>34.35</b>	<b>0.59</b>	<b>43.49</b>	<b>94.95</b>
<b>Net Acreage Gain (ac)</b>	NA		<b>21.53</b>	
<b>Net Functional Unit Gain (fu)</b>	NA		<b>103.50</b>	

<sup>1</sup> Assessed using the 1999 MDT Montana Wetland Assessment Method (MWAM).

<sup>2</sup> Assessed using the 2008 MDT MWAM. The completed forms are in **Appendix B**.

<sup>3</sup> Outside of the recently expanded Lower Dry Fork Dam footprint.

Several problems with inlet/outlet structures were identified in June, and were for the most part repaired prior to site monitoring in July. Fencing and gate construction has also been completed, with a fifth smooth wire added to the existing four-strand fence in order to more effectively discourage use of the site by neighboring domestic goats.

Erosion along the eastern edges of all the wetland cells was observed and is minor at this stage of the project, but needs to be monitored in the future, specifically where the berms are relatively narrow between wetland cells. Until vegetation establishes along these edges, this may be a continuing issue. MDT is investigating the possibility salvaging bulrushes from an adjacent wetland near the site and planting the bulrush along the eroding edges of the wetland cells to speed up vegetative growth, damper wave action, and reduce erosion.

Approximately 3.5 acres of bare uplands were re-seeded (drill seeded) during fall 2008, including all haul roads and access points. Cell inlets / outlets were also re-seeded (broadcast seeded). Noxious weeds are present on the site; Canada thistle occurs mainly in small, scattered patches across the site and should be controlled. Whitetop is present in a large patch in the southwest corner of the site and should also be controlled.

## 2.10 Meriwether-East (Great Falls District, Year 3)

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 was designed to encompass approximately 2.67 acres (ac) and Site 2 was built near milepost 239 and designed to encompass 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 was anticipated that vegetation would be comprised of emergent wetland species.

At Site 1, no wetland or other aquatic habitat has yet developed. The goal at Site 2 has been achieved as 6.62 acres of wetland were present in 2008. Proper hydrology and a seed source from adjacent natural wetlands has been the key to driving the development and maintenance of this wetland habitat.

Site 2 continued to rate as a Category III wetland (**Table 16**). Notable functions and values included General Wildlife Habitat, Flood Attenuation, Short and Long Term Water Storage, Sediment / Nutrient / Toxicant Removal, Production / Export Food Chain Support, and Groundwater Discharge/Recharge. The functional assessment score increased by over three points from the 2007 score. This is a result of changes in the MWAM and better conditions for developing wetland habitat. Environmental conditions were much improved because Site 2 received more precipitation in spring and summer temperatures were lower.

**Table 16: Summary of 2008 wetland function/value ratings and functional points at Site 2 of the Meriwether-East Wetland Mitigation Site.**

Function and Value Parameters from the MDT Montana Wetland Assessment Method	2008 Site 2
Listed/Proposed T&E Species Habitat	Low (0.0)
MTNHP Species Habitat	Low (0.0)
General Wildlife Habitat	Mod (0.7)
General Fish/Aquatic Habitat	NA
Flood Attenuation	High (0.9)
Short and Long Term Surface Water Storage	High (0.9)
Sediment/Nutrient/Toxicant Removal	High (1.0)
Sediment/Shoreline Stabilization	NA
Production Export/Food Chain Support	High (0.8)
Groundwater Discharge/Recharge	Mod (0.7)
Uniqueness	Low (0.3)
Recreation/Education Potential	NA
<b>Actual Points / Possible Points</b>	<b>5.3 / 9.0</b>
<b>% of Possible Score Achieved</b>	<b>59%</b>
<b>Overall Category</b>	<b>III</b>
<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>35.1</b>

The dikes were surveyed for erosion problems in 2008. The dikes were covered evenly with erosion control fabric and no erosion problems were found. Plants have incrementally been colonizing the erosion control fabric. The two small sub-populations of Canada thistle should be sprayed with the appropriate herbicide before they flower in 2009.

### **2.11 Norem Ranch (Billings District, Year 5)**

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 private property. 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 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 2008, the approximate assignable wetland credit at the site is 10.06 acres or 68% of the goal, as outlined in **Table 17**. The wetland impact of 0.15 acre (due to berm construction) was subtracted from the 14.86 total, resulting in the 14.71-acre credit figure.

**Table 17: 2008 wetland credits and acreages for the Norem Ranch Wetland Mitigation Site.**

Wetland Mitigation Type	2008 Net Acre	Ratio	2008 Credit Acre	Target Credit Acre	Comments
Wetland Enhancement	6.98	3:1	2.32	2.32	Grazing removal, hydrological enhancement, and planting completed, with plants developing.
Wetland Creation	4.66	1:1	4.66	9.46	49% of the wetland creation area has been converted to wetlands.
Open Water Creation	1.58	1:1	1.58	1.58	100% of the intended open water has developed.
Buffer Zone Implementation	6.02	4:1	1.50	1.50	2008 net buffer area was assumed within easement.
Berm impact	--	--	---	-0.15	
<b>TOTAL</b>	<b>19.24</b>	<b>--</b>	<b>10.06</b>	<b>14.71</b>	<b>68% of goal</b>

Portions of the cottonwood community, adjacent to the river, have shifted from an upland understory to a wetland understory in 2008. It is likely that over time, more of the cottonwood community will shift to a wetland understory. Elevations at the proposed wetland creation area in the northwest corner of the site may be too high to achieve the desired wetlands in this area; this area will continue to be examined in subsequent monitoring years.

Functional assessment results are summarized in **Table 18** below. Pre-construction functional assessments were completed for the wetlands by Maxim in 2001 and results of that assessment are included in **Table 18**. The site rated as an overall Category II wetland and scores over 72 functional units. This represents an increase of approximately 39 units since 2001. Wildlife use, particularly migratory birds, will continue to increase with the expansion of the wetlands, open water features and the proliferation of the trees and shrubs.

All outflow structures were functioning and the fence around the wetland was intact. In the continued absence of wetland development in this area, elevations in the proposed wetland creation area in the northwest corner of the site could be checked to determine whether wetland creation is still feasible in this area.

During the 2008 monitoring very few leafy spurge plants were noted. These weed species had been sprayed and many were not viable at the time of the monitoring. Leafy spurge infestations are small and located along near around Pond 1 and in the cottonwoods in the southern portion of the project area. Canada thistle is still present, typically in the transition zones between wetlands and uplands. The landowner has diligently implemented biological, mechanical and chemical control and has significantly reduced the population of Canada thistle. Due to the difficulty in controlling this and leafy spurge, continued weed control measures are recommended.

**Table 18: Summary of 2001 (baseline) and 2008 wetland function/value ratings and functional points at the Norem Ranch Wetland Mitigation Project.**

Function and Value Parameters from the MDT Montana Wetland Assessment Method	2001 Baseline Assessment	2008 Post-construction
Listed/Proposed T&E Species Habitat	Low (0)	Low (0.0)
MTNHP Species Habitat	Low (0.1)	Mod (0.5)
General Wildlife Habitat	Moderate (0.5)	Exc (1.0)
General Fish/Aquatic Habitat	Low (0.1)	NA
Flood Attenuation	Moderate (0.5)	NA
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)	High (1.0)
Groundwater Discharge/Recharge	High (1.0)	High (1.0)
Uniqueness	Low (0.2)	Mod (0.4)
Recreation/Education Potential	Low (0.1)	Mod (0.1)
<b>Actual Points / Possible Points</b>	<b>4.8 / 11</b>	<b>5.5 / 8</b>
<b>% of Possible Score Achieved</b>	<b>50</b>	<b>69</b>
<b>Overall Category</b>	<b>III</b>	<b>II</b>
<b>Total Acreage of Assessed Wetlands within Easement</b>	<b>7.0</b>	<b>13.17</b>
<b>Functional Units (acreage x actual points)</b>	<b>33.6</b>	<b>72.43</b>
<b>Net Acreage Gain</b>	<b>NA</b>	<b>6.24</b>
<b>Net Functional Unit Gain</b>	<b>NA</b>	<b>39.18</b>

## 2.12 Perry Ranch (Great Falls District, Year 7)

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.

In general, the site appears to be developing as designed, subject to the limitations of dry and wet years. Approximately 22.4 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 2008 the site has netted about 19 wetland acres, or 79% of the project target.

As wetlands have developed within the oxbows and northern excavated area, so have their associated functions and values (**Table 19**). In 2008, the Inner Oxbow continued to rate as Category II site. Both scrub-shrub (willow) and emergent wetland habitats continue to develop within the Inner Oxbow. In 2008, the Outer Oxbow continued to rate as a Category II wetland, providing emergent wetland habitat. The Northern Excavated Area continued to rate as a Category III wetland, also providing emergent wetland habitat. The project has gained 120.26 functional units to date.

Several dike problems were noted during the 2002 summer visit, repaired during 2003, and have been stable into 2008. The Blackfeet Tribe and MDT have developed a weed plan for the Perry Ranch site. Bio-control was established for leafy spurge and Canada thistle and has been monitored through aerial photograph assessments and at three established Weed Photo Points. Leafy spurge is fairly apparent on the 2006, 2007, and 2008 aerial photographs as bright yellow-green patches.

**Table 19: Summary of baseline and 2008 wetland function/value ratings and functional points at the Perry Ranch Wetland Mitigation Project.**

Function and Value Parameters from the MDT Montana Wetland Assessment Method <sup>1</sup>	Pre-Construction (1997 method)		Post-construction (2008 method)		
	Inner Oxbow	Outer Oxbow	2008 Inner Oxbow	2008 Outer Oxbow	2008 Northern Excavated Area
Listed/Proposed TE Species Habitat	Low (0.1)	Low (0.1)	Low (0.1)	Low (0.1)	Low (0.1)
MTNHP Species Habitat	None (0.0)	None (0.0)	High (1.0)	High (0.8)	Mod (0.8)
General Wildlife Habitat	Mod (0.4)	Low (0.1)	High (0.9)	High (0.9)	Mod (0.7)
General Fish/Aquatic Habitat	NA	NA	NA	NA	NA
Flood Attenuation	Mod (0.5)	Low (0.2)	High (0.9)	Mod (0.6)	Mod (0.6)
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)	Mod (0.7)
Sediment/Shoreline Stabilization	NA	NA	NA	NA	NA
Production Export/Food Chain Support	Mod (0.7)	Mod (0.6)	Mod (0.6)	Mod (0.6)	Mod (0.4)
Groundwater Discharge/Recharge	High (1.0)	Low (0.1)	Mod (0.7)	Mod (0.7)	Mod (0.7)
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)	Low (0.05)	Low (0.05)	Low (0.05)
<b>Actual Points / Possible Points</b>	<b>4.4 / 10</b>	<b>2.7 / 10</b>	<b>6.55 / 9</b>	<b>6.05 / 9</b>	<b>5.35 / 9</b>
<b>% of Possible Score Achieved</b>	<b>44%</b>	<b>27%</b>	<b>73%</b>	<b>67%</b>	<b>59%</b>
<b>Overall Category</b>	<b>III</b>	<b>IV</b>	<b>II</b>	<b>II</b>	<b>III</b>
<b>Total Acreage of Assessed Wetlands and Other Aquatic Habitats within Site Boundaries (ac)</b>	<b>2.30</b>	<b>1.10</b>	<b>5.20</b>	<b>10.39</b>	<b>6.81</b>
<b>Functional Units (acreage x actual points)</b>	<b>10.12</b>	<b>2.97</b>	<b>34.06</b>	<b>62.86</b>	<b>36.43</b>
<b>Net Acreage Gain (ac)</b>	<b>NA</b>	<b>NA</b>	5.20 – 2.30 = <b>2.90</b>	10.39 – 1.10 = <b>9.29</b>	6.81 – 0.00 = <b>6.81</b>
<b>Net Functional Unit Gain (fu)</b>	<b>NA</b>	<b>NA</b>	34.06-10.12 = <b>23.94</b>	62.86 – 2.97 = <b>59.89</b>	36.43 – 0.00 = <b>36.43</b>
<b>Total Functional Unit Gain</b>	<b>120.26</b>				

### 2.13 Peterson Ranch (Missoula District, Year 7)

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.

In the past, large excavated (proposed) wetland cells west of the main ditch bisecting the property did 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 past site visits. Due to implementation of “normal” irrigation practices, large excavated (proposed) wetland cells west of the main drainage bisecting the property appeared to be receiving water during 2008 as originally intended for the first time since monitoring commencement.

In 2008, approximately 21.54 acres of wetland and 1.08 acres of open water were mapped on the mitigation site, for a total of 22.62 acres of aquatic habitat. Subtracting the original 22.60 acres of pre-project wetlands from this total yields a current net of approximately 0.2 wetland/open water acres. Additional acreage may form with additional time, more normal precipitation and continued increase in hydrology levels within excavated wetlands 1 and 2.

The Peterson Ranch was separated into three AAs for purposes of functional assessment. These areas included the created excavation # 1, 2, and associated emergent wet meadow west of the main drainage (AA 1), scrub-shrub/emergent wetlands along the main drainage (AA 2), and the created wetland OW/ponds #3, 4 and 5 with associated emergent vegetation east of the main drainage (AA 3). A complete breakdown of ratings for each assessment area and pre-project AAs are presented in **Table 20** below.

**Table 20: Summary of 1998 (baseline) and 2008 wetland function/value ratings and functional points at the Peterson Ranch Wetland Mitigation Project.**

Function and Value Parameters from the MDT Montana Wetland Assessment Method	Evaluation Year/Assessment Area			
	1998 Baseline <sup>a</sup>	2008 AA 1	2008 AA 2	2008 AA 3
Listed/Proposed T&E Species Habitat	Low (0.3)	Low (0.0)	Low (0.0)	Low (0.0)
MTNHP Species Habitat	Low (0.1)	Low (0.1)	Mod (0.6)	Mod (0.6)
General Wildlife Habitat	Low (0.1)	Mod (0.5)	Mod (0.7)	Mod (0.7)
General Fish/Aquatic Habitat	NA	NA	NA	NA
Flood Attenuation	NA	Mod (0.6)	High (0.9)	Mod (0.6)
Short and Long Term Surface Water Storage	High (1.0)	High (1.0)	High (0.8)	High (1.0)
Sediment, Nutrient, Toxicant Removal	Mod (0.5)	Mod (0.7)	High (0.9)	High (1.0)
Sediment/Shoreline Stabilization	NA	Low (0.3)	High (1.0)	High (1.0)
Production Export/Food Chain Support	Mod (0.7)	Mod (0.6)	Mod (0.7)	Mod (0.6)
Groundwater Discharge/ Recharge	UNK	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)	NA	NA	NA
<b>Actual Points / Possible Points</b>	<b>3.0 / 8</b>	<b>5.0 / 10</b>	<b>6.9 / 10</b>	<b>6.8 / 10</b>
<b>% Of Possible Score Achieved</b>	<b>38%</b>	<b>50%</b>	<b>69%</b>	<b>68%</b>
<b>Overall Category</b>	<b>III</b> (borderline IV)	<b>III</b>	<b>II</b>	<b>II</b>
<b>Total Acreage of Assessed Wetlands and Open Water within Easement by AA</b>	<b>22.60</b>	<b>6.27</b>	<b>3.00</b>	<b>13.35</b>
<b>Functional Units by AA</b> (acreage x actual points)	<b>67.80</b>	<b>31.35</b>	<b>20.70</b>	<b>90.78</b>
<b>Total Acreage of Assessed Wetlands and Open Water on Site</b>	<b>22.60</b>	<b>22.62</b>		
<b>Total Functional Units on Site</b>	<b>67.80</b>	<b>142.83</b>		
<b>Net Acreage Gain</b> (assessed wetlands and open water only)	NA	<b>0.20</b>		
<b>Net Functional Unit Gain</b>	NA	<b>54.97</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 2008 MDT assessment method, which was applied during 2008 monitoring. Thus, direct comparison of pre- and post-project functions is not possible, although some general trends can be noted.

Ratings in 2008 were slightly higher than those derived in 2007 using the 1999 MDT MWAM methods. The wetlands on the Peterson Ranch mitigation site are currently rated as Category II (AA 2 and 3) and III (AA 1) (moderate value). Based on functional assessment results, approximately 142.83 functional units occur at the Peterson Ranch mitigation site as of 2008.

Woody species survival data were collected for the Peterson Ranch. Plantings were difficult to find during the 2004-2008 monitoring due to extensive herbaceous cover of upland grass species and browse by livestock. The area including excavated wetlands # 1 & 2 west of the main drainage bisecting the site 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/depressions # 3, 4 & 5 showed the best survival with higher rates. OW/depression # 3 had the majority of the willows that showed vigorous growth and spread.

Several noxious weeds are present including Canada thistle, hound's tongue, musk thistle, oxeye daisy, and spotted knapweed. These generally consist of scattered individuals with moderate coverage. Treatment was not evident during monitoring, but may have been conducted subsequent to monitoring. 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.

Continued irrigation is recommended to promote additional wetland development. Much of the inundated areas within the excavated wetlands 1 and 2 remained as an upland vegetation community. Conversion from upland to wetland will most-likely continue, if the surface inundation and increased hydrology levels are present. A livestock grazing plan that limits cattle access to the developing wetlands with the excavated wetland 1 and 2 should be developed that minimizes grazing to the appropriate times of the season such early summer and fall.

#### **2.14 Rock Creek Ranch (Glendive District, Year 4)**

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.

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 a minor 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 83.82 acres of wetlands were delineated on the mitigation site in 2008. Approximately 1.08 acres of wetlands occurred on the site prior to project implementation. Consequently, the net aquatic habitat created / restored to date is  $83.82 - 1.08 = 82.74$  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 2008, the maximum assignable credit at the Rock Creek Ranch mitigation site is  $82.74 + 0.36 + 0.9 = 84$  acres, or 168% of the initial 50-acre goal. Additional wetland communities are likely to form and stabilize with consistent inundation from year to year

Cottonwood (40 cubic-inch) and three willow species (30 cubic-inch and one-gallon) were planted at the site in 2007. Estimated percent survival in 2008 was <1%. Plantings were installed in spring 2007 during what would normally have been peak inundation. However, peak inundation was achieved later in 2007 due to plentiful early summer precipitation. Mortality was likely due to longer and deeper inundation conditions than were anticipated during early 2007, coupled with substantive wildlife browse, and drawdown during July 2007; the effects of which were brought to bear in 2008. Vexar plant protection netting was missing in most cases; likely removed by deer. Due to the precipitation-dependent variable inundation regime (as learned over the past 4 years), the flatness of the site (resulting in substantive inundation extent variability from small changes in precipitation), and extensive deer use (and browse) of the area, shrub establishment is unlikely to succeed at this site over the short term. This is also exemplified by the lack of persistent shrub volunteers both onsite and at adjacent wetlands (with the exception of the excavated highway ditch, which has a constant water source).

Functional assessment results are summarized in **Table 21**. For comparative purposes, the functional assessment results for baseline conditions are also included in **Table 21**. The site currently rates as a Category II wetland, a substantial improvement over baseline Category IV ratings. More significantly, the site has gained almost 459 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.

**Table 21: Summary of 2003 and 2008 wetland function/value ratings and functional points at the Rock Creek Ranch Wetland Mitigation Project.**

Function and Value Parameters from the MDT Montana Wetland Assessment Method	Wetland Numbers		
	Pre-Project Wetland Ditches (2003)	Pre-Project Isolated Wetland Patches (2003)	Post-Project 2008
Listed/Proposed T&E Species Habitat	Low (0.3)	Low (0.0)	Low (0.1)
MTNHP Species Habitat	Low (0.1)	Low (0.1)	High (1.0)
General Wildlife Habitat	Low (0.3)	Low (0.1)	High (0.9)
General Fish/Aquatic Habitat	NA	NA	NA
Flood Attenuation	Low (0.2)	NA	NA
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)	High (1.0)
Groundwater Discharge/Recharge	Low (0.1)	Low (0.1)	Low (0.1)
Uniqueness	Low (0.1)	Low (0.1)	Mod (0.4)
Recreation/Education Potential	Low (0.1)	Low (0.1)	Mod (0.1)
<b>Actual Points / Possible Points</b>	<b>2.3 / 11</b>	<b>1.5 / 9</b>	<b>5.5 / 8</b>
<b>% of Possible Score Achieved</b>	<b>21</b>	<b>17</b>	<b>69</b>
<b>Overall Category</b>	<b>IV</b>	<b>IV</b>	<b>II</b>
<b>Total Acreage of Assessed Wetlands within Easement (ac)</b>	<b>0.77</b>	<b>0.31</b>	<b>83.82</b>
<b>Functional Units (acreage x actual points) (fu)</b>	<b>1.77</b>	<b>0.47</b>	<b>461.01</b>
<b>Net Acreage Gain (ac)</b>	NA	NA	<b>82.74</b>
<b>Net Functional Unit Gain (fu)</b>	NA	NA	<b>459.24</b>

All dikes were in good condition during the spring, mid-season, and fall visits with no indications of seepage observed during 2008. A small patch of Canada thistle, a State-listed noxious weed, was observed in the southeast corner of the site and should be treated to prevent further spread.

### **2.15 Roundup (Billings District, Year 8)**

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, 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 and the U.S. Environmental Protection Agency 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 found to be slightly higher in 2008 than those measured during the 2007 sampling event in all five wells, indicating a return to similar levels found during prior sampling events. Field parameters also varied in 2008 from previous sample years. Field measurements of water temperature and pH both decreased slightly while electrical conductivity values increased notably among all sampling locations in 2008. Dissolved oxygen levels decreased little from previous years with the exception of Well #1, which jumped 6.1 mg/L from 2007. Ferrous iron concentrations in 2008 decreased sharply from 2007 levels in the three wells that exhibited significant values in that year. Nutrient concentrations were reported at decreased concentrations in all wells when compared to 2007 results. As was the case in all other sampling

years, the concentration of nitrate + nitrite nitrogen in Well #1 exceeded the human health standard of 10 mg/L for groundwater during 2008, with a concentration of 15.6 mg/L, but decreased from 2007 levels (16.1 mg/L).

The 2008 delineation resulted in a total of 20.88 acres of gross wetland acreage, a decrease of 0.19 acre since 2007. The decrease in the 2008 gross wetland acreage is the result of an increase in upland non-noxious weed cover. Of the 20.88 acres, a total of 8.85 acres were shallow, open water (<4 feet deep) in the north lagoon and shallow inundation (< 6 inches) in the south lagoon.

The site rated as an overall Category II wetland and scores 123 Functional Units (**Table 22**). The decrease of 14 FU since 2007 is primarily the result of slight wetland decrease and use of the 2008 functional assessment. Values with the highest functional points include: general wildlife habitat, short and long term surface water storage, sediment / nutrient / toxicant removal, and production export / food chain support.

All dikes and inlet structures were functioning satisfactorily. All bird boxes are in good condition. To determine if there is a soil nutrient imbalance, several composite and individual soil samples could be gathered and analyzed, and a soil augmentation management plan could be formulated depending on specific parameter results. Weed management is recommended.

**Table 22: Summary of 2001 and 2008 wetland function/value ratings and functional points at the Roundup Wetland Mitigation Project.**

Function and Value Parameters from the MDT Montana Wetland Assessment Method	2001	2008
Listed/Proposed T&E Species Habitat	Low (0.0)	Low (0.0)
MTNHP Species Habitat	Low (0.0)	Low (0.2)
General Wildlife Habitat	Low (0.3)	High (0.9)
General Fish/Aquatic Habitat	NA	NA
Flood Attenuation	High (1.0)	Mod (0.5)
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	Low (0.3)
Production Export/Food Chain Support	Mod. (0.6)	High (0.8)
Groundwater Discharge/Recharge	Low (0.1)	High (1.0)
Uniqueness	Low (0.2)	Low (0.3)
Recreation/Education Potential	Low (0.2)	High (0.2)
<b>Actual Points / Possible Points</b>	<b>3.9 / 10</b>	<b>5.9 / 10</b>
<b>% of Possible Score Achieved</b>	<b>39%</b>	<b>59%</b>
<b>Overall Category</b>	<b>III</b>	<b>II</b>
<b>Total Acreage of Assessed Wetlands within Easement</b>	<b>18.51</b>	<b>20.88</b>
<b>Functional Units (acreage x actual points)</b>	<b>72.21</b>	<b>123.19</b>
<b>Net Acreage Gain</b>	<b>18.51</b>	<b>20.88</b>
<b>Net Functional Unit Gain</b>	<b>72.21</b>	<b>123.19</b>

## 2.16 Selkirk Ranch (Billings District, Year 2)

The Selkirk wetland mitigation site is located in Wheatland County, Montana, near the community of Two Dot, northeast quarter of Section 9, Township 8 North, Range 12 East. Elevation is approximately 4,640 feet above sea level.

The Selkirk mitigation site was constructed by a private party on private land during the winter of 2006/2007, with the intent of providing MDT wetland mitigation credits (via a credit purchase agreement) prior to Highway 12 road construction in Wheatland County (Watershed #10). The wetland site is intended to provide 60.4 acres of mitigation credit (after subtracting 0.4 acre of wetland fill) and a total of 71.5 wetland acres comprised of herbaceous wet meadow wetland (60.1 acres), scrub/shrub wetland (10.0 acres) and open water (1.4 acres). Upland buffer (2.9 acres) along portions of the wetland circumference, when added to the wetland acreage, comprise a 74.4-acre wetland reserve easement.

Four different crediting areas were developed, each with their own specific performance standards and mitigation ratios. Credit ratios vary from 1:1 to 5:1 for the four types of mitigation: rehabilitation, 1.5:1; re-establishment and creation, 1:1; enhancement, 3:1; and, upland buffer, 5:1. Final ratios will be determined by the COE and will be based on the achievement of performance standards.

In 2008, the wetland delineation boundary includes 67.22 wetland acres, of which 66.21 acres is comprised of herbaceous wet meadow and 1.01 acres of open water. Approximate wetland acreages within the various mitigation credit zones were estimated using digitized site plans and the 2008 wetland delineation boundary. These include 1.0 acre in the enhancement credit zone, 34.23 acres in the re-establishment/creation credit zone, and 31.99 acres in the rehabilitation credit zone. In general, most of the wetland performance criteria have been met for each mitigation credit area, with two major exceptions:

- 1) creeping foxtail comprises > 10% aerial coverage within all credit areas, and
- 2) planted woody plant survival in the re-establishment/creation and rehabilitation credit areas was likely less than 50% in 2008. A mitigation credit acreage summary is included in **Table 23**.

Functional assessment results are presented in **Table 24**. For comparative purposes, the functional assessment results for baseline conditions prepared by Oasis Environmental in 2006 are also included in **Table 24**. All mitigation credit areas, excluding upland buffer, were classified as Category II wetlands in 2008 (**Table 24**).

The property owner sprayed creeping foxtail within the southern portion of the wetland and adjacent to the small ponds on the east side. Weeds along the berms and drier areas were also sprayed. The spraying program will continue each year.



**Table 23: 2007-2008 developing wetland and upland mitigation acreage for the Selkirk Wetland Mitigation Reserve.**

CREDIT ZONE	CREDIT CATEGORY	DEVELOPED ACREAGE			CREDIT RATIO <sup>a</sup>	INTERIM MAXIMUM CREDIT ACREAGE <sup>a,b</sup>
		Maximum Target	2007	2008		
1	Re-establishment / Creation	38.6	32.9	34.23	1:1	34.23
2	Rehabilitation	31.9	31.9	31.99	1.5:1	21.32
3	Enhancement	1.0	1.0	1.0	3:1	0.33
<b>Total Wetland Acreage</b>		<b>71.5</b>	<b>65.8</b>	<b>67.22</b>	--	<b>55.88</b>
4	Upland Buffer	2.9	1.7	1.74	5:1	0.35
<b>TOTAL ACREAGE</b>		<b>74.4</b>	<b>67.5</b>	<b>68.96</b>	--	<b>56.23</b>

<sup>a</sup>The Corps of Engineers is the regulatory authority and will determine the actual mitigation ratios and interim and/or final credits as they pertain to the success criteria.

<sup>b</sup>Not all conditions in the success criteria have been fulfilled, therefore final credits have not been calculated. Crediting is at discretion of COE and MDT.

**Table 24: Summary of 2006<sup>1</sup> and 2008 wetland function/value ratings and functional points at the Selkirk Wetland Mitigation Reserve.**

Function and Value Parameters from the MDT Montana Wetland Assessment Method	Re-Establishment & Creation <sup>2</sup> 2008	Rehabilitation		Enhancement	
		2006	2008	2006	2008
Listed/Proposed T&E Species Habitat	Low (0.0)	Low (0.0)	Low (0.0)	Low (0.0)	Low (0.0)
MNHP Species Habitat	Mod (0.7)	Low (0.0)	Mod (0.7)	Low (0.0)	Mod (0.7)
General Wildlife Habitat	Exc. (1.0)	Low (0.3)	Exc. (1.0)	Mod (0.5)	High (0.9)
General Fish/Aquatic Habitat	NA	NA	NA	NA	NA
Flood Attenuation	Mod. (0.5)	NA	Mod (0.5)	NA	Low (0.2)
Short and Long Term Surface Water Storage	High (1.0)	Low (0.3)	High (1.0)	Low (0.2)	Mod (0.4)
Sediment, Nutrient, Toxicant Removal	High (1.0)	Mod (0.6)	High (1.0)	High (0.9)	High (1.0)
Sediment/Shoreline Stabilization	High (1.0)	NA	High (1.0)	NA	High (1.0)
Production Export/Food Chain Support	High (0.8)	Mod (0.7)	High (0.8)	Mod (0.6)	High (0.8)
Groundwater Discharge/Recharge	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)
Uniqueness	Mod (0.4)	Low (0.1)	Mod (0.4)	Low (0.3)	Mod (0.4)
Recreation/Education Potential	High (1.0)	Low (0.1)	High (1.0)	Low (0.1)	High (1.0)
Actual Points/Possible Points	8.4 / 11	3.1 / 9	8.4 / 11	3.6 / 9	7.4 / 11
% of Possible Score Achieved	76%	34%	76%	43%	67%
Overall Category	II	III	II	III	II
<b>Total Acreage of Assessed Aquatic Habitat within AA Boundaries</b>	<b>34.23</b>	<b>31.9</b>	<b>31.99</b>	<b>1.0</b>	<b>1.00</b>
<b>Functional Units (acreage x actual points)</b>	<b>272.41</b>	<b>98.9</b>	<b>268.72</b>	<b>3.6</b>	<b>7.4</b>
<b>Net Acreage Gain</b>	<b>34.23</b>	NA	NA	NA	<b>0</b>
<b>Net Functional Unit Gain</b>	<b>272.41</b>	NA	<b>169.82</b>	NA	<b>3.8</b>

<sup>1</sup> Baseline data provided by Oasis (2006a).

<sup>2</sup> Area an upland prior to construction; no functional assessment conducted for this area in 2006.

## 2.17 Sportsman's Campground (Butte District, Year 1)

The Sportsman's Campground wetland mitigation project was constructed in 2007 by MDT. The purpose of the project is to create approximately 15.6 acres of palustrine emergent, scrub/shrub, and aquatic bed wetland habitat to serve as compensatory wetland mitigation for MDT's Sportsman's Campground East and Dickie Bridge – Wise River reconstruction projects. Wetland impacts associated with these two projects total 14.36 acres, with an additional impact of 0.18 acre expected to existing wetlands at the mitigation site during construction of the mitigation project.

This project is located on public land (MDT-owned) adjacent to Montana State Highway 43 (P-46), approximately 13 miles west of Wise River, Montana. The 27.2-acre project site was utilized by MDT for gravel mining, equipment storage, and gravel stockpiling prior to being converted to a wetland mitigation site in 2007. Gravel was mined from the site for use in the Sportsman's Campground East highway reconstruction project, leaving a pit approximately 19.2 acres in size. The mitigation area is hydrologically connected via groundwater to the nearby Big Hole River (located immediately south of Highway 43). Additional seasonal groundwater recharge occurs at the site as a result of snowmelt from the nearby Pintlar Mountain Range to the north.

The gravel pit was excavated to varying depths so as to provide a range of inundation within developing wetlands including areas of permanent, semi-permanent, and seasonal inundation. Four small islands were also included as part of the design. Prior to project implementation, wetland habitat existed in two areas within the project site, both as a result of past gravel mining in this area. A 1.62 acre open water pond with an emergent / scrub-shrub fringe occurs in the north central portion of the project, while a 0.35 acre emergent marsh wetland occurs immediately south of the pond area. Target wetland communities to be produced across the site included open water/aquatic bed, scrub/shrub, and shallow marsh/wet meadow.

As of 2008, the site has developed 4.81 acres of Class II wetland, 3.48 acres of transitional area (transitioning to wetland), 3.84 acres of transitional open water, and 0.85 acre of mudflat for a total of 12.98 acres of aquatic habitat. When added to the 0.66 acre of pre-existing wetland and 1.31 acres of pre-existing open water, there is a total of 14.95 acres of aquatic habitat within monitoring limits.

After year 1 of monitoring, the mitigation site is 2.62 acres of created aquatic habitat short of the anticipated goal of 15.6 acres and 1.38 acres short of the amount necessary to cover the 14.36 acres of impact. However, an additional approximate 2 acres of aquatic habitat is possible at the site should the area currently identified as cobble/gravel (1.23 acres) and the fringe areas around the four ponds eventually develop into wetland. With an additional 2.0 acres of aquatic habitat possible, the mitigation site has the potential to support 14.98 acres of created aquatic habitat which is less than originally anticipated, but enough to cover the 14.36 acres of highway construction related impacts at a ratio of 1:1.

MDT project files indicate that wetlands occurring within proposed disturbance boundaries prior to construction rated as Category IV using the MDT 1999 MDT Montana Wetland Assessment

Method. Assessment forms for this evaluation are not available. In 2008, the Sportsman’s Campground Wetland Mitigation Site rated as a Category II wetland because it achieved a high wildlife habitat rating (**Table 25**). The site also rated high for short and long term surface water storage, production export/food chain support, and groundwater discharge/recharge (**Table 25**).

One small infestation of spotted knapweed was identified and should be treated. Results of wetland seeding were mixed in 2008, with some areas developing well while others did not. It is recommended that additional seeding be considered following the 2009 monitoring season should the mudflat and transitional areas not show significant herbaceous species establishment following the 2009 growing season. Areas identified as cobble/gravel will likely need to be covered with topsoil before desired vegetation becomes established in these areas. A minimum of 4 inches of topsoil in these areas is recommended.

**Table 25: Summary of 2008 wetland function/value ratings and functional points at the Sportsman’s Campground Wetland Mitigation Site.**

Function and Value Parameters from the MDT Montana Wetland Assessment Method	2008
Listed/Proposed T&E Species Habitat	Low (0.00)
MTNHP Species Habitat	Low (0.10)
General Wildlife Habitat	High (0.90)
General Fish/Aquatic Habitat	NA
Flood Attenuation	NA
Short and Long Term Surface Water Storage	High (0.90)
Sediment/Nutrient/Toxicant Removal	Mod (0.70)
Sediment/Shoreline Stabilization	NA
Production Export/Food Chain Support	High (0.80)
Groundwater Discharge/Recharge	High (1.00)
Uniqueness	Mod (0.40)
Recreation/Education Potential	High (0.20)
<b>Actual Points / Possible Points</b>	<b>5.0 / 8</b>
<b>% of Possible Score Achieved</b>	<b>63%</b>
<b>Overall Category</b>	<b>II</b>
<b>Total Acreage of Assessed Wetlands and Other Aquatic Habitats within Site Boundaries</b>	<b>14.95</b>
<b>Functional Units (acreage x actual points)</b>	<b>74.8</b>

### 2.18 US Highway 93 Onsite (Missoula District, Years 1 and 2)

The US Highway 93 Onsite Wetland Mitigation Sites were developed to mitigate wetland impacts associated with eight MDT segments of the US 93 Evaro to Polson highway reconstruction project along US Highway 93. This report documents the second year of monitoring at three of the four sites monitored in 2008: Bouchard, Jocko River Bridge, and Jocko Spring Creek property. The Peterson property was monitored for the first time in 2008.

The US Highway 93 Onsite Wetland Mitigation Sites are all located in Lake County in Watershed # 3 (Lower Clark Fork). The four mitigation sites are located north of Arlee, Montana between Mileposts 20 and 35. The Jocko River Bridge site is located just south of Milepost 20 and within the segment referenced as Project 3 - North of Arlee-White Coyote Road.

The Bouchard and Jocko Spring Creek sites are located between Mileposts 20 and 25, along a segment identified as Project 4 - White Coyote Road-South of Ravalli. The Peterson site is located north of St. Ignatius near Milepost 35, along a segment identified as Project 6 – Medicine Tree (Old US 93)-vicinity Red Horn Road.

2.18.1 Bouchard Property – Year 2

The Bouchard Property mitigation site is a 40-acre parcel adjacent to US 93 at approximately Milepost 20.5. The Bouchard Property is located in Township 17N, Range 20W, Section 26. The site occurs east of US Highway 93, between the highway and Spring Creek. Spring Creek runs along the east side of the parcel boundary and historically provided a major source of surface water to the Bouchard property. The parcel previously included an abandoned home site, fish rearing ponds, and a system of drainage ditches and berms used to control water flow on the property. The site is near the headwaters of Jocko Spring Creek and has a high water table that inundates a large portion of the site. Proposed mitigation actions included the following:

- Plug drainage ditches and remove berms adjacent to the existing fish ponds;
- Excavate topography in the southeast corner of the property to lower elevation to that of adjacent wetlands; and
- Create forested, scrub-shrub and emergent wetland vegetation types with installation of native plant species in the excavated cells.

The target wetland community types include forested and scrub-shrub, dominated by a smaller cover area of quaking aspen / red osier dogwood habitat, and larger coverage of Bebb's willow and bog birch / beaked sedge communities. Initial construction was completed in summer 2006, and revegetation with herbaceous plants and shrubs was completed in August-October 2006.

As of 2008, approximately 28.53 aquatic habitat acres (28.14 acres of wetlands, 0.39 acre of shallow open water) occur on the mitigation site. Pre-project wetland delineation documented 19.03 acres of wetlands / open water. The initially-calculated net increase in aquatic habitat acres to date is approximately 28.53 – 19.03 = 9.50 acres. **Table 26** lists the current credits based on COE and CSKT credit ratios, including this year’s calculated ratio for the rehabilitation areas at the Bouchard Property site. The site is progressing toward reaching the expected credits. The site currently provides slightly less than the expected creation credit acres, but is exceeding expectations in the remaining categories and as a whole, and is predicted to continue gaining in functional points and credit acreage as the wetlands continue to develop.

**Table 26. Current credits at the Bouchard Property Mitigation Site.**

Targeted Mitigation Type	Current Wetlands (Acre)	Credit Ratio		Current Credit (Acre)		Expected Credit (Acre)	
		COE	CSKT	COE	CSKT	COE	CSKT
Creation	4.79	1:1	3.36:1	4.79	1.43	5.16	1.54
Re-establishment / primary restoration	4.71 <sup>1</sup>	1:1	1.86:1	4.71	2.53	2.94	1.58
Rehabilitation / secondary restoration	19.03	2.86:1	1.86:1	6.65	10.23	4.05	10.23
<b>Total</b>	<b>28.53</b>			<b>16.15</b>	<b>14.19</b>	<b>12.15</b>	<b>13.35</b>

<sup>1</sup> Includes wetlands delineated outside of targeted creation, re-establishment, and rehabilitation areas and assumed to have been re-established by project implementation.

Functional assessment results are presented in **Table 27**. For comparative purposes, the functional assessment results for baseline conditions are also included.

**Table 27: Summary of baseline and 2008 wetland function/value ratings and functional points at the Bouchard Wetland Mitigation Project.**

Function and Value Parameters from the MDT Montana Wetland Assessment Method	Baseline (AA-1) <sup>1</sup>	2008 (AA-1) <sup>2</sup>
Listed/Proposed T&E Species Habitat	Low (0.3)	Low (0.3)
MTNHP Species Habitat	Low (0.1)	Low (0.1)
General Wildlife Habitat	High (0.8)	High (0.9)
General Fish/Aquatic Habitat	NA	NA
Flood Attenuation	NA	NA
Short and Long Term Surface Water Storage	High (0.8)	High (0.9)
Sediment/Nutrient/Toxicant Removal	NA	High (1.0)
Sediment/Shoreline Stabilization	NA	NA
Production Export/Food Chain Support	High (0.9)	High (0.9)
Groundwater Discharge/Recharge	High (1.0)	High (1.0)
Uniqueness	Mod (0.6)	Mod (0.6)
Recreation/Education Potential	Low (0.1)	Mod (0.5)
<b>Actual Points / Possible Points</b>	<b>4.6 / 8</b>	<b>6.2 / 8</b>
<b>% of Possible Score Achieved</b>	<b>56%</b>	<b>78%</b>
<b>Overall Category</b>	<b>III</b>	<b>II</b>
<b>Total Acreage of Assessed Wetlands and Open Water within Easement (ac)</b>	<b>19.03</b>	<b>28.53</b>
<b>Total Functional Units (acreage x actual points) (fu)</b>	<b>87.54</b>	<b>176.89</b>
<b>Net Acreage Gain (ac)</b>	<b>NA</b>	<b>9.5</b>
<b>Net Functional Unit Gain (fu)</b>	<b>NA</b>	<b>89.35</b>

<sup>1</sup>The baseline assessment was performed by Herrera Environmental Consultants using the 1999 MDT Montana Wetland Assessment Method (MWAM).

<sup>2</sup>The post-project functional assessment was performed by PBS&J during 2008 using the 1999 MDT MWAM because the mitigation crediting systems require direct comparisons of pre- and post-project functions.

Overall survival ratings of planted woody species are considered moderate to high based on visual assessment. Plant growth was vigorous and looked healthy with few discolored leaves. Browse protection was intact and properly functioning.

Several Category 1 noxious weeds were present with low to high cover values: Canada thistle, hound's-tongue, oxeye daisy, St. John's wort, and spotted knapweed. Noxious weeds should be controlled in accordance with the *Noxious Weed Management Guidelines, Species and Control Methods for US 93 Evaro to Polson Wetland Mitigation Sites* contained in the mitigation plan.



2.18.2 Jocko River Bridge – Year 2

The Jocko River Bridge mitigation site is approximately one acre in size, and occurs west of the new Jocko River Bridge and adjacent to the south side of the Jocko River within the 2-year flood zone. The site is south of milepost 19 in Township 16N, Range 20W, Section 2. Jocko Spring Brook flows along and through the western edge of this site. Flows from the Jocko River and Jocko Spring Brook serve as the primary hydrology sources for the site. No increase in wetland acreage was planned for this site; rather, an enhancement of existing degraded wetland and riparian area with native plantings is proposed. Objectives included the following:

- Removing livestock (part of this riparian wetland was previously a leased horse pasture); and
- Planting of trees and shrubs to enhance the existing wetlands and riparian areas.

The targeted wetland community type at this site is a scrub-shrub / emergent vegetation type, supporting Drummond willow/beaked sedge habitat type. Revegetation work at this site was completed in October 2006.

As of 2008, approximately 0.19 wetland acre occurs on the mitigation site. During 2007 monitoring, 0.43 acre of wetlands was recorded at the site. The calculated net decrease in aquatic habitat acres to date is approximately  $0.42 - 0.19 = 0.23$  acre. **Table 28** lists the current credits based on COE and CSKT credit ratios including this year’s calculated ratio for the rehabilitation areas at the Jocko River Bridge site. The enhancement ratio was calculated as negative value (due, in part, to differing pre- and post-project functional assessment AAs), and therefore cannot be applied as a credit ratio. However, even if the pre- and post-project AAs were identical, it is likely that no gain (or possibly even a loss) in the functional points would have been recognized as of 2008 due to the impact of horse grazing on the site. The site is not progressing toward reaching the expected credits and currently is receiving no Corps credits based on the calculations. Current credit acres are below the expected credit acres.

**Table 28: Current credits at the Jocko River Bridge Mitigation Site.**

Targeted Mitigation Type	Current Wetland (Acre)	Credit Ratio		Current Credit (Acre)		Expected Credit (Acre)	
		COE	CSKT	COE	CSKT	COE	CSKT
Enhancement / secondary restoration	0.19	0:1	1.86:1	0.0	0.10	0.33	0.54
<b>TOTAL</b>	<b>0.19</b>			<b>0.0</b>	<b>0.10</b>	<b>0.33</b>	<b>0.54</b>

Functional assessment results are presented in **Table 29**. The Jocko River Bridge site was assessed as one area (AA-1) for the purpose of functional assessment, and is currently rated as a Category III site. Based on functional assessment results (**Table 29**), approximately 0.99 functional units occur at the Jocko River Bridge site.

Baseline functional assessment results are provided in **Table 29**, but it should be noted that no calculated pre-project wetland area was available for comparison of functional gain. In addition, the pre-project functional assessment AA included several areas along the greater Jocko River corridor on either side of the highway, and

the river itself, which were not included in the 2008 AA. The pre-project functional assessment score was therefore significantly inflated compared to the post-project assessment completed in 2008, and direct comparison of the two assessments is not practical.

**Table 29: Summary of baseline and 2008 wetland function/value ratings and functional points at the Jocko River Bridge Wetland Mitigation Project.**

Function and Value Parameters from the MDT Montana Wetland Assessment Method	Baseline <sup>1</sup>	2008 (AA-1) <sup>2</sup>
Listed/Proposed T&E Species Habitat	High (1.0)	Low (0.3)
MTNHP Species Habitat	Mod (0.7)	Low (0.1)
General Wildlife Habitat	Mod (0.5)	Mod (0.5)
General Fish/Aquatic Habitat	High (0.9)	NA
Flood Attenuation	Low (0.2)	Low (0.1)
Short and Long Term Surface Water Storage	High (0.8)	Mod (0.4)
Sediment/Nutrient/Toxicant Removal	High (0.9)	High (0.9)
Sediment/Shoreline Stabilization	High (1)	High (1.0)
Production Export/Food Chain Support	High (0.9)	Mod (0.6)
Groundwater Discharge/Recharge	High (1)	High (1.0)
Uniqueness	Mod (0.4)	Low (0.2)
Recreation/Education Potential	High (1)	Low (0.1)
<b>Actual Points / Possible Points</b>	<b>9.3 / 12</b>	<b>5.2 / 11</b>
<b>% of Possible Score Achieved</b>	<b>78%</b>	<b>47%</b>
<b>Overall Category</b>	<b>III</b>	<b>III</b>
<b>Total Acreage of Assessed Wetlands and Open Water within Easement (ac)</b>	Unknown	<b>0.19</b>
<b>Total Functional Units (acreage x actual points) (fu)</b>	Unknown	<b>0.99</b>
<b>Net Acreage Gain (ac)</b>	NA	Unknown
<b>Net Functional Unit Gain (fu)</b>	NA	Unknown

<sup>1</sup> The baseline assessment was performed by Herrera Environmental Consultants using the 1999 MDT Montana Wetland Assessment Method (MWAM) and included a much larger assessment area (Jocko River corridor on both sides of the highway) than did the 2008 assessment.

<sup>2</sup> Assessed by PBS&J during 2008 using the 1999 MDT MWAM because the mitigation crediting systems require direct comparisons of pre- and post-project functions.

The neighboring horses apparently entered the site and destroyed many to most of the woody plantings. Few plantings did still exist near the south side of property outside of the fence-line. Plantings not affected by grazing had vigorous growth and appeared healthy. Re-planting of impacted species should be considered.

Two Category 1 noxious weeds, spotted knapweed and hounds tongue, were present at low cover values. A Category 2 noxious weed, tall buttercup, was also present both in wetland and upland

areas. Noxious weeds should be controlled in accordance with the *Noxious Weed Management Guidelines, Species and Control Methods for US 93 Evaro to Polson Wetland Mitigation Sites* contained in the mitigation plan.

### 2.18.3 Jocko Spring Creek – Year 2

The 6.5-acre Jocko Spring Creek mitigation site is located along the south side of the Montana Rail Link (MRL) grade just north of the Jocko Spring Creek highway crossing. The site occurs at approximately Milepost 23 in Township 17N, Range 20W, Section 16. Jocko Spring Creek flows under the highway and the MRL bridge in a newly constructed channel, and then flows northwest parallel to the railroad grade before it connects to the existing channel alignment on the northwest end of the project area. The mitigation site encompasses the new channel and its floodplain. Existing flows from Jocko Spring Creek provide water for the wetland mitigation site. Objectives included the following:

- Relocating Jocko Spring Creek from between the railroad and highway to a newly constructed channel west of the railroad;
- Constructing a new culvert under the railroad and in-line with the new highway bridge;
- Applying soft bioengineering treatments and installing near-bank plant material along in the new channel;
- Filling the abandoned Jocko Spring Creek channel with cobbles and gravel, topping with salvaged wetland soil, and planting;
- Creating scrub-shrub and emergent vegetation types with native wetland shrub and grass-like plantings and broadcast seeding of a wetland mix;
- Salvaging sod from the excavated channel placing along stream banks;
- Excluding grazing from the property; and
- Eliminating the existing vehicle pullout along the US Hwy. 93.

The target wetland community is a palustrine scrub-shrub system supporting Bebb's willow with inclusions of emergent habitat. Initial construction of the new channel and floodplain was completed in March 2006 with prevegetated coir mats installed during April 2006. Revegetation efforts, including shrub and herbaceous plantings, were completed during August to October 2006.

As of 2008, approximately 1.81 acres of wetland and 0.27 acres of open water / channel occur on the mitigation site, for a total of 2.08 acres of aquatic habitat. Subtracting the original 2.0 acres of pre-project wetlands from this total yields a current net of approximately 0.08 wetland/open water acres. **Table 30** lists the current credits based on COE and CSKT credit ratios, including this year's calculated ratio for the rehabilitation areas at the site. The Jocko Spring Creek site is progressing toward reaching the expected credits. Current credit acres are below expected credit acres, but with further development of targeted wetland creation between the highway and the railroad grade, the site could reach the mitigation goals.

**Table 30: Current credits at the Jocko Spring Creek Mitigation Site.**

Targeted Mitigation Type <sup>1</sup>	Current Wetland (Acre) <sup>1</sup>	Credit Ratio		Current Credit (Acre)		Expected Credit (Acre)	
		COE	CSKT	COE	CSKT	COE	CSKT
Creation	0.66	1:1	3.36:1	0.66	0.19	2.17	1.17
Rehabilitation / primary restoration	0.82	1:1	1.86:1	0.82	0.44	0.59 <sup>2</sup>	0.32
Enhancement / secondary restoration	0.05	7.69:1	--	0.01	0.0	0.01	0.0
Assumed pre-existing wetland (based on the site plan) occurring outside of Mitigation Type boundaries	0.55	--	--	--	--	--	--
<b>TOTAL</b>	<b>2.08</b>			<b>1.49</b>	<b>0.63</b>	<b>2.77<sup>2</sup></b>	<b>1.49</b>

<sup>1</sup> Target mitigation type zone boundaries were derived from the site plan.

<sup>2</sup> Corrected from values presented in the 2007 mitigation monitoring report; revised figures are based on the site plan.

Functional assessment results are presented in **Table 31**. For comparative purposes, the functional assessment results for baseline conditions are also included. The Jocko Spring Creek is currently rated as a Category II site. Functional points and ratings improved significantly for several assessed parameters over baseline conditions.

**Table 31: Summary of baseline and 2008 wetland function/value ratings and functional points at the Jocko Spring Creek Wetland Mitigation Project.**

Function and Value Parameters from the MDT Montana Wetland Assessment Method	Baseline (AA-1) <sup>1</sup>	2008 (AA-1) <sup>2</sup>
Listed/Proposed T&E Species Habitat	Low (0.3)	Low (0.3)
MTNHP Species Habitat	Mod (0.6)	Mod (0.6)
General Wildlife Habitat	Mod (0.5)	Mod (0.7)
General Fish/Aquatic Habitat	High (0.9)	High (0.9)
Flood Attenuation	Low (0.2)	Low (0.1)
Short and Long Term Surface Water Storage	High (0.8)	High (0.8)
Sediment/Nutrient/Toxicant Removal	Mod (0.6)	High (0.9)
Sediment/Shoreline Stabilization	Mod (0.7)	High (1.0)
Production Export/Food Chain Support	Mod (0.7)	High (0.9)
Groundwater Discharge/Recharge	High (1)	High (1.0)
Uniqueness	Mod (0.4)	Mod (0.5)
Recreation/Education Potential	High (1.0)	High (1.0)
<b>Actual Points / Possible Points</b>	<b>7.7 / 12</b>	<b>8.7 / 12</b>
<b>% of Possible Score Achieved</b>	<b>64%</b>	<b>73%</b>
<b>Overall Category</b>	<b>III</b>	<b>II</b>
<b>Total Acreage of Assessed Wetlands and Open Water within Easement (ac)</b>	<b>2.0</b>	<b>2.08</b>
<b>Total Functional Units (acreage x actual points) (fu)</b>	<b>15.40</b>	<b>18.1</b>
<b>Net Acreage Gain (ac)</b>	<b>NA</b>	<b>0.08</b>
<b>Net Functional Unit Gain (fu)</b>	<b>NA</b>	<b>2.7</b>

<sup>1</sup> The baseline assessment was performed by Herrera Environmental Consultants using the 1999 MDT Montana Wetland Assessment Method (MWAM).

<sup>2</sup> Performed by PBS&J during 2008 using the 1999 MDT MWAM because the mitigation crediting systems require direct comparisons of pre- and post-project functions.

The observed woody plantings along all transects looked healthy and exhibited vigorous growth for the season. Few dead species were recorded. Plantings were protected with browse control nets that offered protection from local wildlife. Plantings along the wetland fringes were flourishing and received more than adequate hydrology to sustain continued growth.

Category 1 noxious weeds Canada thistle and hounds tongue were present at moderate cover values. Noxious weeds should be controlled in accordance with the *Noxious Weed Management Guidelines, Species and Control Methods for US 93 Evaro to Polson Wetland Mitigation Sites* contained in the mitigation plan.

#### 2.18.4 Peterson Property – Year 1

The 30-acre Peterson mitigation site occurs approximately 3 miles north of St. Ignatius and west of the highway. The site is south of Milepost 36 in Township 16N, Range 20W, Section 2. The Peterson site consists of a wetland draw dominated by herbaceous vegetation. Site hydrology is sourced by an unnamed perennial tributary to Post Creek. Objectives included the following:

- Constructing impoundments using twelve log crib structures and earthen berms;
- Excavating an oxbow basin along the outer fringe of existing wetland boundaries; and
- Planting shrubs and herbaceous plugs within the oxbow basin, wetland fringe, and log crib structures.

The targeted wetland community type at this site is a scrub-shrub / emergent vegetation type, supporting thinleaf alder / red osier dogwood and Nebraska sedge / Baltic rush habitat type. Revegetation work at this site was completed in October 2006.

As of 2008, approximately 3.71 acres of wetland occur on the mitigation site. The channel was included in the wetland totals. **Table 32** lists the current credits based on Corps and CSKT credit ratios, including this year’s calculated ratio for the rehabilitation areas at the Peterson site. Current credits have exceeded the expected credits, assuming that wetlands delineated outside of the targeted creation and rehabilitation areas were created by project implementation. Additional acreage may form with additional time.

**Table 32: Current credits at the Peterson Property Mitigation Site.**

Targeted Mitigation Type	Current Wetland (Acre)	Credit Ratio		Current Credit (Acre)		Expected Credit (Acre)	
		COE	CSKT	COE	CSKT	COE	CSKT
Creation	2.46 <sup>1</sup>	1:1	3.36:1	2.46	0.73	2.14	0.64
Rehabilitation / secondary restoration	1.25	3.57:1	1.86:1	0.35	0.67	0.25	0.67
<b>TOTAL</b>	<b>3.71</b>	<b>--</b>	<b>--</b>	<b>2.81</b>	<b>1.40</b>	<b>2.39</b>	<b>1.31</b>

<sup>1</sup> Includes wetlands delineated outside of targeted creation and rehabilitation areas and assumed to have been created by project implementation.

Functional assessment results are presented in **Table 33**. For comparative purposes, the functional assessment results for baseline conditions are also included. The Peterson site currently rates as a Category III site.

**Table 33: Summary of baseline and 2008 wetland function/value ratings and functional points at the Peterson Wetland Mitigation Project.**

Function and Value Parameters from the MDT Montana Wetland Assessment Method	Baseline (AA-1) <sup>1</sup>	2008 (AA-1) <sup>2</sup>
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 (0.5)	Mod (0.7)
General Fish/Aquatic Habitat	Low (0.1)	NA
Flood Attenuation	Low (0.2)	Mod (0.4)
Short and Long Term Surface Water Storage	Mod (0.4)	High (0.8)
Sediment/Nutrient/Toxicant Removal	High (0.9)	High (0.9)
Sediment/Shoreline Stabilization	High (0.7)	High (1.0)
Production Export/Food Chain Support	High (0.8)	High (0.8)
Groundwater Discharge/Recharge	High (1.0)	High (1.0)
Uniqueness	Low (0.2)	Low (0.3)
Recreation/Education Potential	Low (0.1)	Mod (0.5)
<b>Actual Points / Possible Points</b>	<b>5.3 / 12</b>	<b>6.8 / 11</b>
<b>% of Possible Score Achieved</b>	<b>44%</b>	<b>61%</b>
<b>Overall Category</b>	<b>III</b>	<b>III</b>
<b>Total Acreage of Assessed Wetlands and Open Water within Easement (ac)</b>	Unknown	<b>3.71</b>
<b>Total Functional Units (acreage x actual points) (fu)</b>	Unknown	<b>25.23</b>
<b>Net Acreage Gain (ac)</b>	NA	Unknown
<b>Net Functional Unit Gain (fu)</b>	NA	Unknown

<sup>1</sup> The baseline assessment was performed by Herrera Environmental Consultants using the 1999 MDT Montana Wetland Assessment Method.

<sup>2</sup> Performed by PBS&J during 2008 using the 1999 MDT MWAM because the mitigation crediting systems required a direct comparisons of pre- and post-project functions.

Overall, survival ratings of planted woody species are considered moderate to high based on visual assessment. Plant growth was vigorous and looked healthy with few discolored leaves. Browse protection was intact and properly functioning.

Two Category 1 noxious weeds were present at low to high cover values and should be treated: Canada thistle and whitetop. A Category 3 noxious weed, yellowflag iris, was also present within the mitigation site. Noxious weeds should be controlled in accordance with the *Noxious Weed Management Guidelines, Species and Control Methods for US 93 Evaro to Polson Wetland Mitigation Sites* contained in the mitigation plan.

Log crib structures were assessed for general functionality and were generally considered to be operational, with shallow inundation observed behind the impoundments. However, undercutting and substantive leakage between logs was observed at many of the structures, which should be addressed in order to maximize impoundment extent.



## 2.19 Wagner Marsh (Billings District, Year 4)

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 2008, a total of approximately 16.19 acres of open water and wetland habitat (including the original 3.87 acres) occur within the monitoring area. This is an increase of approximately 2.89 acres from 2007 totals (13.3 acres).

Of the 16.19-acre 2008 total, approximately 8.81 acres are currently open water habitat and the remaining 7.38 acres are vegetated wetland areas. Due to the variability in water levels at Wagner Marsh, it is unclear how much of the open water habitat will evolve into emergent wetland areas. Much of the ‘disturbed-moist’ vegetation type of previous monitoring years was classified as emergent wetlands or open water in 2008. A 50 foot wetland buffer around wetlands on the site comprises approximately 5.19 acres.

The Corps of Engineers will determine which crediting ratios are applicable to the site. However, using the credit ratios listed, **Table 34** summarizes compensatory mitigation credits developed to date at the Wagner Marsh. Using these assumed credit ratios for wetlands, open water, and upland buffer, approximately 10.16 acres of credit are currently available, a decrease of approximately 0.14. This decrease is primarily attributed to water levels being higher and

**Table 34: 2008 mitigation credit summary for the Wagner Marsh Wetland Mitigation Site.**

Credit Category	Acres	Assumed Credit Ratio <sup>1</sup>	Credit <sup>1</sup>
Total Scrub/Shrub and Emergent Wetland	7.38	1:1	7.38
Total Open water	8.81	20% of wetland acreage <sup>2</sup>	1.48
50-foot wide upland buffer	5.19	4:1	1.30
<b>TOTAL</b>	<b>16.68</b>		<b>10.16</b>

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

<sup>2</sup>According to 7/23/04 correspondence from the Corps to MDT, “credit for open water will be limited to no more than 20% of the amount of actual wetland that develops at the site. For example, if 20 acres of wetland develops, up to 4 acres of additional acres of open water credit could be used as wetland mitigation credit.”

flooding out some of the wetland areas. However, if the water levels remain relatively constant, there is potential for a greater extent of emergent wetlands to establish at Wagner Marsh than in previous years.

A total of 550 woody plantings were installed as part of the overall revegetation plan for the site. As of August 8, 2008, the overall survival rate is estimated at 45 percent, with a total of 305 individuals observed to be dead. This is down from the 92 percent survival rate reported in 2005, the 64 percent survival rate in 2006 and the 57 percent survival rate in 2007. 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 2008, as compared to Category IV in 2001 (**Table 35**). Functions that increased substantially over 2001 baseline conditions include MNHP species habitat, 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 102 functional units, for a conservative gain of 85 functional units.

A few salt cedar saplings were observed and removed during monitoring in 2008, others were shown to the weed sprayer on October 7, 2008. The presence of salt cedar on the site should continue to be monitored and individuals removed when encountered, but overall the threat of salt cedar invasion appears to be low.

In 2006 it was noted that spotted knapweed was well established on the berm on the east side of the site, and in upland communities and that Canada thistle was prevalent in the cattail area in the northwestern portion of the site. During mid-season visits in 2007 and again in 2008 it was noted that a comprehensive weed spraying program had been implemented at the site. This effort made significant progress toward eradicating these species from the site, however, spraying in subsequent years is still needed to fully address the severity of the problem.

Water levels continue to be variable, however it appears that the supplemental water being pumped into the site from the gravel mine west of the site is helping to maintain a somewhat less variable water regime when compared to previous years. Opportunities to create a more natural water regime on the site should be explored, as it could help the establishment and persistence of

**Table 35: Summary of 2001 (baseline) and 2008 wetland function/value ratings and functional points at the Wagner Marsh Wetland Mitigation Site.**

Function and Value Parameters from the MDT Montana Wetland Assessment Method	2001 Baseline Assessment	2008
Listed/Proposed T&E Species Habitat	Low (0.5)	Low (0.0)
MTNHP Species Habitat	Low (0.2)	Mod (0.6)
General Wildlife Habitat	Low (0.3)	High (0.9)
General Fish/Aquatic Habitat	N/A	N/A
Flood Attenuation	N/A	N/A
Short and Long Term Surface Water Storage	Mod (0.6)	High (1.0)
Sediment/Nutrient/Toxicant Removal	Mod (0.7)	Mod (0.7)
Sediment/Shoreline Stabilization	N/A	Mod (0.7)
Production Export/Food Chain Support	Mod (0.6)	High (0.8)
Groundwater Discharge/Recharge	High (1.0)	High (1.0)
Uniqueness	Low (0.2)	Mod (0.5)
Recreation/Education Potential	Low (0.2)	Mod (0.1)
<b>Actual Points / Possible Points</b>	<b>4.3 / 9</b>	<b>6.3 / 9</b>
<b>% of Possible Score Achieved</b>	<b>48%</b>	<b>70%</b>
<b>Overall Category</b>	<b>IV</b>	<b>II</b>
<b>Total Acreage of Assessed Aquatic Habitat within AA Boundaries</b>	<b>3.87</b>	<b>16.19</b>
<b>Functional Units (acreage x actual points)</b>	<b>16.64</b>	<b>102</b>
<b>Net Acreage Gain</b>	NA	<b>12.32</b>
<b>Net Functional Unit Gain</b>	NA	<b>85.36</b>

emergent vegetation on the site. For example water levels might be able to be maintained relatively high until the middle of July and then slowly decreased through the end of August, and then water levels might be able to be increased slightly in September and October.

## 2.20 West Fork Charley Creek (Glendive District, Year 2)

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

Constructed during summer of 2006, the intent of the West Fork Charley Creek project is to provide approximately 5 acres of palustrine, semi-permanent, emergent wetland within an approximate 28.7-acre perpetual conservation easement. This was to be accomplished by flooding a primarily upland area via dike placement across ephemeral West Fork Charley Creek and retaining runoff. Additional project components include upland and wetland seeding, fencing, and implementation of a grazing management plan. Approximately 0.03 acre of emergent wetlands occurred in the project area along the fringes of the creek prior to construction. No required COE or Fort Peck Assiniboine and Sioux Tribes performance standards were found in the project files.

Approximately 1.6 acres of vegetated wetlands and 5.19 acres of open water were delineated on the mitigation site in 2008, for a total of 6.79 acres of aquatic habitat. Approximately 0.03 acre of wetlands occurred on the site prior to project implementation. Consequently, the net aquatic habitat created / restored to date is  $6.79 - 0.03 = 6.76$  acres, which is the maximum assignable credit at this site in 2008. No performance standards for the site were found in the project files; however, the goal of the project was to provide approximately 5 acres of palustrine, semi-permanent, emergent wetland. Additional flooded uplands and shallow open water areas are likely to convert to emergent wetland over time, given consistent inundation.

Functional assessment results are summarized in **Table 36**. Functional assessment results for baseline conditions are also provided in **Table 36** for comparison. The site currently rates as a Category III wetland and has gained 37 functional units. Prominent functions include general wildlife habitat, surface water storage, sediment/nutrient/toxicant removal, documented MTNHP species habitat (northern leopard frog), and production export.

**Table 36: Summary of 2008 and baseline wetland function/value ratings and functional points at the WF Charley Creek Mitigation Project.**

Function and Value Parameters from the MDT Montana Wetland Assessment Method	2005 (Baseline)	2008
Listed/Proposed T&E Species Habitat	Low (0.0)	Low (0.1)
MTNHP Species Habitat	Low (0.0)	Mod (0.6)
General Wildlife Habitat	Low (0.2)	Mod (0.7)
General Fish/Aquatic Habitat	NA	NA
Flood Attenuation	Low (0.1)	Mod (0.6)
Short and Long Term Surface Water Storage	Low (0.3)	Mod (0.6)
Sediment/Nutrient/Toxicant Removal	Mod (0.6)	Mod (0.7)
Sediment/Shoreline Stabilization	Low (0.2)	Low (0.3)
Production Export/ Food Chain Support	Low (0.3)	High (0.8)
Groundwater Discharge/Recharge	NA	Mod (0.7)
Uniqueness	Low (0.3)	Low (0.3)
Recreation/Education Potential	Low (0.1)	Low (0.05)
<b>Actual Points / Possible Points</b>	<b>2.1 / 10</b>	<b>5.45 / 10</b>
<b>% of Possible Score Achieved</b>	<b>21</b>	<b>55</b>
<b>Overall Category</b>	<b>IV</b>	<b>III</b>
<b>Total Acreage of Assessed Aquatic Habitat within Easement (ac)</b>	<b>0.03</b>	<b>6.79</b>
<b>Functional Units (acreage x actual points) (fu)</b>	<b>0.06</b>	<b>37.0</b>
<b>Net Acreage Gain (ac)</b>	<b>NA</b>	<b>6.76</b>
<b>Net Functional Unit Gain (fu)</b>	<b>NA</b>	<b>36.94</b>

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

## 2.21 Woodson Creek (Butte District, Year 2)

This mitigation site was constructed in 2006 in Meagher County in the south-eastern portion of the Missouri-Sun-Smith watershed (Watershed #7). Approximately 50 acres of wetland credit at this site is to be provided to MDT through a credit purchase agreement. It is anticipated that this site will compensate for wetland impacts resulting from MDT highway and bridge reconstruction projects in the watershed. Woodson Creek was constructed on the Ringling Land and Cattle Company property. The goal of the project is to restore Woodson Creek to its original configuration (i.e., increase sinuosity), improve wetland hydrology within some portions of the site, and create wetlands in other portions of the site. It is anticipated that the project will ultimately provide a maximum of 75.14 acres of palustrine emergent and scrub-shrub wetland within the confines of the 105-acre site.

Crediting for the Woodson Creek Mitigation Site is complex and comprised of seven different credit areas, each with their own success criteria. A detailed discussion of these, and how these affected 2008 credit calculations, is provided in the individual monitoring report. In the strictest terms, none of the seven credit zones achieved all of their ultimate individual success criteria as of 2008. Partial credit may be possible for some of the zones upon negotiation between MDT and the COE.

Overall the site has improved considerably over pre-construction conditions, but there are specific actions that need to be implemented in order to fulfill the success criteria. Generally these actions are:

- Improve plant species diversity by killing Garrison creeping foxtail and seeding/planting other hydrophytic species.
- Plant woody cuttings at the specified densities and provide an ‘as-built’ map so that they can be located and monitored in the field. The density of the Garrison creeping foxtail makes finding (and monitoring) woody cuttings almost impossible without a map.

The Corps of Engineers will determine which crediting ratios are applicable to the site. Up to 59.89 interim credit-acres have developed on the site in the absence of full ultimate success criteria application (**Table 37**). *Though many of the success criteria have been achieved in each of the seven credit zones, none of the credit zones had yet achieved all of the ultimate success criteria established for them.* Actual credits will need to be negotiated between MDT and the COE.

**Table 37: 2008 mitigation credit summary for the Woodson Creek Wetland Mitigation Site.**

Credit Zone	Credit Category	Planned Credit Acreage	Onsite Aquatic Acreage	Credit Ratio <sup>a</sup>	Interim Maximum Credit Acreage <sup>a,c</sup>
1	Restoration (Re-establishment)	4.02	3.41	1:1	3.41
2	Restoration (Re-establishment)	8.50	5.35	1:1	5.35
3	Restoration (Rehabilitation/Re-establishment)	18.30	18.2	1:1 <sup>b</sup>	18.20
4	Restoration (Rehabilitation/Re-establishment)	23.00	21.19	1:1 <sup>b</sup>	21.19
5	Restoration (Rehabilitation/Re-establishment)	9.77	5.52	1.5:1 <sup>b</sup>	3.68
6	Restoration (Rehabilitation)	5.55	7.68	1:1	7.68
7	Creation	6.00	0.38	1:1	0.38
<b>TOTAL</b>		<b>75.14</b>	<b>61.73</b>		<b>59.89</b>

<sup>a</sup> The Corps of Engineers is the regulatory authority and will determine the actual mitigation ratios and interim and/or final credits as they pertain to the success criteria.

<sup>b</sup> Restoration (Rehabilitation/Re-establishment) areas will be credited at 1:1 if a functional replacement performance standard is met; otherwise, they will be credited at 1.5:1 if the remaining performance criteria are met. Interim credits reflect 2008 functional assessment categories for these sites.

<sup>c</sup> All conditions in the success criteria have not been fulfilled, therefore final credits have not been calculated. Crediting is at discretion of COE and MDT.

Functional assessment results are summarized in **Table 38**. For comparative purposes, the functional assessment results for baseline conditions prepared by Oasis Environmental in 2005 are also included in **Table 38**.

The restored wetlands at Woodson Creek were ranked as Category II and III wetlands in 2008 as compared to Category III and IV in 2005 (**Table 38**). Functions that increased over 2005 baseline conditions included the MTNHP sensitive species habitat, general wildlife habitat, flood attenuation, short and long term surface water storage, sediment/nutrient/ toxicant removal, streambank/shoreline stabilization, and production export. The pre-project site provided a total of about 141 functional units within the monitoring area, in 2008 the post-project site currently provides about 418 functional units, for a conservative gain of approximately 277 functional units. This represents a slight increase of approximately 8 functional units from 2007.

Garrison creeping foxtail continues to dominate the majority of the site. As part of the mitigation agreement, much of the existing Garrison creeping foxtail is to be eliminated at the site. Eradication measures using herbicides were begun in June 2008. Canada thistle has become established in some of the previously disturbed areas, though it had been eradicated in the area where Woodson Creek enters the mitigation site and in the vicinity of the outlet culvert at the southern end of the restored creek channel. It does still occur in small patches on the dikes.



**Table 38: Summary of 2005 and 2008 wetland function/value ratings and functional points at the Woodson Creek Wetland Mitigation Site.**

Function and Value Parameters from the MDT Montana Wetland Assessment Method	2005 Baseline		2008 <sup>1</sup>		
	Woodson Floodplain	East & West Parcel	New Woodson Floodplain	East Parcel	West Parcel
Listed/Proposed T&E Species Habitat	Low (0.0)	Low (0.0)	Low (0.0)	Low (0.0)	Low (0.0)
MNHP Species Habitat	Low (0.1)	Low (0.1)	High (1.0)	High (1.0)	Mod (0.6)
General Wildlife Habitat	Low (0.3)	Low (0.3)	High (0.9)	Mod (0.7)	Mod (0.7)
General Fish/Aquatic Habitat	Low (0.3)	NA	Mod (0.6)	NA	NA
Flood Attenuation	Low (0.1)	NA	Mod (0.6)	NA	NA
Short and Long Term Surface Water Storage	Low (0.3)	NA	High (1.0)	High (0.8)	Low (0.3)
Sediment/Nutrient/Toxicant Removal	Mod (0.6)	Mod (0.7)	High (1.0)	High (1.0)	High (1.0)
Sediment/Shoreline Stabilization	Mod (0.7)	NA	High (1.0)	NA	NA
Production Export/Food Chain Support	Mod (0.4)	Mod (0.7)	High (0.9)	High (0.9)	Mod (0.6)
Groundwater Discharge/Recharge	High (1.0)	Low (0.1)	Mod (1.0)	Mod (1.0)	High (1.0)
Uniqueness	Low (0.2)	Low (0.2)	Low (0.2)	Low (0.2)	Low (0.3)
Recreation/Education Potential	Low (0.1)	Low (0.1)	Low (0.1)	Low (0.1)	Low (0.1)
<b>Actual Points / Possible Points</b>	<b>4.1 / 12</b>	<b>2.2 / 8</b>	<b>8.3 / 12</b>	<b>5.7 / 9</b>	<b>4.6 / 9</b>
<b>% of Possible Score Achieved</b>	<b>34.0</b>	<b>27.5</b>	<b>69</b>	<b>63</b>	<b>51.0</b>
<b>Overall Category</b>	<b>III</b>	<b>IV</b>	<b>II</b>	<b>II</b>	<b>III</b>
<b>Total Acreage of Assessed Aquatic Habitat within AA Boundaries</b>	<b>0.48</b>	<b>57.00</b>	<b>28.08</b>	<b>27.77</b>	<b>5.90</b>
<b>Functional Unit</b> (acreage x actual points)	<b>16.40</b>	<b>124.70</b>	<b>233.06</b>	<b>158.29</b>	<b>27.14</b>
<b>Net Acreage Gain</b> (from baseline conditions)	NA	NA	<b>4.27</b>		
<b>Net Functional Unit Gain</b> (from baseline conditions)	NA	NA	<b>277.39</b>		

If shrub dominated areas are desired, then woody species need to be planted to fulfill success criteria requirements. The willows that have been planted were observed to be stunted and growing slowly. This is likely due to the willows being planted in locations that are too wet, and perhaps due to the tight clay soils. It is suggested that if additional willows are planted, that planting them in the upland 'islands' to the depth of shallow groundwater and/or soil saturation, could lead to more vigorous willow growth and add considerable value to birds and wildlife in the area, and could increase functional assessment scores. In addition, due to the pumping action of their root systems, planting willows in these upland islands may help to raise water table depths closer to the soil surface and thereby increase overall wetland acreage at the site. Mature willow transplants might be a better option than cuttings. Due to its ability to better cope with clayey soils, yellow willow may be better adapted for use at the Woodson Creek Mitigation site than other willow species.

## **Appendix A**

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

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*MDT Wetland Mitigation Monitoring  
2008 Executive Summary*

Table 1: Summary of MDT Wetland Mitigation Sites monitored during 2001 to 2008.

Site	Year Built	Major Montana Watershed Basin	Pre-Project Wetland Acreage and MDT Category	Target Wetland Credit	2008 Wetland/Open Water Acreage and MDT Category	Enhancement Credit (ratio)	Upland Credit (ratio)	Total Acreage Gain / Credit and Functional Unit Gain as of 2008	Comments
<b>MISSOULA DISTRICT</b>									
Batavia	1998	4 – Flathead	137 ac Category II 1069 fu	28.72 ac (see comments)	146.73 ac Category II 1408 fu	See comments	NA	Applying ratios, site has achieved 24.42 ac. of credit.  Gain of 340 fu	2007 was seventh and final year of monitoring. Site at 85% of goal. Full delineation conducted in 2007. See report for project goals and ratios.
Camp Creek	2002	3 – Lower Clark Fork	48.73 ac Category III 251.58 fu	11.4 ac minimum (see comments)	39.37 ac wetland 2.15 ac channel Category I & II 400.56 fu	None specified	None specified	Gain of 148.98 fu  FU-based credit approach = 15.71 ac credit	2008 is seventh 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 15.71 acres of credit to date.
Creston	1998	4 – Flathead	2 ac Category and fu unknown	6 ac (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	5.85 ac (total) Category II (0.06 ac) Category III (4.12 ac) Category IV (1.69 ac) 29.33 fu	8.1 ac (restore & create) 5.2 acre (upland enhance)	13.91 ac Category III (13.45 ac) Category IV (0.46 ac) 103.6 fu	None specified	None specified	Approx. 8.1 ac 72.38 fu	2008 is seventh and final monitoring year. See report text for explanation of credits. Planting at adjacent uplands was accomplished in 2003 and 2004. Virtually at 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	12 ac	22.71 ac wetland 2.41 ac open water Category II & III 209 fu	1:2 on 8.05 = 4.02 1:3 on 3.43 = 1.14 Total Acres = 5.16	1:4 on 7.99 = 1.99 ac. 4.70 ac of up buffer reverted to wetland	17.90 max. total credit <b>Recommend 12 ac credit</b> 97.72 fu	2007 was sixth and final monitoring year. No credit for low intensity enhancement due to accidental grazing impacts; recommend eventual re-planting in this zone. Recommend certification of 12 credits (see 2007 report text).
Lawrence Park	1998	4 – Flathead	0 ac	Up to 2 ac	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.
Lonepine	2007/ 2008	3 – Lower Clark Fork	7.18 ac Category III and IV 34.94 fu	23.85 ac COE 11.86 ac CSKT	7.13 ac wetland 21.58 transitional ow 138.44 fu	See report	1:4 on 2.23 ac = 0.56 ac (COE)  0 credit CSKT	2.6 ac COE credit 12.26 ac CSKT credit 103.5 fu	2008 is first monitoring year. Credit is considered interim pending satisfaction of ultimate (end of monitoring period) performance standards. See report for credit breakdown.
Peterson Ranch	2002	2 – Upper Clark Fork	22.6 ac Category III 67.8 fu	17.5 ac (created)	21.54 ac wetland 1.08 ac open water Category II and III 142.83 fu	None specified	None specified	0.02 ac created 75.03 fu	2008 is seventh monitoring year. Currently at 1% of project goal. Grazing control recommended. Water rights may be problematic and may prevent site from functioning as designed.
US 93 Bouchard	2006	3 – Lower Clark Fork	19.03 ac Category III 87.54 fu	12.15 ac COE 13.35 ac CSKT	28.14 ac wetland 0.39 ac ow Category II 176.89 fu	Varies according to current FA score	None specified	16.15 ac COE credit 14.19 ac CSKT credit 89.35 fu	2008 is second monitoring year. Credit is considered interim pending satisfaction of ultimate (end of monitoring period) performance standards. See report for credit breakdown.
US 93 Jocko River Bridge	2006	3 – Lower Clark Fork	Unknown	0.33 ac COE 0.54 ac CSKT	0.19 ac wetland Category III 0.99 fu	Varies according to current FA score	None specified	0.0 ac COE credit 0.1 ac CSKT credit fu gain unknown	2008 is second monitoring year. Substantial grazing impacts to planted shrubs. Credit is considered interim pending satisfaction of ultimate (end of monitoring period) performance standards. See report for credit breakdown.
US 93 Jocko Spring Creek	2006	3 – Lower Clark Fork	2.0 ac wetland/ow Category III 15.4 fu	2.77 ac COE 1.49 ac CSKT	1.81 ac wetland 0.27 ac ow Category II 18.1 fu	Varies according to current FA score	None specified	1.49 ac COE credit 0.63 ac CSKT credit 2.7 fu	2008 is second monitoring year. Credit is considered interim pending satisfaction of ultimate (end of monitoring period) performance standards. See report for credit breakdown.
US 93 Peterson	2006	3 – Lower Clark Fork	Unknown	2.39 ac COE 1.31 ac CSKT	3.71 ac wetland Category III 25.23 fu	Varies according to current FA score	None specified	2.81 ac COE credit 1.40 ac CSKT credit fu gain unknown	2008 is first monitoring year. Credit is considered interim pending satisfaction of ultimate (end of monitoring period) performance standards. See report for credit breakdown.

Table 1 (continued): Summary of MDT Wetland Mitigation Sites monitored during 2001 to 2008.

Site	Year Built	Major Montana Watershed Basin	Pre-Project Wetland Acreage and MDT Category	Target Wetland Credit	2008 Wetland / Open Water Acreage and MDT Category	Enhancement Credit (ratio)	Upland Credit (ratio)	Total Acreage Gain / Credit and Functional Unit Gain as of 2008	Comments
<b>BUTTE DISTRICT</b>									
Beaverhead Ranch	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	Monitoring completed in 2006. Excellent site with heavy wildlife use. Project at 178% of goal. MDT opted not to purchase additional credits outside the current easement (below the dike). Total credit “gain” includes 6.5 acres of open water.
Big Hole Grazing Association	2007	6 – Upper Missouri	31 ac Category II and III fu unknown	45.8 ac	49.81 ac Category II	NA	NA	3.5 ac preservation <u>+35.81 ac restoration</u> 39.31 ac credit fu gain unknown	2008 is first monitoring year. 14 ac preservation @ 4:1 = 3.5 ac, 35.81 ac restoration @ 1:1 = 35.81 ac. Project at 86% of goal.
Brown’s Gulch	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.
Cow Coulee	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 re-instated when delivery issues are addressed.
Jack Creek Ranch	2003	6 – Upper Missouri	11.4 ac Category III 30.78 fu	50 ac	65.4 ac wetland 2.51 ac open water Category II 510.12 fu	None specified	None specified	67.91 ac restored 479.34 fu	2008 is fifth monitoring year. The 50-acre goal includes pre-existing wetlands and open water; currently at 136% of goal. Monitoring area increased in 2008 to include lower McKee Spring Creek restoration, which was determined in 2008 by MDT to be included in the credit purchase agreement.
Rey Creek	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.
Ringling Galt	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; not monitored in 2007 or 2008. No wetlands have developed to date. Site contains no conservation easement.
South Fork Smith	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	Monitoring suspended after 2006 (fifth monitoring year). Site contains no conservation easement, and grazing impacts are extensive. No specific project acreage target was established.
Sportsman’s Campground	2007	6 – Upper Missouri	0.66 ac wetland 1.31 ac open water Category IV fu unknown	15.6 ac	5.47 ac wetland 5.15 open water 4.33 ac trans/mudflat Category II 74.8 fu	NA	NA	12.98 ac net aq habitat fu gain unknown	2008 is first monitoring year. Site nearing 83% of overall net acreage goal.
Woodson Creek	2006	7 – Missouri-Sun-Smith	57.48 ac wetland Category III/IV 141.8 fu	50 ac	59.02 ac wetland 2.73 ac open water Category II/III 418.49 fu	NA	NA	59.51 ac restoration <u>0.38 ac creation</u> 59.89 ac total credit 277.39 fu	2008 is second monitoring year. Complex ultimate performance standards (see individual report). Current credit is considered “interim” pending satisfaction of all ultimate performance standards.

Table 1 (continued): Summary of MDT Wetland Mitigation Sites monitored during 2001 to 2008.

Site	Year Built	Major Montana Watershed Basin	Pre-Project Wetland Acreage and MDT Category	Target Wetland Credit	2008 Wetland / Open Water Acreage and MDT Category	Enhancement Credit (ratio)	Upland Credit (ratio)	Total Acreage Gain / Credit and Functional Unit Gain as of 2008	Comments
<b>GREAT FALLS DISTRICT</b>									
Alkali Lake	2005	8 - Marias	0 ac	COE: 154.48 ac Tribe: 81.61 ac	56.76 ac wetland 130.18 ac open water Category II 1037.52 fu	NA	COE: 1:4 ratio on 22.56 ac = 5.64 ac  Tribe: 1:4 ratio on 45.12 ac = 11.28 ac	186.94 ac aquatic hab. 119.16 ac COE credit 86.05 ac Tribal credit 1037.52 fu	2008 is third monitoring year. COE credits = 56.76 ac wetlands @ 1:1, 130.18 ac open water @ 1:1 (but limited to amount matching wetland credit), 22.56 ac buffer @ 1:4 = 119.16 ac total credit. Tribal credits = 56.76 ac wetlands @ 1:2.5, 130.18 ac open water @ 1:2.5, 45.12 ac buffer @ 1:4 = 86.05 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	110.27 ac wetland 70.85 ac open water Category II 1122.94 fu	NA	NA	110.27 ac wetland 70.85 ac open water 1122.94 fu	2008 is fifth monitoring year. Essentially exceeding original 63.57-ac credit goal again in 2008. Wetlands are likely to continue development.
Meriwether-East Onsite	2005	8 - Marias	0 ac	9.29 ac	6.62 ac wetland Category III 35.1 fu	NA	NA	6.62 ac wetland Category III 35.1 fu	2008 is third 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)	2006 was 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. Project at 111% of 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	22.4 ac wetland Category II and III 133.35 fu	NA	NA	19 ac 120.26 fu	2008 is seventh monitoring year. Currently at about 79% of project goal.

Table 1 (continued): Summary of MDT Wetland Mitigation Sites monitored during 2001 to 2008.

Site	Year Built	Major Montana Watershed Basin	Pre-Project Wetland Acreage and MDT Category	Target Wetland Credit	2008 Wetland / Open Water Acreage and MDT Category	Enhancement Credit (ratio)	Upland Credit (ratio)	Total Acreage Gain / Credit and Functional Unit Gain as of 2008	Comments
<b>GLENDIVE DISTRICT</b>									
American Colloid	2001	16 – Little Missouri	0 ac	4.4 ac	4.08 ac Category III 13.4 fu	NA	NA	4.08 ac 13.4 fu	2007 was sixth monitoring year. Site was primarily open water in 2005 and 2006, with minor (0.06 acre) wetlands in 2006 and 2007. Functional units slightly decreased. Counting presumed open water, currently at 93% of project goal. Dike breach temporarily drained site sometime during 2007. Monitoring suspended until breach is repaired.
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	0.9 ac (school) 1.5 ac (creek) 2.4 ac total	0.91 ac (school) <u>1.18 ac (creek)</u> 2.09 ac total Category II & III 15.72 fu	NA	NA	2.09 ac 15.72 fu	2007 was sixth and final monitoring year. Site consists of school site and two Alderson Creek sites. Currently at approximately 87% of adjusted project goal. Project goal adjusted based on as-built verses design features and MDT-specified monitoring area limits.
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	47.17 ac wetland <u>10.31 ac open water</u> 57.48 ac total Category II 425.87 fu	NA	NA	57.48 ac Category II 425.87 fu	2007 was seventh and final monitoring year. One of the 16 ponds in this complex (W-9) was intensively sampled / monitored in 2001-2007, although all ponds were delineated and functionally assessed in 2007. Counting shallow open water development, the project is at approximately 115% of project goal. Total includes 10.31 acres of shallow open water.
Rock Creek Ranch	2004	11 - Milk	1.08 ac Category IV 2.24 fu	50 ac	83.82 ac wetland Category II 461.01 fu	1:3 on 1.08 ac = 0.36 ac	1:4 on 3.6 ac = 0.9 ac	82.74 ac creation 0.36 ac enhancement <u>0.9 ac buffer</u> 84 ac total credit 459.24 fu	2008 is fourth monitoring year. Site is currently at 168% of 50-acre goal.
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 was 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.
W.F. Charley Creek	2006	12 – Lower Missouri	0.03 ac Category IV 0.06 fu	5.0 ac	1.6 ac wetlands <u>5.19 ac open water</u> 6.79 ac total Category III 37 fu	NA	NA	1.6 ac wetlands <u>5.19 ac open water</u> 6.79 ac total 36.94 fu	2008 is second formal monitoring year. Counting all aquatic habitat, site is at 136% of goal. Vegetated wetlands will likely continue to develop. Cattle are accessing site.



**Table 1 (continued): Summary of MDT Wetland Mitigation Sites monitored during 2001 to 2008.**

Site	Year Built	Major Montana Watershed Basin	Pre-Project Wetland Acreage and MDT Category	Target Wetland Credit	2008 Wetland / Open Water Acreage and MDT Category	Enhancement Credit (ratio)	Upland Credit (ratio)	Total Acreage Gain / Credit and Functional Unit Gain as of 2008	Comments
<b>BILLINGS DISTRICT</b>									
<b>Big Spring Creek</b>	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 wtlnd creation, enh exist. wtlnd and strm	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 was 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.
<b>Cloud Ranch</b>	2003	13 – Upper Yellowstone	0.72 ac Category and fu unknown	5.5 ac total	Off-chan: 2.4 ac Creek fringe: 1.42 ac Category II and III 42.88 fu	NA	1:4 on 3.56 ac = 0.89 ac	3.82 ac restoration <u>0.89 ac buffer</u> 4.71 ac total 7.41 fu gain since 2004	2008 is fifth monitoring year. Site currently at 87% 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
<b>DH Ranch</b>	2007	13 – Upper Yellowstone	0.57 ac Category III 1.6 fu	17.4 ac	11.39 ac wetland 6.05 ac open water Category II 89.82 fu	NA	1:4 on 0.8 ac =0.2 ac	11.39 ac wetland 1.14 ac ow (10% of wet.) <u>0.2 upland buffer</u> 12.73 ac credit 88.22 fu	2008 is second monitoring year. Open water credit limited to 10% of wetland acreage. Site at 73% of goal.
<b>Lavina</b>	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.
<b>Norem Ranch</b>	2002	13 – Upper Yellowstone	6.93 ac Category III 33.6 fu	14.71 ac total	11.64 ac wetland <u>1.58 ac open water</u> 13.22 total Category II 72.43	1:3 on 6.98 ac =2.32 ac	1:4 on 6 ac = 1.5 ac	2.32 ac enhancement 4.66 ac creation 1.58 ac open water creation <u>1.5 ac buffer</u> 10.06 ac total 39.12 fu	2008 is fifth monitoring year. Site currently at 68% 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
<b>Roundup</b>	2000	10 - Musselshell	0 ac	24 ac	12.03 ac wetland <u>8.85 ac open water</u> 20.88 ac developing Category II 123.19 fu	NA	NA	20.88 ac total 123.19 fu	2008 is eighth monitoring year. Site currently at 87% of goal. Kochia and goosefoot dominance and other weedy species proliferation somewhat problematic.
<b>Ryegate</b>	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.
<b>Stillwater River</b>	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 was final monitoring year. Results similar to 2002 - 2005. 10.69-ac goal included existing wetlands. Currently at 91% of goal.
<b>Selkirk Ranch</b>	2006/ 2007	10 - Musselshell	32.9 ac Category III 102.5 fu	60.4 ac	66.21 ac wetland 1.01 ac open water 548.53 fu	1:3	1:5	34.23 ac re-establishment 21.32 ac rehabilitation 0.33 ac enhancement <u>0.35 ac credit (buffer)</u> 56.23 ac total credit 446.03 fu	2008 is second monitoring year. Complex ultimate performance standards (see individual report). Gained 34.32 acres of aquatic habitat in 2008. Current credit is considered “interim” pending satisfaction of all ultimate performance standards.
<b>Vince Ames</b>	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.

**Table 1 (continued): Summary of MDT Wetland Mitigation Sites monitored during 2001 to 2008.**

Site	Year Built	Major Montana Watershed Basin	Pre-Project Wetland Acreage and MDT Category	Target Wetland Credit	2008 Wetland / Open Water Acreage and MDT Category	Enhancement Credit (ratio)	Upland Credit (ratio)	Total Acreage Gain / Credit and Functional Unit Gain as of 2008	Comments
<b>BILLINGS DISTRICT</b>									
<b>Wagner Marsh</b>	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	7.38 ac wetland <u>8.81 ac open water</u> 16.19 ac total Category II 102 fu	NA	1:4 on 5.19 ac = 1.3 ac	7.38 ac (total wetland) 1.48 ac (open water) <u>+1.3 ac (buffer)</u> 10.16 ac credit 85.36 fu	2008 is fourth monitoring year. Open water credit limited to 20% of wetland credit. Much of the open water habitat observed in 2008 is expected to become vegetated with emergent hydrophytic species over time.
<b>Wyola-Sunlight Ranch</b>	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.