# MONTANA DEPARTMENT OF TRANSPORTATION
# WETLAND MITIGATION MONITORING REPORT: YEAR 2006

*Norem Property*
*Big Timber, Montana*

Prepared for:

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

Prepared by:

**POST, BUCKLEY, SCHUH, & JERNIGAN**
P.O. Box 239
Helena, MT 59624

December 2006

Project No: B43054.00 - 0508

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## 1.0 INTRODUCTION

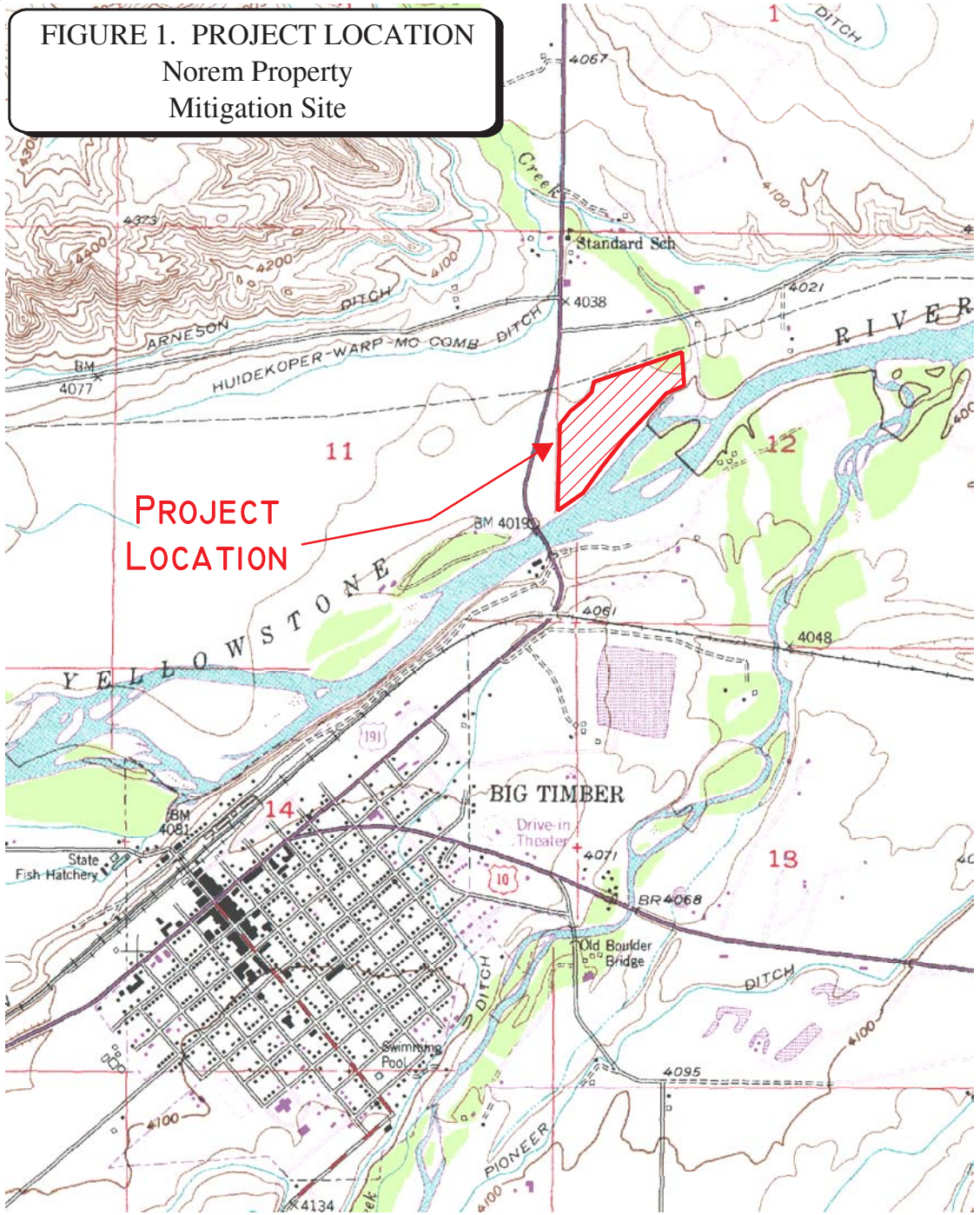
This annual report summarizes the methods and results from the 2006 (third year) monitoring effort at the Norem Property Wetland Mitigation Site. This project was constructed in the fall of 2002 by the landowner and Maxim Technologies, Inc. (Maxim) to provide the Montana Department of Transportation (MDT) with wetland mitigation credits that offset wetland impacts associated with proposed road and bridge reconstruction projects in the vicinity of Big Timber and the middle reaches of watershed #13 - Upper Yellowstone River Basin. The Norem wetland project site is located in in Section 12, Township 1 North, Range 14 East of Sweetgrass County, approximately two miles northeast of Big Timber, Montana (**Figure 1**). Elevations within the assessment area range from approximately 4,000 to 4,018 feet above sea level. The Yellowstone River borders the southern project boundary and to the east is it bounded by Big Timber Creek. Fenced pastures delineate the western and northern project boundaries. The surrounding land uses include pastures, hay production and residential areas.

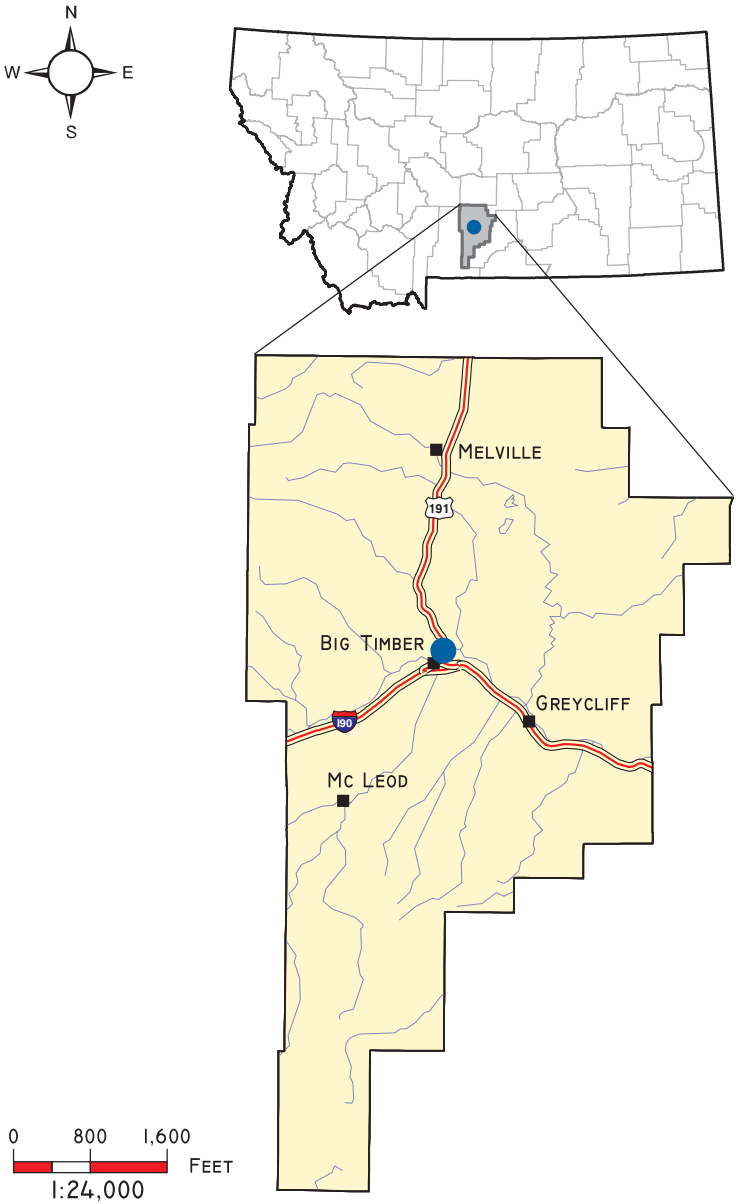
The project was intended to develop approximately 14.71 acres of wetland credit within a 26.88-acre conservation easement on property owned by Mark Norem. The site boundary is illustrated on **Figure 2** in **Appendix A** and the original conceptual layout is provided in **Appendix D.** The overall wetland 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 Corps of Engineers (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 (2002) for the 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 return water and groundwater in addition to the four (4) shallow open water ponds. The berm construction impacted approximately 0.15 acre of existing wetlands. 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 summary table of potential wetland credits available for the Norem project is outlined in the COE 2002 letter (**Appendix G).**

# FIGURE 1. PROJECT LOCATION
Norem Property
Mitigation Site




PROJECT #: 330054.508
DATE: JAN 2005
LOCATION:
PROJECT MANAGER:
DRAWN BY: B. STEINEBACH

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# 2.0 METHODS

## 2.1 Monitoring Dates and Activities

The site was visited on August 1 to collect the primary Wetland Mitigation Monitoring Form data (**Appendix B**). The primary monitoring area and monitoring activity locations are shown on **Figure 2** in **Appendix A**. Per MDT instruction (Urban, pers. comm.), monitoring activities were limited to the major restoration and enhancement areas within the site that are projected to provide MDT with wetland credit. Activities and information conducted/collected during the monitoring event included: wetland delineation; wetland/open water boundary mapping; vegetation community mapping; vegetation transects; soils data; hydrology data; bird and general wildlife use; photograph points; macroinvertebrate sampling; GPS data points; functional assessment; and, maintenance needs of the outflow structure (non-engineering).

Maxim also conducted monitoring at this site in 2006. However, their 2006 monitoring report was not available as of the printing of this report. Consequently, Maxim's 2006 report could not be included as an appendix to this document as it was in the 2004 report, but it will be available in the MDT project file once completed.

## 2.2 Hydrology

Wetland hydrology indicators were recorded using procedures outlined in the COE 1987 Wetland Delineation Manual (Environmental Laboratory 1987). Hydrology data were recorded on a COE Routine Wetland Delineation Data Form (**Appendix B**) at each wetland determination point. Precipitation data for the year 2006 were compared to the 1894-2006 average (Western Regional Climate Center [WRCC] 2006).

All additional hydrologic data were recorded on the Wetland Mitigation Site Monitoring Form (**Appendix B**). The boundary between emergent vegetation and open water was mapped on the aerial photograph (**Figure 3** in **Appendix A**). In September 2004, depths to water in 12 piezometers on the site were recorded by Maxim. Future monitoring of groundwater depths will also be conducted by Maxim (Urban pers. comm.).

## 2.3 Vegetation

General vegetation types were delineated on the aerial photograph during the August site visit (**Figure 3** in **Appendix A**). Coverage of the dominant species in each community type is listed on the Wetland Mitigation Site Monitoring Form (**Appendix B**). A comprehensive plant species list for the entire site was compiled and will be updated as new species are encountered. Observations will be compared with new data to document vegetation changes over time. The assessment area is fenced and woody species were planted on this site. The visual assessment included written estimates of species survival along the entire transect length (belt transect). Qualitative observations were used to assess the survival of the planted woody species in concentrated planting areas outside the transect width.

One transect was established during the 2004 monitoring event to represent the range of current vegetation conditions. This transect was re-evaluated in 2006 to reflect changes in species composition and changing wetland boundaries. The transect location is shown on **Figure 2** in **Appendix A**. Percent cover for each species was recorded on the Vegetation Transect Form (**Appendix B**). This transect is used to evaluate changes over time, especially the establishment and increase of hydrophytic vegetation. Transect ends are marked with metal fence posts and their locations recorded with the GPS unit. Photos of each transect end were taken during the August monitoring visit.

### 2.4 Soils

Soils were evaluated during the mid-season visit according to the procedure outlined in the COE 1987 Wetland Delineation Manual. Soil data were recorded for each wetland determination point on COE Routine Wetland Delineation Data Forms (**Appendix B**). The most current terminology used by NRCS was used to describe hydric soils.

### 2.5 Wetland Delineation

A wetland delineation was conducted within the assessment area according to the 1987 COE Wetland Delineation Manual. Wetland and upland areas within the monitoring area were investigated for the presence of wetland hydrology, hydrophytic vegetation and hydric soils. The information was recorded on COE Routine Wetland Delineation Forms (**Appendix B**). The indicator status of vegetation was derived from the National List of Plant Species that Occur in Wetlands: Northwest Region 9 (Reed 1988). The wetland/upland and open water boundaries were mapped on a 2005 aerial photograph and used to calculate the wetland area developed at the Norem wetland project. A pre-construction wetland map was completed by the Maxim Technologies, Inc. (2001) (**Appendix D**).

### 2.6 Mammals, Reptiles, and Amphibians

Mammal, reptile, and amphibian species observations were recorded on the Wetland Mitigation Site Monitoring Form during the visit (**Appendix B**). Indirect use indicators were also recorded including tracks, scat and burrows. A comprehensive wildlife species list for the entire site was compiled and will be updated as new species are encountered. Observations from past years will be compared with new data to determine if wildlife use is changing over time.

### 2.7 Birds

Bird observations were recorded during the August 2006 site visit according to the established Bird Survey Protocol (**Appendix E**). A general, qualitative bird list has been compiled using these observations. Observations will be compared between years in future studies.

## 2.8 Macroinvertebrates

One macroinvertebrate composite sample was collected during the site visit using the Macroinvertebrate Sampling Protocol (**Appendix F**). Samples were preserved as outlined in the sampling procedure and sent to Rhithron Associates, Inc. in Missoula, Montana for analysis (**Appendix F**). The approximate location of the macroinvertebrate sample was mapped (**Figure 2** in **Appendix A**).

## 2.9 Functional Assessment

A Functional Assessment Form was completed for the site using the 1999 MDT Montana Wetland Assessment Method (Berglund 1999) (**Appendix B**). Field data necessary for this assessment were collected on a condensed data sheet. The remainder of the assessment was completed in the office. Pre-construction functional assessment was completed by Maxim in 2001.

## 2.10 Photographs

Photographs were taken showing the current land use surrounding the site, the wetland buffer, the monitored area, pond/open water, and the vegetation transects **(Appendix C)**. A description and compass direction for each photograph were recorded on the wetland monitoring form.

During the 2004 monitoring season, each photograph point was marked on the field map and the location recorded with a resource grade GPS. The approximate locations are shown on **Figure 2** in **Appendix A**. All photographs were taken using a digital camera.

## 2.11 GPS Data

During the 2004 monitoring season survey points were collected using a resource grade Trimble Geoexplorer III hand-held GPS unit **(Appendix E)**. Points collected included: the beginning and end locations of the vegetation transects, the wetland boundary, and the sample point (SP) locations. In addition, GPS data were collected for four landmarks recognizable on the air photo for purposes of line fitting to the topography. No additional GPS data were collected in 2006.

## 2.12 Maintenance Needs

The condition of the outflow structures and potential problematic areas (erosive, barren or weedy areas) were evaluated. This examination did not entail an engineering-level analysis.

# 3.0 RESULTS

## 3.1 Hydrology

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.

During the August 1, 2006 monitoring visit, approximately 40% of the assessment area was inundated with several inches of standing water. Ponds 3 and 4 were full, while ponds 1 and 2 were approximately 4 to 6 inches below normal pond level as indicated by saturated mud flats and water marks on the islands. Emergent vegetation continues to colonize around the exposed saturated soils of ponds 1 and 2. These areas were included in the open water pond delineation and are depicted on **Figure 3** in **Appendix A**.

According to the Western Regional Climate Center (WRCC), the Big Timber weather station has calculated a mean annual precipitation of 15.38 inches from 1894 through July 2006 (last updated file). The average precipitation through the month of May for that period was 6.24 inches. For the year 2006, precipitation through May was 4.49 inches or 72% of the mean indicating that the spring of 2006 (through May) was drier compared to historic precipitation.

### 3.2 Vegetation

Vegetation species identified on the site are presented in **Table 1** and in the **Monitoring Form** (**Appendix B**). Wetland vegetation types include: Type 1, Mixed *Carex species,* Type 2, *Carex sp. /Juncus balticus*; Type 3, *Bromus inermis/Festuca pratensis;* Type 4, *Populus trichocarpa/Agropyron repens* and, Type 5, *Typha latifolia*. Dominant species within each community are listed on the **Monitoring Form** (**Appendix B**).

Type 1 occurs in the areas with shallow standing water (1 to 2 inches deep) to areas with saturated soils. This vegetation type is dominated by sedge species. Common species include beaked sedge (*Carex utriculata*), Nebraska sedge (*C. nebrascensis*), water sedge (*C. aquatilis*) and wooly sedge (*C .lanuginosa*) Type 2 community composition includes a mix of FAC to OBL species and it is likely as the wetland features develop, FACW and OBL species will dominate this wetland area. Large, irregular scattered patches of Baltic rush (*Juncus balticus*) occupy portions of this community type. Three-square bulrush (*Scirpus pungens*) was noted as a minor species throughout this community type. Type 2 is the largest wetland community type within the project area and is expanding into upland areas.

Type 3 occurs in the uplands and consists primarily of smooth brome (*Bromus inermis*) and meadow fescue (*Festuca pratensis*). Western wheatgrass (*Agropyron smithii*) co-dominants portions of this upland community but the cover and abundance of this species appears lower compared to 2004 and 2005 assessments. Tall fescue (*Festuca arundinacea*) was a common species north of the ponds, near the project boundary fence. Other common species in Type 3 include Kentucky bluegrass (*Poa pratensis*) and quackgrass (*Agropyron repens*). Species such as redtop (*Agrostis alba*), Baltic rush and silverweed (*Potentilla anserina)* were noted along the wetter margins between community types 3 and 2. Type 4 is also an upland community on the upland bench north of the Yellowstone River. Black cottonwood (*Populus trichocarpa*) plants were observed within this community and ranged from 12 inches to 5.5 feet in height. Sandbar willow (*Salix exigua*) seedlings (volunteers) were also observed.

**Table 1:** ***2004 to 2006 vegetation species list for the Norem Property Wetland Mitigation Site.***

| Scientific Name | Region 9 (Northwest) Wetland Indicator Status [1, 2] |
|---|---|
| *Agropyron dasystachyum* | UPL |
| *Agropyron repens* | FAC- |
| *Agropyron smithii* | FACU |
| ***Agropyron trachycaulum*** | **FAC** |
| *Agrostis alba* | FACW |
| *Alopecurus arundinacea* | (FACW) |
| *Alopecurus pratensis* | FACW |
| ***Beckmannia syzigachne*** | **OBL** |
| *Bromus inermis* | (UPL) |
| *Bromus tectorum* | UPL |
| *Cardaria draba* | UPL |
| *Carex aquatilis* | OBL |
| *Carex arcta* | OBL |
| *Carex lanuginose* | OBL |
| *Carex nebrascensis* | OBL |
| *Carex utriculuta* | OBL |
| *Centaurea maculosa* | (UPL) |
| *Cirsium arvense* | FACU+ |
| *Cornus stolonifera* | FACW |
| *Crateagus douglasii* | FAC |
| *Crepis acuminate* | (FACU) |
| *Deschampsia cespitosa* | FACW |
| *Eleocharis palustris* | FACW+ |
| ***Epilobium ciliatum*** | **FACW-** |
| *Equisetum arvense* | FAC |
| *Erigeron lanatus* | FACU |
| *Euphorbia esula* | (UPL) |
| *Festuca arundinacea* | FACU- |
| *Festuca pratensis* | FACU+ |
| *Glyceria grandis* | OBL |
| *Glyceria striata* | OBL |
| ***Glycyrrhiza lepidota*** | **FAC+** |
| *Juncus balticus* | OBL |
| *Juncus longistylis* | FACW |
| *Juncus torreyi* | FACW |
| *Lithosperum arvense* | (FAC) |
| *Melilotus alba* | FACU |
| *Melilotus officinalis* | FACU |
| *Mentha arvense* | FACW- |
| *Phalaris arundinacea* | FACW |
| *Phleum pratense* | FAC- |
| *Poa pratensis* | FAC |
| *Polygonum punctatum* | OBL |
| *Populus trichocarpa* | FAC |
| *Potentilla anserina* | OBL |
| *Rumex crispus* | FACW |
| ***Sagittaria sp.*** | **OBL** |
| *Salix alba(lutea)* | FACW/OBL |
| *Salix exigua* | OBL |

**Table 1 (continued):** ***2004 to 2006 vegetation species list for the Norem Property Wetland Mitigation Site.***

| Scientific Name | Region 9 (Northwest) Wetland Indicator Status [1, 2] |
|---|---|
| *Scirpus acutus* | OBL |
| *Scirpus pungens* | OBL |
| *Sisymbrium altissmum* | FACU- |
| *Spartana pectinata* | OBL |
| *Solidago occidentalis* | FACW |
| *Taraxacum officinale* | FACU |
| *Thlaspi arvense* | (UPL) |
| *Tragopogon dubius* | UPL |
| *Typha latifolia* | OBL |

[1] **Bolded** species indicate those documented within the analysis area for the first time in 2006.
[2] Species in parentheses indicate either not included or classified as "non-indicator" in the *National List of Plant Species that Occur in Wetlands: Northwest (Region 9)* (Reed 1988); statuses in parentheses are probable and based on biologist's experience.

In 2004, yellow and white sweet clover (*Melilotus officinalis* and *M. alba*, respectfully) were common species in this community type. During the 2005 and 2006 monitoring, species such as quackgrass, meadow fescue, western wheatgrass and redtop replaced the clover. Type 5 represents wetland vegetation growing in open and standing water. The herbaceous species noted growing along the waters edge include cattail (*Typha latifolia*), with scattered patches of hardstem bulrush (*Scirpus acutus*), creeping spikerush (*Eleocharis palustris*) and beaked sedge. Woody species transplanted around the pond perimeter include primarily sandbar willow, red-osier dogwood (*Cornus stolonifera*), hawthorn (*Crateagus douglasii*), and cottonwood. Other willow species were also observed. The willows and dogwoods were transplanted as rooted cuttings in the spring of 2003. Black cottonwood and hawthorn were planted as seedlings. Volunteer native woody species were also prevalent within the buffer zone as a result of grazing exclusion. The young cottonwoods and sandbar willows were noted primarily along the southern project boundary which will develop into riparian corridor. Sandbar willows transplanted along the western edge of the access road are reaching heights of 28 to 34 inches and will eventually form an attractive and functional woody buffer along the eastern end of the project site. There are approximately 31 known species of wetland plants with a FACW to OBL status within the assessment area.

Overall the planted woody species survival ranged from 65 to 80 percent across the project site. The survival around Ponds 1 and 2 was slightly lower (65 to 70 percent) compared to Ponds 3 and 4 which ranged from 75 to 80 percent survival. Hawthorn seedlings appeared more abundant and robust around Pond 3. Red-osier and willow species were particularly robust and vigorous across the project site. Cottonwood seedlings along Pond 4 are an impressive 22 to 32 inches tall. Within the **Monitoring Form** (**Appendix B**) are details related to the species and quantities planted around each pond.

The monitoring transect is located in the western half of the project site and runs from south to northwest. The vegetation transect results are detailed in the **Monitoring Form (Appendix B)** and are summarized in **Table 2** and **Charts 1** and **2**. The charts evaluate trends in vegetation community cover along the transect with a comparison between the past three years. **Chart 1** presents the length of each community as it is encountered from the start to the end of the transect. **Chart 2** shows graphically the total length occupied by each community type within

the transect. Overall, upland habitat and open water habitats have shrunk while wetlands have increased since 2004. In 2004, two wetland communities were present (**Chart 2**). In 2006 these same wetland communities were present with a third type developing (**Chart 2**).

Noxious weeds were noted at the site, including four species on the State of Montana list. These include spotted knapweed (*Centaurea maculosa*), leafy spurge (*Euphorbia esula*), Canada thistle (*Cirsium arvense*) and whitetop (*Cardaria draba*). Leafy spurge, whitetop and spotted knapweed were noted closer to the banks along the Yellowstone River; the majority of the plants were dead during the August monitoring. Canada thistle occurs in random patches scattered throughout the upland and wetland edges. Canada thistle plants were also noted on the island within Pond 1. Locations of the weeds were not mapped or surveyed, as the infestations are minor and do not constitute discreet vegetation communities. Weed control measures have been implemented by the landowner and include herbicide applications as well as mechanical and biological control methods. Effective weed control has significantly lowered the size and frequency of the Canada thistle, whitetop, spotted knapweed and leafy spurge infestations.

**Table 2:** ***2004 to 2006 Transect 1 data summary.***

| **Monitoring Year** | **2004** | **2005** | **2006** |
|---|---|---|---|
| **Transect Length (feet)** | 625 | 625 | 625 |
| **# Vegetation Community Transitions along Transect** | 4 | 4 | 4 |
| **# Vegetation Communities along Transect** | 6 | 7 | 7 |
| **# Hydrophytic Vegetation Communities along Transect** | 2 | 3 | 3 |
| **Total Vegetative Species** | 24 | 30 | 31 |
| **Total Hydrophytic Species** | 16 | 23 | 23 |
| **Total Upland Species** | 8 | 7 | 8 |
| **Estimated % Total Vegetative Cover** | 85 | 85 | 81 |
| **% Transect Length Comprised of Hydrophytic Vegetation Communities** | 29 | 41 | 44 |
| **% Transect Length Comprised of Upland Vegetation Communities** | 47 | 38 | 35 |
| **% Transect Length Comprised of Unvegetated Open Water** | 24 | 21 | 21 |
| **% Transect Length Comprised of Bare Substrate** | 0 | 0 | 0 |

**Chart 1:** ***Transect maps showing vegetation types from start of transect (0 feet) to end of transect (625 feet) for each year monitored.***

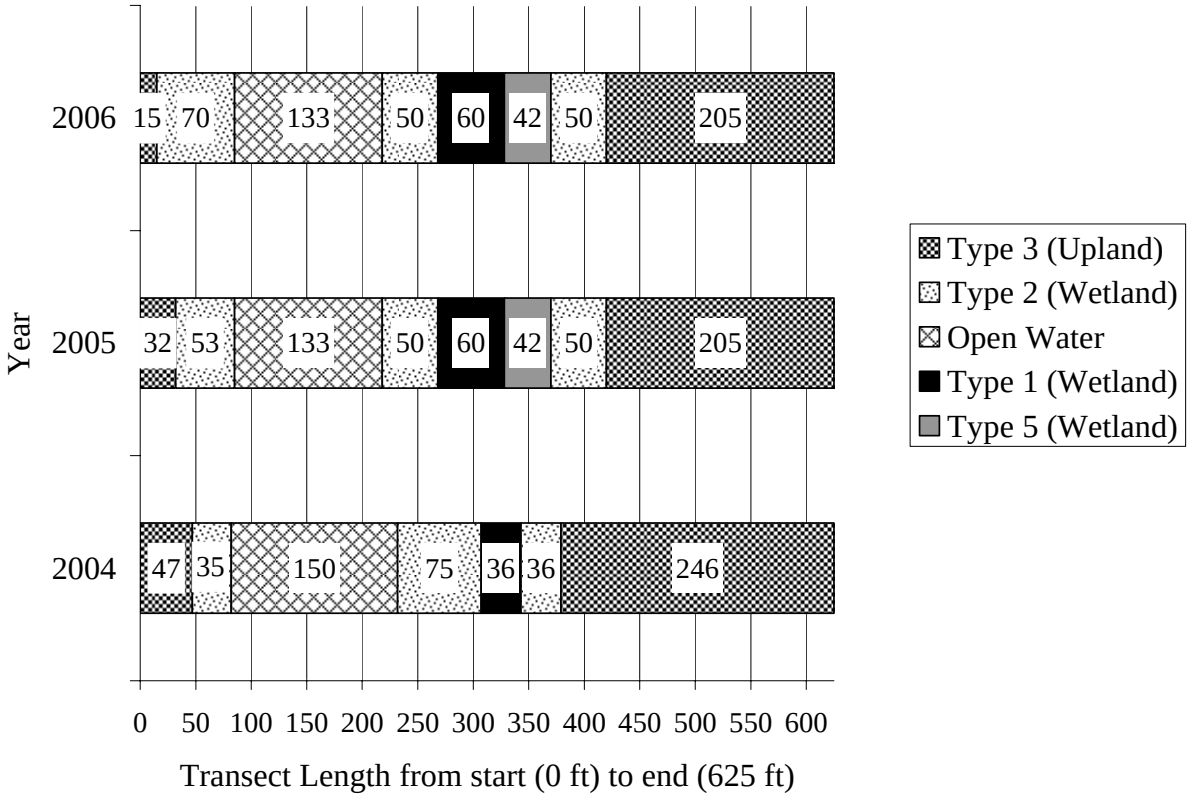
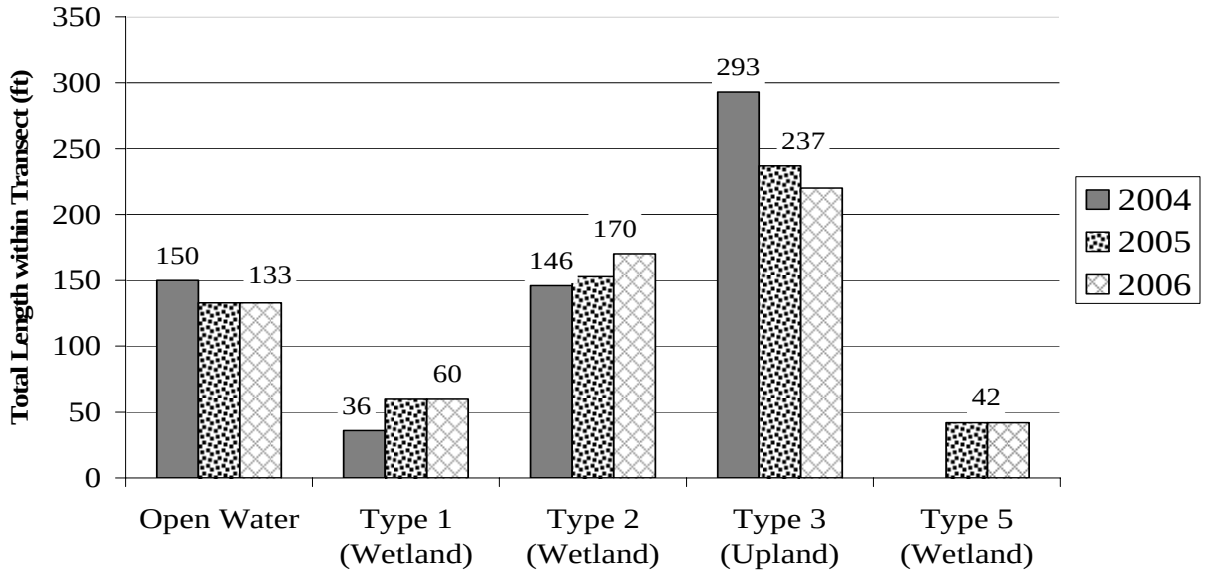



**Chart 2:** ***Length of vegetation communities within Transect 1 for each year monitored.***



### 3.3 Soils

The site was mapped as part of the Sweetgrass County Soil Survey (USDA 2001). Three soil mapping units are found within the assessment area. The dominant soil on the site is mapped as Lallie silty clay (250A). This soil is hydric, poorly to very poorly drained, with a water table less than 1 foot from the surface during the growing season. Soils are frequently flooded and are typically found on floodplains. Lallie is a silty clay to silty loam textured soil. Nesda-McIlwaine loam (107A) is a well-drained coarse textured loam over a sandy gravelly alluvium. This soil unit is borders the Yellowstone River within the assessment area. Fairway loam (135A) occupies the western third of the assessment area. This soil is a non-hydric loamy alluvium that is somewhat poorly drained soil found on floodplains.

Soils were sampled at two (2) sample points (SP-1 and SP-2) along Transect 1. Soil samples generally matched USDA descriptions. At SP-1, soils were a dark gray (10YR 4/1) from 1 to 8 inches and gray (10YR 5/1) from 8 to 13 inches. Faint dark yellowish brown mottles (10YR 4/6) were noted below 8 inches. The soil texture in the upper 8 inches was a silty loam and a silty clay loam below 8 inches. Soils were saturated at 10 inches. Soils within this sampling point are considered a hydric soil; hydrophytic vegetation and wetland hydrology were also present.

The soils at SP-2 were a grayish brown (10YR 5/2) silty loam from 0 to 14 inches without mottles. Soils were dry throughout the 14 inch profile. This sampling point does not meet the hydric soils, hydrophytic and wetland hydrology criteria.

### 3.4 Wetland Delineation

The delineated wetland boundary is depicted on **Figure 3** in **Appendix A**. The **COE Forms** are included in **Appendix B**. Aquatic vegetation is developing around the edge of all four pond margins. The gross wetland boundary encompasses 12.54 acres, including 1.50 acres of shallow open water (<4 feet deep). However, it should be noted that this total does not include two small pre-existing wetland lobes (totaling 0.05 acre) within the easement that extend to the southeast outside of the MDT-defined monitoring area in the northeast corner of the site (**Figure 3** in **Appendix A**). Pre-existing wetland acreage totaled 6.98 acres, which did include the two wetland lobes outside of the current monitoring area. Therefore, pre-existing wetland within the current monitoring area shown on **Figure 3** in **Appendix A** was approximately 6.98 - 0.05 = 6.93 acres. Wetland / shallow open water acreage within the shown monitoring area has therefore increased by approximately 12.54 – 6.93 = 5.61 acres since construction (2002). Credit is assigned for enhancement of the original 6.98 wetland acres on the property, as well as the open water (1.5 acres) and wetland creation (4.11 acres) achieved within the monitoring area to date. Please see **Section 3.10** for crediting calculations.

### 3.5 Wildlife

Wildlife species observed on the site in are listed in **Table 3.** Activities and densities associated with these observations are included on the monitoring form in **Appendix B**. Avian species will likely increase as migrating flocks key into this wetland that features open water as well as inundated emergent wetlands along the Yellowstone River flyway.

**Table 3:** ***2004 - 2006 wildlife species observed within the Norem Property Wetland Mitigation Site[1].***

| | |
|---|---|
| **REPTILES and AMPHIBIANS** | |
| Western Chorus Frog (*Pseudacris triseriata*) | |
| **BIRDS** | |
| American Kestrel (*Falco sparerius*) | Mallard (*Anas platyrhynchos*) |
| Blue-winged Teal (*Anas discors)* | **Osprey (*Pandion haliaetus*)** |
| Canada Goose (*Branta canadensis*) | **Red-tailed Hawk (*Buteo jamaicensis*)** |
| **Cedar Waxwing (*Bombycilla cedrorum*)** | **Red-winged Blackbird (*Agelaius phoeniceus*)** |
| **Common Snipe *(Gallinago gallinago*)** | Sandhill Crane (*Grus canadensis*)[2] |
| **Common Yellowthroat (*Geothlypis trichas*)** | Savanah Sparrow (*Passerculus sandwichensis*) |
| Eastern Kingbird (*Tyrannus tyrannus*) | Spotted Sandpiper *(Actitis macularia*) |
| European Starling *(Sturnus vulgaris*) | **Tree Swallow *(Tachycineta bicolor*)** |
| **Great Blue Heron *(Ardea herodias*)** [3] | Turkey Vulture (*Cathartes aura*)[2] |
| Greater Yellowlegs (*Tringa melanoleuca*) | Western Meadowlark (*Sturnella neglecta*) |
| Gull (unidentified species) | Wild Turkey (*Meleagris gallopavo*)[2] |
| Killdeer (*Charadrius vociferous*) | Wilson's Phalarope (*Phalaropus tricolor*) |
| Least Sandpiper (*Calidris minitilla*) | |
| **MAMMALS** | |
| **Mule Deer (*Odocoileus hemionus*)** | |
| **Raccoon *(Procyon lotor*)** | |
| **Red fox (V*ulpes vulpes*)** | |

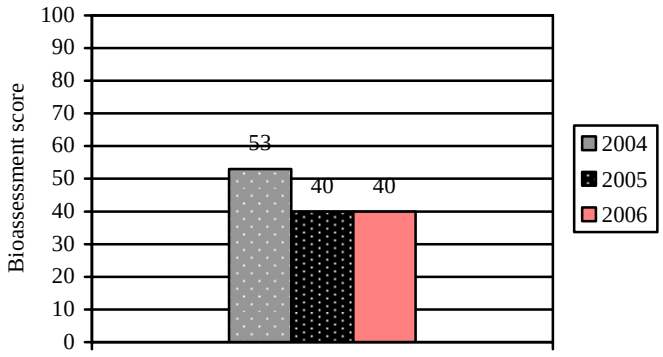
[1] **Bolded** species indicate those documented within the analysis area in 2006.
[2] Nest observed by Landowner.
[3] A young-of-the-year was found dead by the Landowner on the edge of the northern pond.

## 3.6 Macroinvertebrates

Macroinvertebrate sampling results are provided in **Appendix F** and were summarized by Rhithron Associates, Inc. in the italicized sections below (Bollman 2006).

> *Very low abundance characterized this site in both 2005 and 2006, suggesting monotonous habitats. Assessment scores and interpretations are unreliable when depauperate assemblages are encountered. The hemoglobin-bearing midge* Dicrotendipes *sp. dominated the sample; these animals are typically associated with hypoxic sediments. Water quality impairment seems likely at this site. Bioassessment scores indicate poor conditions.*

**Chart 3:** ***Bioassessment scores from 2004 to 2006 for the Norem Property Wetland Mitigation Site..***




## 3.7 Functional Assessment

Completed functional assessment forms are included in **Appendix B** and summarized in **Table 4**. Pre-construction functional assessments were completed for the wetlands by Maxim (2001) (**Table 4)**. The site rated as an overall Category II wetland and scores 84.02 functional units. This represents an increase of approximately 50.76 units since 2001. 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.

## 3.8 Photographs

Representative photos taken from photo points and transect ends are included in **Appendix C.**

## 3.9 Maintenance Needs/Recommendations

All outflow structures were functioning and the fence around the wetland was intact.

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

***Table 4: Summary of the 2001 and 2004 to 2006 wetland function/value ratings and functional points at the Norem Property Wetland Mitigation Project.***

| Function and Value Parameters From the 1999 MDT Montana Wetland Assessment Method | 2001 Pre-construction | 2004 Post-construction | 2005 Post-construction | 2006 Post-construction |
|---|---|---|---|---|
| Listed/Proposed T&E Species Habitat | Low (0) | Low (0.3) | Low (0.3) | Low (0.3) |
| MTNHP Species Habitat | Low (0.1) | Mod (0.6) | Mod (0.6) | Mod (0.6) |
| General Wildlife Habitat | Mod (0.5) | Mod (0.9) | Mod (0.9) | Exc (1.0) |
| General Fish/Aquatic Habitat | Low (0.1) | NA | NA | NA |
| Flood Attenuation | Mod (0.5) | Mod (0.5) | Mod (0.5) | Mod (0.5) |
| 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) | High (0.9) | High (0.9) | High (0.9) |
| Sediment/Shoreline Stabilization | NA | NA | NA | NA |
| Production Export/Food Chain Support | Mod (0.7) | Mod (0.7) | Mod (0.7) | Mod (0.7) |
| Groundwater Discharge/Recharge | High (1.0) | High (1.0) | High (1.0) | High (1.0) |
| Uniqueness | Low (0.2) | Mod (0.4) | Mod (0.4) | Mod (0.4) |
| Recreation/Education Potential | Low (0.1) | Mod (0.7) | Mod (0.7) | Mod (0.7) |
| Actual Points/Possible Points | 4.8/11 | 6.6/10 | 6.6/10 | 6.7/10 |
| % of Possible Score Achieved | 50 | 66 | 66 | 67 |
| Overall Category | III | II | II | II |
| **Total Acreage of Assessed Wetlands within Easement** | **6.93** | **10.82** | **11.39** | **12.54** |
| **Functional Units (acreage x actual points) (fu)** | **33.26** | **71.41** | **75.17** | **84.02** |
| **Net Acreage Gain (ac)** | **NA** | **3.89** | **4.46** | **5.61** |
| **Total Functional Unit Gain (fu)** | **NA** | **38.15** | **41.91** | **50.76** |

## 3.10 Current Credit Summary

MDT anticipates that wetland enhancement and creation on this site will provide 14.71 acres of credit within a 26.88-acre conservation easement. A summary table from the COE of potential wetland credits allows credit for enhancement of existing wetlands (2.32 acres credit), wetland creation (9.46 acres credit), open water creation (1.58 acres credit) and buffer zone (1.50 acres credit) (**Appendix G**). 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. As of 2006, the approximate assignable wetland credit at the site is 9.43 acres or 64% of the goal, as outlined in **Table 5**.

**Table 5:** ***2006 wetland credits and acreages for the Norem Property Wetland Mitigation Site.***

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

The net functional unit gain has increased to over 50 points since 2001 due to increase in wetland size. The wetland is ranked as a Category II site.

## 4.0 REFERENCES

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Environmental Laboratory. 1987. *Corps of Engineers Wetlands Delineation Manual*. U.S. Army Corps of Engineers, Washington, DC.

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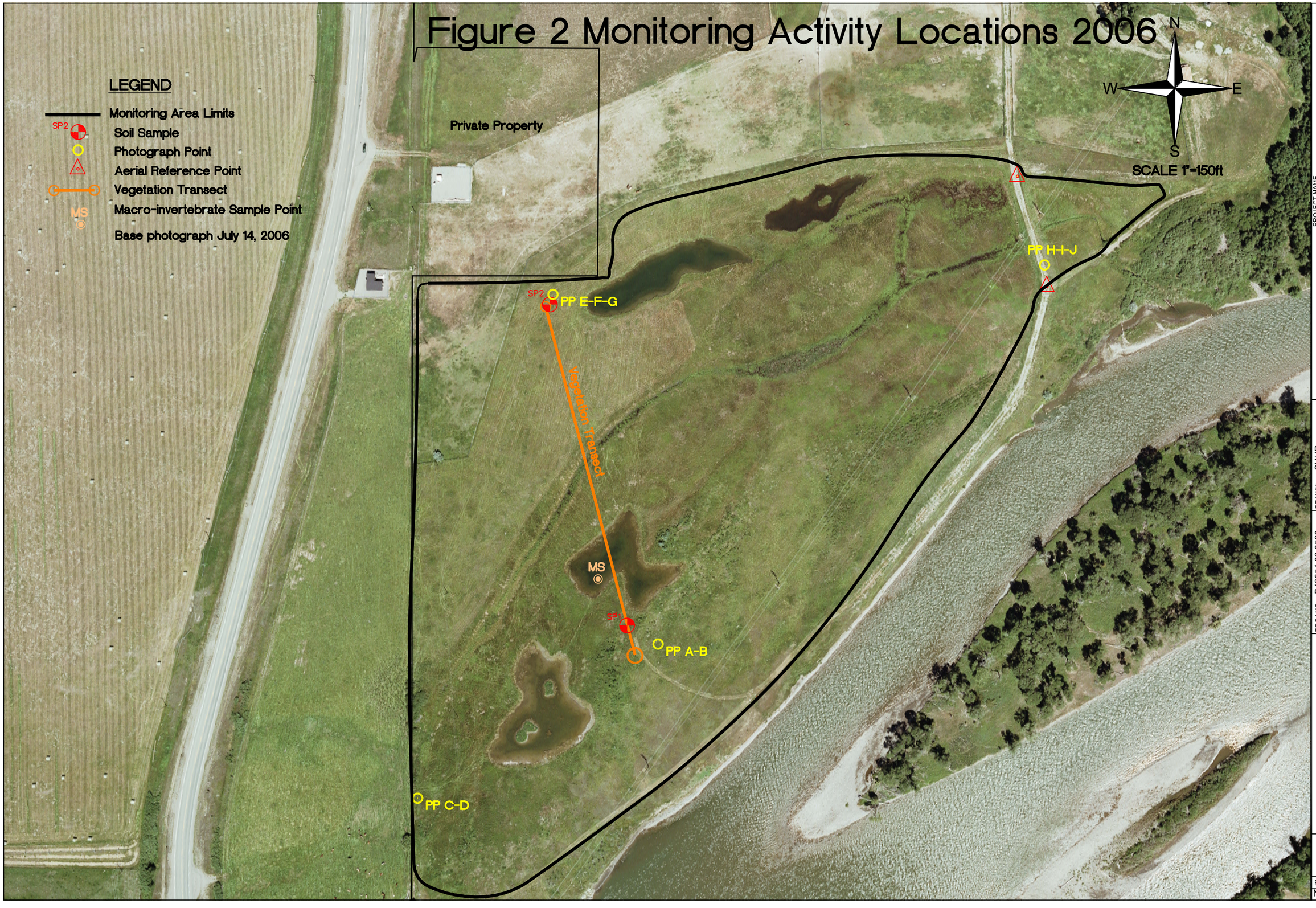
# Appendix A

## FIGURES 2 & 3

*MDT Wetland Mitigation Monitoring*
*Norem Property*
*Big Timber, Montana*

# Figure 2 Monitoring Activity Locations 2006




PROJECT NAME
MDT NOREM WETLAND MITIGATION

DRAWING TITLE
MONITORING ACTIVITY LOCATIONS 2006

| | |
|---|---|
| PROJ NO: | B430354.00 0508 |
| LOCATION: | BIG TIMBER, MT |
| SCALE: | 1" = 150' |
| FILE NAME: | 2006 Base.dwg |
| DRAWN: | SH/JR |
| PROJ MGR: | J. BERGLUND |
| CHECKED: | CH |
| APPVD: | JB |


PBSJ
3810 Valley Commons Drive
Suite 4
Bozeman, MT 59718


FIGURE
2
OF

REV -
Nov/17/2006

# Figure 3 Mapped Site Features 2006

## LEGEND

- Monitoring Area Limits
- Wetland Limits
- Vegetation Community Boundary
- Open Water Boundary
- Historic Wetland
- Base photograph July 14, 2006

| | |
|---|---|
| Gross Wetland Area = | 12.54 Acres* |
| Open Water = | 1.50 Acres* |
| Historic Wetland Area = | 6.93 Acres* |
| Net Wetland Area = | 4.11 Acres* |

* within Monitoring Area Limits

### VEGETATION COMMUNITIES

1. Mixed Carex species
2. Carex sp./Juncus balticus
3. Bromus inermis\Festuca pratensis
4. Populus trichiocarpa (juvenile)/Agropyron repens
5. Typha latifolia

Private Property

POND 1

POND 2

POND 3

POND 4

N

W

E

S

SCALE 1"=150ft

PROJECT NAME
MDT NOREM WETLAND MITIGATION

DRAWING TITLE
MAPPED SITE FEATURES 2006

| | | | |
|---|---|---|---|
| PROJ NO: B43054.00 0508 | DRAWN: SH/JR | | |
| LOCATION: BIG TIMBER, MT | PROJ MGR: J. BERGLUND | | |
| SCALE: 1" = 150' | CHECKED: CH | APPVD: JB | |
| FILE NAME: 2006 Base.dwg | | | |

PBSJ
3810 Valley Commons Drive
Suite 4
Bozeman, MT 59718

FIGURE 3 OF -

REV -

Dec/18/2006

# Appendix B

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## 2006 WETLAND MITIGATION SITE MONITORING FORMS
## 2006 BIRD SURVEY FORMS
## 2006 COE WETLAND DELINEATION FORMS
## 2006 FUNCTIONAL ASSESSMENT FORMS

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***MDT Wetland Mitigation Monitoring***
***Norem Wetland Project***
***Big Timber, Montana***

**PBS&J / MDT WETLAND MITIGATION SITE MONITORING FORM**

Project Name: **Norem Wetland Project** Project Number: **B43054-0508**
Assessment Date: **August 1, 2006** Person(s) conducting the assessment: **CH/LWC**
Location: **2.0 miles NE of Big Timber** MDT District: **Billings** Milepost: _____
Legal Description: T **1N** R **14E** Section **12**
Weather Conditions: **partly cloudy, some rain** Time of Day: **7 AM**
Initial Evaluation Date: **August 13, 2004** Monitoring Year: **third** # Visits in Year: **1**
Size of evaluation area: **26.88 acres** Land use surrounding wetland: **grazing/hay/residential**

## HYDROLOGY

Surface Water Source: **Groundwater and irrigation return.**
Inundation: **Present** Average Depth: **2 feet** Range of Depths: **1-3 ft**
Percent of assessment area under inundation: **40%**
Depth at emergent vegetation-open water boundary: **2 feet**
If assessment area is not inundated then are the soils saturated within 12 inches of surface: **Yes**
Other evidence of hydrology on the site (ex. – drift lines, erosion, stained vegetation, etc.):
**water marks, silts/sediment on wetland vegetation.**

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

| Well Number | Depth | Well Number | Depth | Well Number | Depth |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

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

**COMMENTS / PROBLEMS:**

_____

## VEGETATION COMMUNITIES

Community Number: **1** Community Title (main spp): **Mixed Carex species**

| Dominant Species | % Cover | Dominant Species | % Cover |
|---|---|---|---|
| Carex utriculata | 4 = 21-50% | Scirpus acutus | + = < 1% |
| C. nebrascensis | 3 = 11-20% | Typha latifolia | + = < 1% |
| C. aquatilis | 2 = 6-10% | Mentha arvense | 1 = 1-5% |
| C. lanuginosa | 2 = 6-10% | Salix exigua | 1 = 1-5% |
| Glyceria grandis | 1 = 1-5% | Scirpus pungens | 1 = 1-5% |
| Juncus balticus | 1 = 1-5% | Juncus torreyi | 1 = 1-5% |

Comments / Problems: **Soils saturated at the surface or ponded water.**

Community Number: **2** Community Title (main spp): **Carex sp./Juncus balticus**

| Dominant Species | % Cover | Dominant Species | % Cover |
|---|---|---|---|
| Carex nebrascensis | 3 = 11-20% | J. torreyi | 1 = 1-5% |
| C. lanuginosa | 1 = 1-5% | Agrostis alba | 1 = 1-5% |
| C. aquatilis | 1 = 1-5% | Scirpus pungens | 2 = 6-10% |
| C. arcta | 1 = 1-5% | Potentilla anserina | 1 = 1-5% |
| Juncus balticus | 3 = 11-20% | Spartana pentinata | 1 = 1-5% |
| J. longistylis | 1 = 1-5% | Mentha arvensis | 1 = 1-5% |

Comments / Problems: **This is a very diverse community, other species present include Rumex crispus, Alopecurus arundinacea, Glyceria striata, Deschampsia cespitosa, Epilobium ciliatum and Polygonum punctatum. Cirsium arvense represents less than 1% of the cover in this CT.**

Community Number: **3** Community Title (main spp): **Bromus inermis/Festuca pratensis**

| Dominant Species | % Cover | Dominant Species | % Cover |
|---|---|---|---|
| Bromus inermis | 3 = 11-20% | Agropyron dasytachyum | 1 = 1-5% |
| Festuca pratensis | 3 = 11-20% | Equistem arvense | 1 = 1-5% |
| Agropyron smithii | 2 = 6-10% | Juncus balticus | 1 = 1-5% |
| Poa pratensis | 2 = 6-10% | Cirsium arvense | 1 = 1-5% |
| Agropyron repens | 2 = 6-10% | POTANS | + = < 1% |
| Agrostis alba | 1 = 1-5% | Melilotus officinalis | + = < 1% |

Comments / Problems: **Noting an increase in cover by Festuca pratensis compared to 2005. Agropyron smithii co-dominants in the driest portions of the project site. Festuca arundinacea replaces F. pratensis north of the ponds.**

Community Number: **4** Community Title (main spp): **Populus trichocarpa/Agropyron repens**

| Dominant Species | % Cover | Dominant Species | % Cover |
|---|---|---|---|
| Populus trichocarpa (1-5.5 ft) | 4 = 21-50% | Bromus inermis | 1 = 1-5% |
| Agropyron repens | 3 = 11-20% | Phlaris arundinacea | 1 = 1-5% |
| Festuca pratense | 2 = 6-10% | Juncus balticus | 1 = 1-5% |
| Agropyron smithii | 1 = 1-5% | Salix exigua | 1 = 1-5% |
| Poa pratensis | 1 = 1-5% | Alopecurus pratensis | 1 = 1-5% |
| Agrostis alba | 1 = 1-5% | Phleum pratense | 1 = 1-5% |

Comments / Problems: **This riparian community type will potentially be a very valuable ecological asset to the Yellowstone River ecosystem. This buffer zone is spreading toward the river-noted root suckers closer to the trail/old road.**

## VEGETATION COMMUNITIES (continued)

Community Number: **5** Community Title (main spp): **Typha latifolia**

| Dominant Species | % Cover | Dominant Species | % Cover |
|---|---|---|---|
| Typha latifolia | 5 = > 50% | | |
| Scipus acutus | 2 = 6-10% | | |
| Carex utriculuta | 2 = 6-10% | | |
| Eleocharis palustris | 1 = 1-5% | | |
| Scirpus pungens | 1 = 1-5% | | |
| Spartana pectinata | 1 = 1-5% | | |

Comments / Problems: **This community represents the wettest vegetation type within the project site.**

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

| Dominant Species | % Cover | Dominant Species | % Cover |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
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| | | | |

Comments / Problems: _____

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

| Dominant Species | % Cover | Dominant Species | % Cover |
|---|---|---|---|
| | | | |
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| | | | |

Comments / Problems: _____

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

| Dominant Species | % Cover | Dominant Species | % Cover |
|---|---|---|---|
| | | | |
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Comments / Problems: _____

**Additional Activities Checklist:**

☒ Record and map vegetative communities on aerial photograph.

## COMPREHENSIVE VEGETATION LIST

| Plant Species | Vegetation Community Number (s) | Plant Species | Vegetation Community Number (s) |
|---|---|---|---|
| Agropyron dasystachyum | 3, 4 | Juncus torreyi | 1, 2 |
| Agropyron repens | 3, 4 | Lithosperum arvense | 3 |
| Agropyron smithii | 3, 4 | Melilotus alba | 3, 4 |
| Agropyron trachycaulum | 4 | Melilotus officinalis | 3, 4 |
| Agrostis alba | 2, 3, 4 | Mentha arvense | 1, 2 |
| Alopecurus arundinacea | 2 | Phalaris arundinacea | 2, 4 |
| Alopecurus pratensis | 2, 4 | Phleum pratense | 4 |
| Beckmannia syzigachne | 2 | Poa pratensis | 3, 4 |
| Bromus inermis | 3, 4 | Polygonum punctatum | 2 |
| Bromus tectorum | 4 | Populus trichocarpa | 2, 3, 4 |
| Cardaria draba | 4 | Potentilla anserina | 2, 3 |
| Carex aquatilis | 1, 2 | Rumex crispus | 2 |
| Carex arcta | 2 | Sagittaria sp. | open water |
| Carex lanuginosa | 1, 2 | Salix alba (lutea) | 2 |
| Carex nebrascensis | 1, 2 | Salix exigua | 1, 2, 4 |
| Carex utriculata | 1, 2, 5 | Scirpus acutus | 1, 2, 5 |
| Centaurea maculosa | 3, 4 | Scirpus pungens | 1, 2, 5 |
| Cirsium arvense | 2, 3, 4 | Sisymbrium altissmum | 3 |
| Cornus stolonifera | 1, 2 | Spartana pectinata | 2, 5 |
| Crataegus douglasii | 1, 2 | Solidago occidentalis | 2 |
| Crepis acuminata | 3, 4 | Taraxacum officinale | 3 |
| Deschampsia cespitosa | 2 | Thlaspi arvense | 3 |
| Eleocharis palustris | 1, 5 | Tragopogon dubius | 3 |
| Epilobium ciliatum | 2 | Typha latifolia | 1, 5 |
| Equisetum arvense | 2, 3 | | |
| Erigeron lanatus | 3 | | |
| Euphorbia esula | 3, 4 | | |
| Festuca arundinacea | 3 | | |
| Festuca pratensis | 3, 4 | | |
| Glyceria grandis | 1 | | |
| Glyceria striata | 2 | | |
| Glycyrrhiza lepidota | 2, 4 | | |
| Juncus balticus | 1, 2, 3, 4 | | |
| Juncus longistylis | 2 | | |
| | | | |
| | | | |
| | | | |

**Comments / Problems:**

## PLANTED WOODY VEGETATION SURVIVAL

| Plant Species | Number Originally Planted | Mortality Causes & General Information |
|---|---|---|
| Pond # 1 | | No new mortality was noted for the trees and shrubs planted around the perimeter of this pond. Overall, the woody species are doing very well. Zone planting is developing with Salix species along the N, NW pond perimeter. Cornus stolonifera continues to thrive in the saturated soils along the pond margins, patches of Crateagus species were observed during the 2006 monitoring visit. The percent survival is 65 to 70% (same as in 2005) but higher than in 2004 due to the re-growth of the Cornus stolonifera. |
| Cornus stolonifera | 522 | |
| Salix sp. (primarily exigua) | 561 | |
| Crateagus douglasii | 15 | |
| Populus trichocarpa | 46 | |
| | | |
| | | |
| Pond #2 | | In 2006 no new mortality to the transplanted trees and shrubs were noted. This pond is within the transect line, young Cornus stolonifera, Populus trichocarpa and Salix species were noted during the 2006 monitoring. Numerous new root suckers of Salix and Populus species were noted along the SE portion of the pond perimeter. This may be the encroachment of species from the buffer zone or the development of transplanted species not noticed in earlier visits. The 69% survival estimate from 2005 remains the same in 2006. |
| Cornus stolonifera | 200 | |
| Salix sp. (primarily exigua) | 314 | |
| Crateagus douglasii | 100 | |
| Populus trichocarpa | 30 | |
| | | |
| | | |
| | | |
| Pond #3 | | In 2006 transplanted woody species continue to thrive along this pond. Cornus stolinfera, Salix alba, S. exigua and Populus trichocarpa are healthy and robust. Many of the woody plants are 20 to 28 inches tall. Crateagus plants were observed and are healthy but with a slower growth rate - these plants ranged from 6 to 12 inches in height. The estimated 77% survival from 2005 remains the same in 2006. |
| Cornus stolonifera | 200 | |
| Salix sp. (primarily exigua) | 314 | |
| Crateagus douglasii | 100 | |
| Populus trichocarpa | 300 | |
| | | |
| | | |
| | | |
| Pond #4 | | In 2006 transplanted woody species were robust and healthy along this pond. Several different Salix sp. were noted as well as Populus trichocarpa and P. angustifolia. Cottonwood seedlings along the north side are impressive 22-32 inches tall. The estimated survival of 75 to 80% from 2005 remains the same in 2006. |
| Cornus stolonifera | 126 | |
| Salix sp. (primarily exigua) | 275 | |
| Populus trichocarpa | 70 | |
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**Comments / Problems:** _____

## WILDLIFE

### Birds

Were man-made nesting structures installed? **Yes**
If yes, type of structure: **osprey on tel-pole** How many? **1**
Are the nesting structures being used? **Yes**
Do the nesting structures need repairs? **No**

### Mammals and Herptiles

| Mammal and Herptile Species | Number Observed | Indirect Indication of Use | | | |
|---|---|---|---|---|---|
| | | Tracks | Scat | Burrows | Other |
| Mule deer | 1 | ☐ | ☐ | ☐ | |
| Raccoon | | ☒ | ☐ | ☐ | |
| Red fox | | ☒ | ☐ | ☐ | |
| White-tailed deer | | ☒ | ☐ | ☐ | |
| | | ☐ | ☐ | ☐ | |
| | | ☐ | ☐ | ☐ | |
| | | ☐ | ☐ | ☐ | |
| | | ☐ | ☐ | ☐ | |

**Additional Activities Checklist:**
**Yes** Macroinvertebrate Sampling (if required)

**Comments / Problems:** **Osprey nest platform was in place prior to the project.**

## PHOTOGRAPHS

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

**Photograph Checklist:**

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

| Location | Photograph Frame # | Photograph Description | Compass Reading (°) |
|---|---|---|---|
| A | | At southern end of transect looking NW | NW |
| B | | At southern end of transect looking SW | SW |
| C | | Shallow open water pond | West |
| D | | Southernwestern corner of the property | North |
| E | | At northern end of the transect looking South | South |
| F | | At northern end of transect looking SW (upland) | SW |
| G | | At northern end of transect, north side of pond | East |
| H | | Looking SW across CT 1 and 2 (wetlands) | SW |
| I | | Willow establishment along eastern road edge | North |
| J | | Buffers between the river and wetlands | SW |
| C-1 | | Shrub establishment in saturated soils | |
| C-2 | | Aquatic vegetation - Sagittaria sp.in ponds | |
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**Comments / Problems:** _____

## GPS SURVEYING

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

GPS Checklist:

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

Comments / Problems: _____

## WETLAND DELINEATION

(attach COE delineation forms)

At each site conduct these checklist items:

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

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

Comments / Problems: **Survey was done in 2004**

## FUNCTIONAL ASSESSMENT

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

Comments / Problems: _____

## MAINTENANCE

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

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

Comments / Problems: _____

## MDT WETLAND MONITORING – VEGETATION TRANSECT

Site: **Norem Property** Date: **August 1, 2006** Examiner: **CH/LWC**
Transect Number: **1** Approximate Transect Length: **625 feet** Compass Direction from Start: **0˚** Note: _____

| Vegetation Type A: **CT 3 (upland)** | |
|---|---|
| Length of transect in this type: 15 feet | |
| **Plant Species** | **Cover** |
| FESPRA | 4 = 21-50% |
| AGRREP | 2 = 6-10% |
| AGRSMI | 2 = 6-10% |
| POPTRI | 2 = 6-10% |
| JUNBAL | 2 = 6-10% |
| POAPRA | 1 = 1-5% |
| CIRARV | 1 = 1-5% |
| EQUARV | 1 = 1-5% |
| SALEXI | 1 = 1-5% |
| PHLARU | + = < 1% |
| MELOFF | + = < 1% |
| Total Vegetative Cover: | 90% |

| Vegetation Type B: **CT 2 (wetland)** | |
|---|---|
| Length of transect in this type: 70 feet | |
| **Plant Species** | **Cover** |
| JUNBAL | 3 = 11-20% |
| CARNEB | 3 = 11-20% |
| POTANS | 2 = 6-10% |
| CARLAN | 1 = 1-5% |
| CARAQU | 1 = 1-5% |
| MENARV | 1 = 1-5% |
| SALEXU | 1 = 1-5% |
| ALOPRA | 1 = 1-5% |
| TYPLAT | 1 = 1-5% |
| CARUTR | 1 = 1-5% |
| SCIPUN | 1 = 1-5% |
| Total Vegetative Cover: | 85% |

| Vegetation Type C: **Open Water <4ft** | |
|---|---|
| Length of transect in this type: 133 feet | |
| **Plant Species** | **Cover** |
| Open water | 5 = > 50% |
| TYPLAT | 1 = 1-5% |
| SCIPUN | 1 = 1-5% |
| GLYGRA | 1 = 1-5% |
| JUNTOR | 1 = 1-5% |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| Total Vegetative Cover: | 20% |

| Vegetation Type D: **CT 2** | |
|---|---|
| Length of transect in this type: 50 feet | |
| **Plant Species** | **Cover** |
| CARNEB | 3 = 11-20% |
| CARLAN | 2 = 6-10% |
| CARUTR | 2 = 6-10% |
| JUNBAL | 3 = 11-20% |
| POTANS | 1 = 1-5% |
| AGRALB | 2 = 6-10% |
| GLYSTR | 1 = 1-5% |
| EPICIL | 1 = 1-5% |
| | |
| | |
| | |
| | |
| Total Vegetative Cover: | 80% |

## MDT WETLAND MONITORING – VEGETATION TRANSECT

Site: **Norem Property** Date: **August 1, 2006** Examiner: **CH**
Transect Number: **1** Approximate Transect Length: **625 feet** Compass Direction from Start: **0˚** Note: _____

| Vegetation Type E: **CT 1 (wetland)** | |
|---|---|
| Length of transect in this type: 60 feet | |
| **Plant Species** | **Cover** |
| CARUTR | 3 = 11-20% |
| CARNEB | 2 = 6-10% |
| CARAQU | 3 = 11-20% |
| ELEPAL | 1 = 1-5% |
| GLYGRA | 1 = 1-5% |
| SCIACU | 1 = 1-5% |
| TYPLAT | 1 = 1-5% |
| JUNBAL | 1 = 1-5% |
| MENARV | + = < 1% |
| | |
| | |
| Total Vegetative Cover: | 75% |

| Vegetation Type F: **CT5 (wetland)** | |
|---|---|
| Length of transect in this type: 42 feet | |
| **Plant Species** | **Cover** |
| TYPLAT | 4 = 21-50% |
| CARUTR | 2 = 6-10% |
| SCIACU | 2 = 6-10% |
| SCIPUL | 1 = 1-5% |
| GLYGRA | 1 = 1-5% |
| CARNEB | 1 = 1-5% |
| POLPUN | + = < 1% |
| | |
| | |
| | |
| | |
| Total Vegetative Cover: | 85% |

| Vegetation Type G: **CT 2 (wetland)** | |
|---|---|
| Length of transect in this type: 50 feet | |
| **Plant Species** | **Cover** |
| CARUTR | 2 = 6-10% |
| CARLAN | 2 = 6-10% |
| CARNEB | 1 = 1-5% |
| JUNBAL | 3 = 11-20% |
| JUNLON | 1 = 1-5% |
| AGRALB | 2 = 6-10% |
| SCIPUN | 2 = 6-10% |
| CARAQU | 1 = 1-5% |
| CIRARV | + = < 1% |
| | |
| | |
| | |
| Total Vegetative Cover: | 75% |

| Vegetation Type H: **CT 3 (upland)** | |
|---|---|
| Length of transect in this type: 205 feet | |
| **Plant Species** | **Cover** |
| FESPRA | 3 = 11-20% |
| BROINE | 3 = 11-20% |
| AGRSMI | 2 = 6-10% |
| POAPRA | 2 = 6-10% |
| JUNBAL | 1 = 1-5% |
| CIRARV | 1 = 1-5% |
| EQUARV | 1 = 1-5% |
| AGRDAS | 1 = 1-5% |
| LITARV | 1 = 1-5% |
| MELOFF | 1 = 1-5% |
| | |
| | |
| Total Vegetative Cover: | 80% |

## MDT WETLAND MONITORING – VEGETATION TRANSECT

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

Percent of perimeter developing wetland vegetation (excluding dam/berm structures): **90%**

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

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

Comments: _____

## BIRD SURVEY – FIELD DATA SHEET

Site: **Norem Property** Date: **8/1/06**
Survey Time: **7AM** to **9AM**

| Bird Species | # | Behavior | Habitat | Bird Species | # | Behavior | Habitat |
|---|---|---|---|---|---|---|---|
| Common Yellowthroat | 2 | BD | UP | | | | |
| Red-tailed Hawk | 3 | F | UP | | | | |
| Osprey | 1 | N | UP | | | | |
| Red-winged Blackbird | 6 | BD | MA | | | | |
| Tree Swallow | 20 | F | MA | | | | |
| Cedar Waxwing | 3 | FO | MA | | | | |
| Common Snipe | 1 | F | MA | | | | |
| Great Blue Heron* | 1 | | MA | | | | |
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**BEHAVIOR CODES**
**BP** = One of a breeding pair
**BD** = Breeding display
**F** = Foraging
**FO** = Flyover
**L** = Loafing
**N** = Nesting

**HABITAT CODES**
**AB** = Aquatic bed
**FO** = Forested
**I** = Island
**MA** = Marsh
**MF** = Mud Flat
**OW** = Open Water
**SS** = Scrub/Shrub
**UP** = Upland buffer
**WM** = Wet meadow
**US** = Unconsolidated shore

Weather: **cloudy**

Notes: ***Found dead by owner on bank of north pond**

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

| | |
|---|---|
| Project / Site: **Norem Property** | Date: **August 1, 2006** |
| Applicant / Owner: **MDT** | County: **Sweetgrass** |
| Investigator: **CH/LWC** | State: **Montana** |

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

## VEGETATION

| Dominant Species | Stratum | Indicator | Dominant Species | Stratum | Indicator |
|---|---|---|---|---|---|
| 1. *JUNBAL* | Herb | OBL | 11. | | |
| 2. *POPANS* | Herb | OBL | 12. | | |
| 3. *POPTRI (seedling/sprout)* | Tree | FAC | 13. | | |
| 4. *CARNEB* | Herb | OBL | 14. | | |
| 5. *POAPRA* | Herb | FACU+ | 15. | | |
| 6. *EPICIL* | Herb | FACW- | 16. | | |
| 7. *MENARV* | Herb | FAC | 17. | | |
| 8. *CIRARV* | Herb | FACU+ | 18. | | |
| 9. *AGRSMI* | Herb | FACU | 19. | | |
| 10. | | | 20. | | |

| | |
|---|---|
| Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-): **6** / **9** = **86**% | FAC Neutral: **4** / **7** = **57**% |
| Remarks: **66% hydrophytic vegetation** | |

## HYDROLOGY

| | |
|---|---|
| **Yes** Recorded Data (Describe in Remarks):<br>**N/A** Stream, Lake, or Tide Gauge<br>**Yes** Aerial Photographs<br>**N/A** Other<br><br>**No** No Recorded Data | Wetland Hydrology Indicators<br>Primary Indicators:<br>**NO** Inundated<br>**YES** Saturated in Upper 12 Inches<br>**NO** Water Marks<br>**NO** Drift Lines<br>**NO** Sediment Deposits<br>**NO** Drainage Patterns in Wetland |
| Field Observations:<br>Depth of Surface Water **None** ____ (in.)<br>Depth to Free Water in Pit > **14** (in.)<br>Depth to Saturated Soil = **10** (in.) | Secondary Indicators (2 or more required):<br>**NO** Oxidized Root Channels in Upper 12 inches<br>**NO** Water-Stained Leaves<br>**NO** Local Soil Survey Data<br>**YES** FAC-Neutral Test<br>**NO** Other (Explain in Remarks) |
| Remarks: **Soils saturated at 10 inches** | |

## SOILS

Map Unit Name (Series and Phase): **Nesda-McIlwaine loams**
Map Symbol: **107A** Drainage Class: **well-drained** Mapped Hydric Inclusion? _
Taxonomy (Subgroup): **Fine sandy loam** Field Observations confirm Mapped Type? **No**

**Profile Description**

| Depth (inches) | Horizon | Matrix Color (Munsell Moist) | Mottle Color(s) (Munsell Moist) | Mottle Abundance/Contrast | Texture, Concretions, Structure, etc. |
|---|---|---|---|---|---|
| 1-8 | | 10 YR 4/1 | /<br>/ | N/A<br>N/A | <br>Silty loam |
| 8-13 | A/B | 10 YR 5/1 | 10 YR 4/6<br>/ | Few<br>Faint | <br>Silty clay loam |
| | | / | /<br>/ | N/A<br>N/A | |
| | | / | /<br>/ | N/A<br>N/A | |
| | | / | /<br>/ | N/A<br>N/A | |

Hydric Soil Indicators:

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

Remarks: **Mottles noted below 8 inches.**

## WETLAND DETERMINATION

Hydrophytic Vegetation Present? **YES**
Wetland Hydrology Present? **YES**
Hydric Soils Present? **YES**

Is this Sampling Point within a Wetland? **YES**

Remarks: **Slight increase in wetland boundary to the south.**

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

| | |
|---|---|
| Project / Site: **Norem Property** | Date: **August 1, 2006** |
| Applicant / Owner: **MDT** | County: **Sweetgrass** |
| Investigator: **CH/LWC** | State: **Montana** |

| | |
|---|---|
| Do Normal Circumstances exist on the site? **Yes** | Community ID: **Upland** |
| Is the site significantly disturbed (Atypical Situation)? **No** | Transect ID: **1** |
| Is the area a potential Problem Area? **No** | Plot ID: **SP-2** |
| (If needed, explain on reverse side) | |

## VEGETATION

| Dominant Species | Stratum | Indicator | Dominant Species | Stratum | Indicator |
|---|---|---|---|---|---|
| 1. *FESPRAL* | Herb | FACU+ | 11. | | |
| 2. *BROINE* | Herb | NI | 12. | | |
| 3. *AGRSMI* | Herb | FACU | 13. | | |
| 4. *JUNBAL* | Herb | OBL | 14. | | |
| 5. *POAPRA* | Herb | FACU+ | 15. | | |
| 6. *EQUARV* | Herb | FAC | 16. | | |
| 7. *AGRALB* | Herb | FACW | 17. | | |
| 8. | | | 18. | | |
| 9. | | | 19. | | |
| 10. | | | 20. | | |

| | |
|---|---|
| Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-): **3** / **7** = **43**% | FAC Neutral: **2** / **6** = **33**% |

Remarks: **43% hydrophytic vegetation, starting to see more wetland species in this area.**

## HYDROLOGY

**Yes** Recorded Data (Describe in Remarks):
**N/A** Stream, Lake, or Tide Gauge
**Yes** Aerial Photographs
**N/A** Other

**No** No Recorded Data

Field Observations:

Depth of Surface Water **None** ____ (in.)

Depth to Free Water in Pit > **14** (in.)

Depth to Saturated Soil > **14** (in.)

Wetland Hydrology Indicators
Primary Indicators:
**NO** Inundated
**NO** Saturated in Upper 12 Inches
**NO** Water Marks
**NO** Drift Lines
**NO** Sediment Deposits
**NO** Drainage Patterns in Wetland
Secondary Indicators (2 or more required):
**NO** Oxidized Root Channels in Upper 12 inches
**NO** Water-Stained Leaves
**NO** Local Soil Survey Data
**NO** FAC-Neutral Test
**NO** Other (Explain in Remarks)

Remarks: **Soils dry from 0 to 14 inches, sampling site does not meet primary or secondary hydrologic indicators.**

## SOILS

Map Unit Name (Series and Phase): **Lallie family**
Map Symbol: **250A** Drainage Class: **poorly-drained** Mapped Hydric Inclusion? _
Taxonomy (Subgroup): **Silty clay** Field Observations confirm Mapped Type? **No**

**Profile Description**

| Depth (inches) | Horizon | Matrix Color (Munsell Moist) | Mottle Color(s) (Munsell Moist) | Mottle Abundance/Contrast | Texture, Concretions, Structure, etc. |
|---|---|---|---|---|---|
| 0-14 | A | 10 YR 5/2 | /<br>/ | N/A<br>N/A | <br>Silty loam |
| | | / | /<br>/ | N/A<br>N/A | |
| | | / | /<br>/ | N/A<br>N/A | |
| | | / | /<br>/ | N/A<br>N/A | |
| | | / | /<br>/ | N/A<br>N/A | |

Hydric Soil Indicators:

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

Remarks: **Hydric soil indicators are not present**

## WETLAND DETERMINATION

Hydrophytic Vegetation Present? **NO**
Wetland Hydrology Present? **NO**
Hydric Soils Present? **NO**

Is this Sampling Point within a Wetland? **NO**

Remarks: **Starting to see more wetland species encroaching into the northern portion of the project area.**

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

**1. Project Name:** Norem Wetland Project **2. Project #:** STPX 49(20) **Control #:** 5190

**3. Evaluation Date:** 8/1/2006 **4. Evaluator(s):** CH/LWC **5. Wetland / Site #(s):** _____

**6. Wetland Location(s) i. T:** 1 N **R:** 14 E **S:** 12 **T:** __ N **R:** __ E **S:** _____

**ii. Approx. Stationing / Mileposts:** _____

**iii. Watershed:** 13 **GPS Reference No. (if applies):** _____

**Other Location Information:** _____

**7. A. Evaluating Agency** MDT

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

**B. Purpose of Evaluation:**
- ☐ Wetlands potentially affected by MDT project
- ☐ Mitigation wetlands; pre-construction
- ☒ Mitigation wetlands; post-construction
- ☐ Other

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

**10. CLASSIFICATION OF WETLAND AND AQUATIC HABITATS IN AA**

| HGM CLASS [1] | SYSTEM [2] | SUBSYSTEM [2] | CLASS [2] | WATER REGIME [2] | MODIFIER [2] | % OF AA |
|---|---|---|---|---|---|---|
| Riverine | Palustrine | None | Emergent Wetland | Seasonally Flooded | Impounded | 90 |
| Riverine | Palustrine | None | Unconsolidated Bottom | Permanently Flooded | Excavated | 10 |
| --- | --- | --- | --- | --- | --- | |
| --- | --- | --- | --- | --- | --- | |

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

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

**12. GENERAL CONDITION OF AA**

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

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

**Comments:** (types of disturbance, intensity, season, etc.) low disturbance includes a road/berm.

**ii. Prominent weedy, alien, & introduced species:** herbaceous species include scattered leafy spurge, whitetop and knapweed patches closer to the river, patches of Canada thistle.

**iii. Briefly describe AA and surrounding land use / habitat:** Emergent marsh surrounded by grazing agricultural and residential. 0.05 ac of wetlands and AA listed in #8 and #9 above occur outside current official monitoring limits, but were included in assessment.

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

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

**Comments:** this will change in the near future with the establishment and growth of the woody species.

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

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

| | | | |
|---|---|---|---|
| Primary or Critical habitat **(list species)** | ☐ D | ☐ S | |
| Secondary habitat **(list species)** | ☐ D | ☐ S | |
| Incidental habitat **(list species)** | ☐ D | ☒ S | Bald Eagle |
| No usable habitat | ☐ D | ☐ S | |

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

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

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

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

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

| | | | |
|---|---|---|---|
| Primary or Critical habitat **(list species)** | ☐ D | ☐ S | _____ |
| Secondary habitat **(list species)** | ☐ D | ☒ S | Black Tern, Peregrine Falcon |
| Incidental habitat **(list species)** | ☐ D | ☐ S | _____ |
| No usable habitat | ☐ D | ☐ S | _____ |

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

| Highest Habitat Level: | doc/primary | sus/primary | doc/secondary | sus/secondary | doc/incidental | sus/incidental | none |
|---|---|---|---|---|---|---|---|
| Functional Point and Rating | --- | --- | --- | .6 (M) | --- | --- | --- |

**If documented, list the source** (e.g., observations, records, etc.)**:** black tem, peregrine falcon

**14C. General Wildlife Habitat Rating**

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

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

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

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

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

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

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

| Evidence of Wildlife Use from 14C(i) | **Wildlife Habitat Features Rating** from 14C(ii) | | | |
|---|---|---|---|---|
| | ☒ Exceptional | ☐ High | ☐ Moderate | ☐ Low |
| Substantial | 1 (E) | -- | -- | -- |
| Moderate | -- | -- | -- | -- |
| Low | -- | -- | -- | -- |

**Comments:** _____

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

If the AA is not or was not historically used by fish due to lack of habitat, excessive gradient, then check the NA box above.

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

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

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

ii. **Modified Habitat Quality:** Is fish use of the AA precluded or significantly reduced by a culvert, dike, other man-made structure or activity **or** is the waterbody included on the 'MDEQ list of waterbodies in need of TMDL development' with 'Probable Impaired Uses' listed as cold or warm water fishery or aquatic life support**?**

☐ **Y** ☐ **N** If yes, reduce the rating from 14D(i) by one level and check the modified habitat quality rating: ☐ E ☐ H ☐ M ☐ L

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

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

**Comments:** _____

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

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

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

| Estimated wetland area in AA subject to periodic flooding | ☐ ≥ 10 acres | | | ☒ <10, >2 acres | | | ☐ ≤2 acres | | |
|---|---|---|---|---|---|---|---|---|---|
| % of flooded wetland classified as forested, scrub/shrub, or both | 75% | 25-75% | <25% | 75% | 25-75% | <25% | 75% | 25-75% | <25% |
| AA contains **no outlet or restricted outlet** | -- | -- | -- | -- | -- | .5 (M) | -- | -- | -- |
| AA contains **unrestricted outlet** | -- | -- | -- | -- | -- | -- | -- | -- | -- |

ii. **Are residences, businesses, or other features which may be significantly damaged by floods located within 0.5 miles downstream of the AA?** (check)

☒**Y** ☐**N** **Comments:** homes, ranches

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

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

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

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

**Comments**: _____

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

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

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

| Sediment, Nutrient, and Toxicant Input Levels Within AA | AA receives or surrounding land use has potential to deliver low to moderate levels of sediments, nutrients, or compounds such that other functions are not substantially impaired. Minor sedimentation, sources of nutrients or toxicants, or signs of eutrophication present. | | | | Waterbody on MDEQ list of waterbodies in need of TMDL development for "probable causes" related to sediment, nutrients, or toxicants **or** AA receives or surrounding land use has potential to deliver high levels of sediments, nutrients, or compounds such that other functions are substantially impaired. Major sedimentation, sources of nutrients or toxicants, or signs of eutrophication present. | | | |
|---|---|---|---|---|---|---|---|---|
| % cover of wetland vegetation in AA | ☒ ≥ 70% | | ☐ < 70% | | ☐ ≥ 70% | | ☐ < 70% | |
| Evidence of flooding or ponding in AA | ☒ Yes | ☐ No | ☐ Yes | ☐ No | ☐ Yes | ☐ No | ☐ Yes | ☐ No |
| AA contains **no or restricted outlet** | -- | -- | -- | -- | -- | -- | -- | -- |
| AA contains **unrestricted outlet** | .9 (H) | -- | -- | -- | -- | -- | -- | -- |

**Comments**: _____

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

Applies only if AA occurs on or within the banks or a river, stream, or other natural or man-made drainage, or on the shoreline of a standing water body that is subject to wave action. If this does not apply, check NA above.

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

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

**Comments:**

**14I. PRODUCTION EXPORT / FOOD CHAIN SUPPORT**

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

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

**Comments:**

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

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

ii. ☐ **Recharge Indicators**
- ☐ Permeable substrate presents without underlying impeding layer.
- ☐ Wetland contains inlet but not outlet.
- ☐ Other

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

| Criteria | Functional Point and Rating |
|---|---|
| AA has known Discharge/Recharge area or one or more indicators of D/R present | 1 (H) |
| No Discharge/Recharge indicators present | -- |
| Available Discharge/Recharge information inadequate to rate AA D/R potential | -- |

**Comments:**

**14K. UNIQUENESS**

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

| Replacement Potential | AA contains fen, bog, warm springs or mature (>80 yr-old) forested wetland or plant association listed as "S1" by the MTNHP. | | | AA does not contain previously cited rare types and structural diversity (#13) is high or contains plant association listed as "S2" by the MTNHP. | | | AA does not contain previously cited rare types or associations and structural diversity (#13) is low-moderate. | | |
|---|---|---|---|---|---|---|---|---|---|
| Estimated Relative Abundance from #11 | ☐rare | ☐common | ☐abundant | ☐rare | ☐common | ☐abundant | ☐rare | ☒common | ☐abundant |
| **Low** disturbance at AA (#12i) | -- | -- | -- | -- | -- | -- | -- | .4M | -- |
| **Moderate** disturbance at AA (#12i) | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| **High** disturbance at AA (#12i) | -- | -- | -- | -- | -- | -- | -- | -- | -- |

**Comments:** .

**14L. RECREATION / EDUCATION POTENTIAL**

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

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

**iii. Based on the location, diversity, size, and other site attributes, is there a strong potential for recreational or educational use?**
☒ **Yes** [Proceed to 14L (ii) and then 14L(iv).] ☐ **No** [Rate as low in 14L(iv)]

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

| Ownership | Disturbance at AA from #12(i) | | |
|---|---|---|---|
| | ☒ Low | ☐ Moderate | ☐ High |
| **Public** ownership | -- | -- | -- |
| **Private** ownership | .7(M) | -- | -- |

**Comments:** As the wetland features expand and develop, this area will provide excellent recreation and education opportunities. .

## FUNCTION, VALUE SUMMARY, AND OVERALL RATING

| Function and Value Variables | Rating | Actual Functional Points | Possible Functional Points | Functional Units (Actual Points x Estimated AA Acreage) |
|---|---|---|---|---|
| A. Listed/Proposed T&E Species Habitat | L | 0.30 | 1 | |
| B. MT Natural Heritage Program Species Habitat | M | 0.60 | 1 | |
| C. General Wildlife Habitat | E | 1.00 | 1 | |
| D. General Fish/Aquatic Habitat | NA | 0.00 | -- | |
| E. Flood Attenuation | M | 0.50 | 1 | |
| F. Short and Long Term Surface Water Storage | M | 0.60 | 1 | |
| G. Sediment/Nutrient/Toxicant Removal | H | 0.90 | 1 | |
| H. Sediment/Shoreline Stabilization | NA | 0.00 | -- | |
| I. Production Export/Food Chain Support | M | 0.70 | 1 | |
| J. Groundwater Discharge/Recharge | H | 1.00 | 1 | |
| K. Uniqueness | M | 0.40 | 1 | |
| L. Recreation/Education Potential | M | 0.70 | 1 | |
| | **Totals:** | 6.70 | 10.00 | |
| | ***Percent of Total Possible Points:*** | | **67%** (Actual / Possible) x 100 [rd to nearest whole #] | |

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

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

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

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

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

☐ **I** ☒ **II** ☐ **III** ☐ **IV**

# Appendix C

## 2006 REPRESENTATIVE PHOTOGRAPHS

***MDT Wetland Mitigation Monitoring***
***Norem Property***
***Big Timber, Montana***

# 2006 Norem Property Wetland Mitigation Site

**Location: A** **Description:** Transect 1 South end. **Compass Reading:** NW

**Location: B** **Description:** Transect 1 South end. **Compass Reading:** SW

**Location: C** **Description:** Shallow open water pond. **Compass Reading:** West

**Location: D** **Description:** SW wetland corner **Compass Reading:** North

**Location: E** **Description:** Transect 1 northern end: **Reading:** South

**Location: F** **Description:** Transect 1 northern end**.** Upland community type**. Compass Reading:** SW

# 2006 Norem Property Wetland Mitigation Site

**Location: G** **Description:** Transect 1 northern end. Pond with woody species. **Compass Reading:** East

**Location: H** **Description:** Looking across communities 1 and 2 wetlands. **Compass Reading:** SW

**Location: I** **Description:** Willow establishment along the eastern road edge. **Compass Reading:** North

**Location**: **J** **Description:** Buffers between Yellowstone River and wetlands. **Compass Reading:** SW

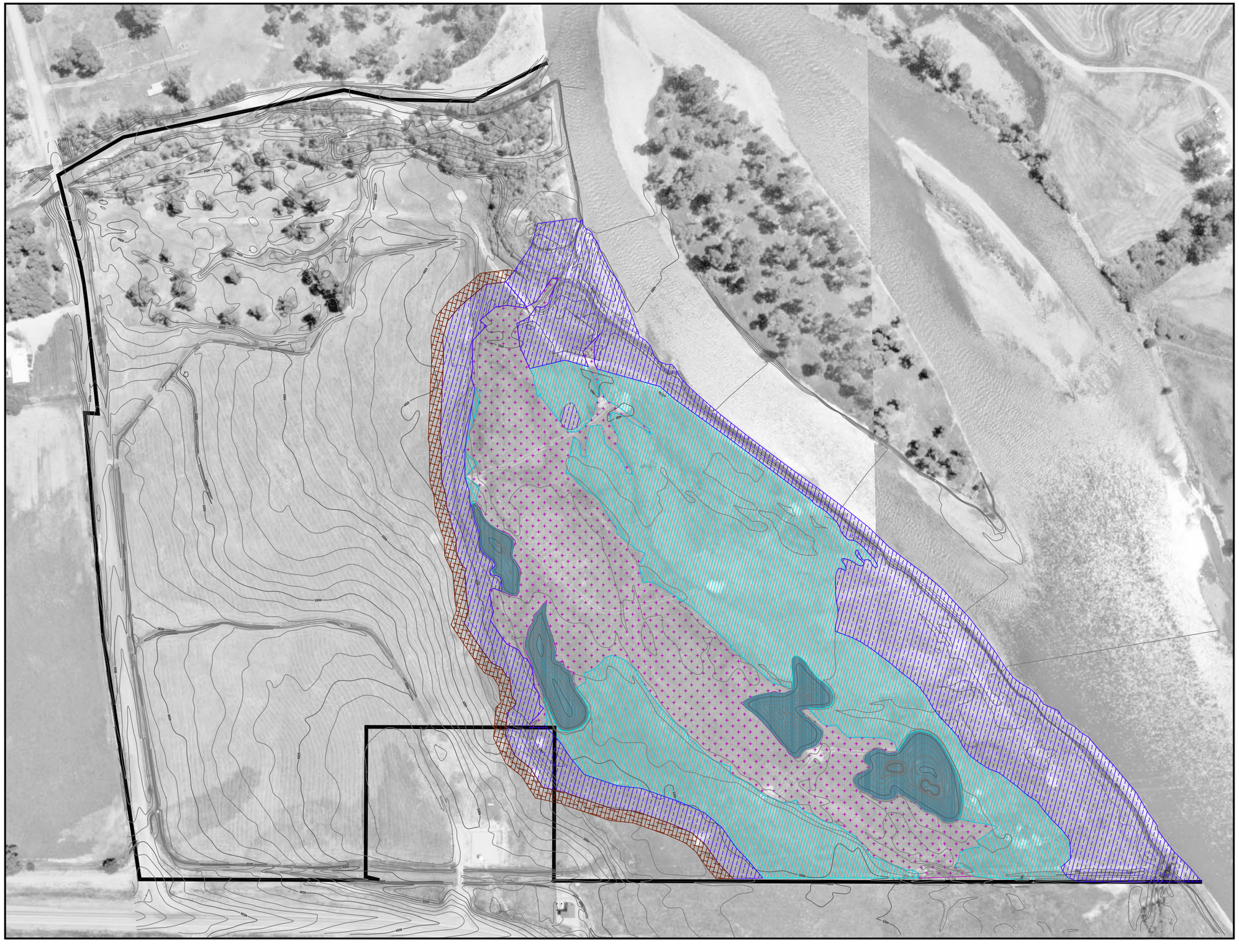
**Location: C -1** **Description:** Shrub establishment in saturated soils. **Compass Reading**:

**Location: C-2** **Description:** Aquatic vegetation – Sagittaria sp. colonizing in ponds . **Compass Reading:**

# Appendix D

## PROPOSED WETLAND MITIGATION SITE MAP (MAXIM TECHNOLOGIES INC.)

*MDT Wetland Mitigation Monitoring*
*Norem Property*
*Big Timber, Montana*



Existing Wetlands
(6.98 acres)

Wetland Acres Resulting from Berm Placement (9.46 acres)

Created Open Water Wetland Areas
(1.58 acres)

Buffer Zone
(7.99 acres)

Low Impact Buffer
(0.99 acres)

N

0 Feet 200

MAXIM 1560117.500

April 2002

**Wetland/Buffer Areas**
**Norem Property**
**Wetland Reserves Development**
**Big Timber, Montana**
**FIGURE 7**

# Appendix E

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## BIRD SURVEY PROTOCOL
## GPS PROTOCOL

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***MDT Wetland Mitigation Monitoring***
***Norem Property***
***Big Timber, Montana***

# BIRD SURVEY PROTOCOL

The following is an outline of the MDT Wetland Mitigation Site Monitoring Bird Survey Protocol. Though each site is vastly different, the bird survey data collection methods must be standardized to a certain degree to increase repeatability. An Area Search within a restricted time frame will be used to collect the following data: a bird species list, density, behavior, and habitat-type use. There will be some decisions that team members must make to fit the protocol to their particular site. Each of the following sections and the desired result describes the protocol established to reflect bird species use over time.

**Species Use within the Mitigation Wetland: Survey Method**

Result: To conduct a bird survey of the wetland mitigation site within a restricted period of time and the budget allotment.

***Sites that can be circumambulated or walked throughout.***

These types of sites will include ponds, enhanced historic river channels, wet meadows, and any area that can be surveyed from the entirety of its perimeter or walked throughout. If the wetland is not uncomfortably inundated, conduct several "meandering" transects through the site in an orderly fashion (record the number and approximate location/direction of the transects in the field notebook; they do not have to be formalized or staked). If a very small portion of the site cannot be crossed due to inundation, this method will also apply. Though the sizes of the site vary, each site will require surveying to the fullest extent possible within a set time limit. The optimum times to conduct the survey are in the morning hours. Conduct the survey from sunrise to no later than 11:00 AM. (Note: some sites may have to be surveyed in the late afternoon or evening due to time constraints or weather; if this is the case, record the time of day and include this information in your report discussion.) If the survey is completed before 11:00 AM and no additions are being made to the list, then the task is complete. The overall limiting factor regarding the number of hours that are spent conducting this survey is the number of budgeted hours; this determination must be made by site by each individual.

In many cases, binoculars will be the only instrument that is needed to identify and count the birds using the wetland. If the wetland includes deep water habitat that can not be assessed with binoculars, then a scope and tripod are necessary. If this is the case, establish as many lookout posts as necessary from key vantage points to collect the data. Depending on the size of the open water, more time may be spent viewing the mitigation area from these vantage points than is spent walking the peripheries of more shallow-water wetlands.

***Sites that cannot be circumambulated.***

These types of sites will include large-bodied waters, such as reservoirs, particularly those with deep water habitat (>6 ft) close to the shore and no wetland development in that area of the shoreline. If one area of the reservoir was graded in such a way to create or enhance the development of a wetland, then that will be the area in which the ambulatory bird survey is conducted. The team member must then determine the length of the shoreline that will be surveyed during each visit.

As stated above in the ambulatory site section, these large sites most likely will have to be surveyed from established vantage points.

**Species Use within the Mitigation Wetland: Data Recording**

Result: A complete list of bird species using the site, an estimate of bird densities and associated behaviors, and identification of habitat use.

***1. Bird Species List***

Record the bird species on the Bird Survey - Field Data Sheet using the appropriate 4-letter code of the common name. The coding uses the first two letters of the first two words of the birds' common name or if one name, the first four (4) letters. For example, mourning dove is coded MODO and mallard is MALL. If an unknown individual is observed, use the following protocol and define your abbreviation at the bottom of the field data sheet: unknown shorebird: UNSB; unknown brown bird (UNBR); unknown warbler (UNWA); unknown waterfowl (UNWF). For a flyover of a flock of unknown species, use a term that describes the birds' general characteristics and include the approximate flock size in parentheses; do not fill in the habitat column. For example, a flock of black, medium-sized birds could be coded: UNBB / FO (25). You may also note on the data sheet if that particular individual is using a constructed nest box.

***2. Bird Density***

In the office, sum the Bird Survey – Field Data Sheet data by species and by behavior. Record this data in the Bird Summary Table.

***3. Bird Behavior***

Bird behavior must be identified by what is known. When a species is simply observed, the behavior that it is immediately exhibiting is what is recorded. Only behaviors that have discreet descriptive terms should be used. The following terms are recommended: breeding pair individual (BP); foraging (F); flyover (FO); loafing (L; e.g. sleeping, roosting, floating with head tucked under wing are loafing behaviors); and, nesting (N). If more behaviors are observed that do have a specific descriptive word, use them and we will add it to the protocol; descriptive words or phrases such as "migrating" or "living on site" are unknown behaviors.

***4. Bird Species Habitat Use***

We are interested in what bird species are using which particular habitat within the mitigation wetlands. This data is easily collected by simply recording what habitat the species was initially observed. Use the following broad category habitat classifications: aquatic bed (AB - rooted floating, floating-leaved, or submergent vegetation); forested (FO); marsh (MA – cattail, bulrush, emergent vegetation, etc. with surface water); open water (OW – primarily unvegetated); scrub-shrub (SS); and upland buffer (UP); wet meadow (WM – sedges, rushes, grasses with little to no surface water). If other categories are observed onsite that are not suggested here, we will make a new category next year.

# GPS Mapping and Aerial Photo Referencing Procedure

The wetland boundaries, photograph location points and sampling locations were field located with mapping grade Trimble Geo III GPS units. The data was collected with a minimum of three positions per feature using Course/Acquisition code. The collected data was then transferred to a PC and differentially corrected to the nearest operating Community Base Station. The corrected data was then exported to ACAD drawings in Montana State Plain Coordinates NAD 83 international feet.

The GPS positions collected and processed had a 68% accuracy of 7 feet except in isolated areas of Tasks .008 and .011, where it went to 12 feet. This is within the 1 to 5 meter range listed as the expected accuracy of the mapping grade Trimble GPS.

Aerial reference points were used to position the aerial photographs. This positioning did not remove the distortion inherent in all photos; this imagery is to be used as a visual aide only. The located wetland boundaries were given a final review by the wetland biologist and adjustments were made if necessary.

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

# Appendix F

## 2006 MACROINVERTEBRATE SAMPLING PROTOCOL AND DATA

*MDT Wetland Mitigation Monitoring*
*Norem Property*
*Big Timber, Montana*

# AQUATIC INVERTEBRATE SAMPLING PROTOCOL

**Equipment List**

- D-frame sampling net with 1 mm mesh. Wildco is a good source of these.
- Spare net.
- 1-liter plastic sample jars, wide-mouth. VWR has these: catalog #36319-707.
- 95% ethanol: Northwest Scientific in Billings carries this.

All these other things are generally available at hardware or sporting goods stores. Make the labels on an ink jet printer preferably.

- hip waders.
- pre-printed sample labels (printed on Rite-in-the-Rain or other coated paper, two labels per sample).
- pencil.
- plastic pail (3 or 5 gallon).
- large tea strainer or framed screen.
- towel.
- tape for affixing label to jar.
- cooler with ice for sample storage.

**Site Selection**

Select the sampling site with these considerations in mind:

- Select a site accessible with hip waders. If substrates are too soft, lay a wide board down to walk on.
- Determine a location that is representative of the overall condition of the wetland.

**Sampling**

Wetland invertebrates inhabit the substrate, the water column, the stems and leaves of aquatic vegetation, and the water surface. Your goal is to sweep the collecting net through each of these habitat types, and then to combine the resulting samples into the 1-liter sample jar.

Dip out about a gallon of water into the pail. Pour about a cup of ethanol into the sample jar. Fill out the top half of the sample labels, using pencil, since ink will dissolve in the ethanol.

Ideally, you can sample a swath of water column from near-shore outward to a depth of approximately 3 feet with a long sweep of the net, keeping the net at about half the depth of the water throughout the sweep. Sweep the water surface as well. Pull the net through a vegetated area, beneath the water surface, for at least a meter of distance.

Sample the substrate by pulling the net along the bottom, bumping it against the substrate several times as you pull.

This step is optional, but it gives you a chance to <u>see</u> that you've collected some invertebrates. Rinse the net out into the bucket, and look for insects, crustaceans, etc. If necessary, repeat the sampling process in a nearby location, and add the net contents to the bucket. Remember to sample all four environments.

Sieve the contents of the bucket through the straining device and pour or carefully scrape the contents of the strainer into the sample jar.

If you skip the bucket-and-sieve steps, simply lift handfuls of material out of the sampling net into the jars. In either case, please include some muck or mud and some vegetation in the jar. Often, you will have collected a large amount of vegetable material. If this is the case, lift out handfuls of material from the sieve into the jar, until the jar is about half full. Please limit material you include in the sample, so that there is only a single jar for each sample.

Top off the sample jar with enough ethanol to cover all the material in the jar. Leave as little headroom as possible.

It is not necessary to sample habitats in any specified order. Keep in mind that disturbing the habitats prior to sampling will chase off the animals you are trying to capture.

Complete the sample labels. Place one label inside the sample jar and tape the other label securely to the outside of the jar. Dry the jar before attaching the outer label if necessary. In some situations, it may be necessary to collect more than one sample at a site. If you take multiple samples from the same site, clearly indicate this by using individual sample numbers, along with the total number of samples collected at the site (e.g. Sample #3 of 5 total samples).

Photograph the sampled site.

**Sample Handling/Shipping**

- In the field, keep collected samples cool by storing them in a cooler. Only a small amount of ice is necessary.
- Inventory all samples, preparing a list of all sites and enumerating all samples, before shipping or delivering to the laboratory.
- Deliver samples to Rhithron.

# MDT Mitigated Wetland Monitoring Project: Aquatic Invertebrate Monitoring Summary 2001 – 2006

Prepared for PBS&J, Inc.
Prepared by W.Bollman, Rhithron Associates, Inc.

## INTRODUCTION

Among other monitoring activities, aquatic invertebrate assemblages were collected at a number of mitigated wetlands throughout Montana. This report summarizes data generated from six years of collection. Over all years of sampling, a total of 182 invertebrate samples were collected. Table 2 summarizes sites and sampling years.

## METHODS

### Sample processing

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

At Rhithron's laboratory, Caton subsamplers and stereomicroscopes with 10X magnification were used to randomly select a minimum of 100 organisms from each sample. In some instances, the entire sample contained fewer than 100 organisms; in these cases, all organisms from the sample were taken. Animals were identified to lowest practical taxonomic levels using relevant published resources. Quality control (QC) procedures were applied to sample sorting, taxonomic determinations and enumeration, and data entry. QC statistics are presented in Table 3. The identified samples have been archived at Rhithron's laboratory.

### Assessment

The method employed to assess these wetlands is based on an index incorporating a battery of 12 bioassessment metrics or attributes (Table 1) tested and recommended by Stribling et al. (1995) in a report to the Montana Department of Health and Environmental Science. In that study, it was determined that some of the metrics were of limited use in some geographic regions, and for some wetland types. Despite that finding, all 12 metrics are used in this evaluation of mitigated wetlands, since detailed geographic information and wetland classifications were unavailable.

Scoring criteria for metrics were developed by generally following the tactic used by Stribling et al. Boxplots were generated using a statistical software package (Statistica™), and distributions, median values, ranges, and quartiles for each metric were examined. All sites in all years of sampling were used. Camp Creek, which was sampled in 2002, 2003, 2004, 2005 and 2006, and Kleinschmidt Creek, sampled in 2003, 2004, 2005 and 2006, were assessed using the tested metric battery developed for montane streams of Western Montana (Bollman 1998).Invertebrate assemblages at these sites differed from those of the other sites, and suggested montane or foothill stream conditions rather than wetland conditions. For the wetland sites, "optimal" scores were generally those that fell above the 75$^{th}$ percentile (for those metrics that decrease in value in response to stress) or below the 25$^{th}$ percentile (for metrics that respond to stress by an increase in value) of all scores. Additional scoring ranges were established by bisecting the range below the 75$^{th}$ percentile for decreasing scores (or above the 25$^{th}$ percentile for increasing scores) into "sub-optimal" and "poor" assessment categories. A score of 5, 3, or 1 was assigned to optimal, sub-optimal, and poor metric performance, respectively. In this way, metric values were translated into normalized metric scores, and scores for all metrics were summed to produce a total bioassessment score. Total bioassessment scores were classified according to a similar process, using the ranges and distributions of total scores for all sites studied in all years.

The purpose of constructing an index from biological attributes or metrics is to provide a means of integrating information to facilitate the determination of whether management action is needed. The nature of the action needed is not determined solely by the index score, however, but by consideration of an

analysis of the component metrics, the taxonomic composition of the assemblages, and other issues. The diagnostic functions of the metrics and taxonomic data need more study since our understanding of the interrelationships of natural environmental factors and anthropogenic disturbances is tentative. Thus, the further interpretive remarks accompanying the raw taxonomic and metric data in this summary are offered cautiously. Year-to-year comparisons depend on an assumption that specific sites were revisited in each year, and that equivalent sampling methods were utilized at each site revisit.

## Bioassessment metrics

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

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

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

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

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

Metric scoring criteria were re-examined each year as new data was added. For 2005, all 151 records were utilized. Ranges of individual metrics, as well as median metric values remained remarkably consistent over all 5 years of analysis. Since metric value distributions changed insignificantly with the addition of the 2006 data, no changes were made to scoring criteria this year. Summary metric values and scores for the 2006 samples are given in Tables 3a-3d.

## Quality control

Quality control procedures for initial sample processing and subsampling involved checking sorting efficiency. These checks were conducted on 100% of the samples by independent technicians who microscopically re-examined 20% of sorted substrate from each sample. All organisms that were missed were counted and this number was added to the total number obtained in the original sort. Sorting efficiency was evaluated by applying the following calculation:

$$SE = \frac{n_1}{n_2} \times 100$$

Where: SE is the sorting efficiency, expressed as a percentage, $n_1$ is the total number of specimens in the first sort, and $n_2$ is the total number of specimens in the first and second sorts combined.

Quality control procedures for taxonomic determinations involved checking accuracy, precision and enumeration. Four samples were randomly selected and all organisms re-identified by independent taxonomists. A Bray-Curtis similarity statistic (Bray and Curtis 1957) was generated to evaluate identifications.

**Table 1.** Montana Department of Transportation Mitigated Wetlands Monitoring Project sites. 2001 – 2006.

| Site identifier | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
|---|---|---|---|---|---|---|
| Beaverhead 1 | + | + | + | + | + | + |
| Beaverhead 2 | + | + | | | | |
| Beaverhead 3 | + | + | | + | + | + |
| Beaverhead 4 | + | + | + | | | |
| Beaverhead 5 | + | + | + | + | + | + |
| Beaverhead 6 | + | + | + | + | + | + |
| Big Sandy 1 | + | | | | | |
| Big Sandy 2 | + | | | | | |
| Big Sandy 3 | + | | | | | |
| Big Sandy 4 | + | | | | | |
| Johnson-Valier | + | | | | | |
| VIDA | + | | | | | |
| Cow Coulee | + | + | + | | | |
| Fourchette – Puffin | + | + | + | + | | |
| Fourchette – Flashlight | + | + | + | + | | |
| Fourchette – Penguin | + | + | + | + | | |
| Fourchette – Albatross | + | + | + | + | | |
| Big Spring | + | + | + | + | + | |
| Vince Ames | + | | | | | |
| Ryegate | + | | | | | |
| Lavinia | + | | | | | |
| Stillwater | + | + | + | + | + | |
| Roundup | + | + | + | + | + | + |
| Wigeon | + | + | + | + | + | + |
| Ridgeway | + | + | + | + | + | + |
| Musgrave – Rest. 1 | + | + | + | + | + | + |
| Musgrave – Rest. 2 | + | + | + | + | + | + |
| Musgrave – Enh. 1 | + | + | + | + | + | + |
| Musgrave – Enh. 2 | + | | | | | + |
| Hoskins Landing | | + | + | + | + | |
| Hoskins Landing | | | | | | |
| Peterson - 1 | | + | + | + | + | + |
| Peterson – 2 | | + | | + | + | + |
| Peterson – 4 | | + | + | + | + | + |
| Peterson – 5 | | + | + | + | + | + |
| Jack Johnson - main | | + | + | | | |
| Jack Johnson - SW | | + | + | | | |
| Creston | | + | + | + | + | |
| Lawrence Park | | + | | | | |
| Perry Ranch | | + | | | + | |
| SF Smith River | | + | + | + | + | + |
| Camp Creek | | + | + | + | + | + |
| Camp Creek | | | | | | + |
| Kleinschmidt | | + | + | + | + | + |
| Kleinschmidt – stream | | | + | + | + | + |
| Ringling - Galt | | | + | | | |
| Circle | | | | + | | |
| Cloud Ranch Pond | | | | + | + | |
| Cloud Ranch Stream | | | | + | | |
| American Colloid | | | | + | + | + |
| Jack Creek | | | | + | + | |
| Jack Creek | | | | | | |
| Norem | | | | + | + | + |
| Rock Creek Ranch | | | | | + | + |
| Wagner Marsh | | | | | + | + |
| Alkali Lake 1 | | | | | | + |
| Alkali Lake 2 | | | | | | + |

**Table 2.** Aquatic invertebrate metrics employed in the MTDT mitigated wetland monitoring study, 2001-2005.

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

## RESULTS

*(Note: Individual site discussions were removed from this report by PBS&J and are included in the macroinvertebrate sections of individual monitoring reports. Summary tables (4a – 4d) are provided on the following pages.)*

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### Quality Assurance

Table 3 gives the results of quality assurance procedures for sample sorting and taxonomic determinations and enumeration.

**Table 3.** *Results of quality control procedures for subsampling and taxonomy.*

| Sample ID | Site name | SE | Bray-Curtis similarity |
|---|---|---|---|
| MDT06PBSJ001 | MUSGRAVE LAKE ES-1 | 91.67% | |
| MDT06PBSJ002 | MUSGRAVE LAKE ES-2 | 94.44% | |
| MDT06PBSJ003 | MUSGRAVE LAKE RS-1 | 87.30% | |
| MDT06PBSJ004 | MUSGRAVE LAKE RS-2 | 100.00% | |
| MDT06PBSJ005 | ROCK CREEK RANCH | 96.49% | 95.25% |
| MDT06PBSJ006 | Alkali Lake Sample 1 | 100.00% | |
| MDT06PBSJ007 | Alkali Lake Sample 2 | 100.00% | |
| MDT06PBSJ008 | Peterson Ranch Pond # 4 | 100.00% | |
| MDT06PBSJ009 | Peterson Ranch Pond # 1 | 97.35% | |
| MDT06PBSJ010 | Peterson Ranch Pond # 5 | 91.67% | |
| MDT06PBSJ011 | South Fork Smith River | 100.00% | |
| MDT06PBSJ012 | Beaverhead 1 | 100.00% | |
| MDT06PBSJ013 | Beaverhead 3 | 95.65% | |
| MDT06PBSJ014 | Beaverhead 5 | 100.00% | |
| MDT06PBSJ015 | Beaverhead 6 | 94.12% | 98.38% |
| MDT06PBSJ016 | Peterson Ranch Pond # 2 | 91.67% | 99.66% |
| MDT06PBSJ017 | American Colloid | 100.00% | |
| MDT06PBSJ018 | Norem | 100.00% | |
| MDT06PBSJ019 | Cloud Ranch | 85.56% | 98.89% |
| MDT06PBSJ020 | Jack Creek Pond | 100.00% | |
| MDT06PBSJ021 | Jack Creek Stream | 100.00% | |
| MDT06PBSJ022 | Camp Creek 1 | 99.10% | |
| MDT06PBSJ023 | Camp Creek 2 | 100.00% | |
| MDT06PBSJ024 | Kleinschmidt Pond | 100.00% | |
| MDT06PBSJ025 | Kleinschmidt Stream | 96.49% | |
| MDT06PBSJ026 | Hoskins Landing 1 | 97.35% | |
| MDT06PBSJ027 | Hoskins Landing 2 | 96.49% | |
| MDT06PBSJ028 | Wagner Marsh | 100.00% | |
| MDT06PBSJ029 | Wigeon Reservoir | 100.00% | |
| MDT06PBSJ030 | Ridgeway | 98.21% | |
| MDT06PBSJ031 | Roundup | 100.00% | |

**Table 4a.** Metric values and scores for Montana Department of Transportation mitigated wetland sites. 2006.

| | BEAVERHEAD #1 | BEAVERHEAD #3 | BEAVERHEAD #5 | BEAVERHEAD #6 | ROUNDUP | WIDGEON | RIDGEWAY | MUSGRAVE RS-1 |
|---|---|---|---|---|---|---|---|---|
| Total taxa | 12 | 11 | 4 | 15 | 11 | 11 | 21 | 23 |
| POET | 1 | 0 | 1 | 3 | 2 | 1 | 3 | 4 |
| Chironomidae taxa | 5 | 3 | 1 | 7 | 4 | 3 | 10 | 7 |
| Crustacea + Mollusca | 1 | 4 | 2 | 3 | 2 | 2 | 5 | 7 |
| % Chironomidae | 52.38% | 25.22% | 0.69% | 63.06% | 18.87% | 6.42% | 37.25% | 9.62% |
| Orthocladiinae/Chir | 0.181818 | 0.965517 | 0 | 0.142857 | 0.2 | 0.285714 | 0.289474 | 0.7 |
| %Amphipoda | 0.00% | 0.00% | 0.00% | 0.90% | 0.00% | 6.42% | 11.76% | 1.92% |
| %Crustacea + %Mollusca | 9.52% | 69.57% | 98.62% | 3.60% | 73.58% | 79.82% | 45.10% | 51.92% |
| HBI | 7.857143 | 7.773913 | 7.97931 | 7.243243 | 8.09434 | 8.100917 | 7.127451 | 7.403846 |
| %Dominant taxon | 33.33% | 39.13% | 97.93% | 27.93% | 72.64% | 73.39% | 28.43% | 23.08% |
| %Collector-Gatherers | 61.90% | 68.70% | 100.00% | 84.68% | 87.74% | 6.42% | 49.02% | 47.12% |
| %Filterers | 0.00% | 2.61% | 0.00% | 1.80% | 0.00% | 0.00% | 0.00% | 4.81% |
| | | | | | | | | |
| Total taxa | 1 | 1 | 1 | 3 | 1 | 1 | 5 | 5 |
| POET | 1 | 1 | 1 | 3 | 1 | 1 | 3 | 5 |
| Chironomidae taxa | 3 | 3 | 1 | 5 | 3 | 3 | 5 | 5 |
| Crustacea + Mollusca | 1 | 3 | 1 | 1 | 1 | 1 | 3 | 5 |
| % Chironomidae | 1 | 3 | 5 | 1 | 3 | 5 | 3 | 5 |
| Orthocladiinae/Chir | 1 | 5 | 1 | 1 | 3 | 3 | 3 | 5 |
| %Amphipoda | 5 | 5 | 5 | 5 | 5 | 3 | 3 | 5 |
| %Crustacea + %Mollusca | 5 | 1 | 1 | 5 | 1 | 1 | 3 | 3 |
| HBI | 1 | 1 | 1 | 3 | 1 | 1 | 3 | 3 |
| %Dominant taxon | 5 | 3 | 1 | 5 | 1 | 1 | 5 | 5 |
| %Collector-Gatherers | 3 | 3 | 5 | 5 | 5 | 1 | 3 | 3 |
| %Filterers | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| | | | | | | | | |
| **Total score** | 30 | 32 | 26 | 40 | 28 | 24 | 42 | 52 |
| **Percent of maximum score** | 0.5 | 0.533333 | 0.433333 | 0.666667 | 0.466667 | 0.4 | 0.7 | 0.866667 |
| **Impairment classification** | **poor** | **poor** | **poor** | **sub-optimal** | **poor** | **poor** | **optimal** | **optimal** |

**Table 4b.** Metric values and scores for Montana Department of Transportation mitigated wetland sites. 2006.

| | MUSGRAVE RS- 2 | MUSGRAVE ES- 1 | MUSGRAVE ES- 2 | HOSKINS LANDING 1 | HOSKINS LANDING 2 | PETERSON RANCH 1 | PETERSON RANCH 2 | PETERSON RANCH 4 | PETERSON RANCH 5 |
|---|---|---|---|---|---|---|---|---|---|
| **Total taxa** | 10 | 21 | 10 | 22 | 29 | 19 | 17 | 28 | 26 |
| POET | 1 | 2 | 1 | 5 | 4 | 2 | 2 | 3 | 4 |
| Chironomidae taxa | 2 | 7 | 4 | 6 | 6 | 7 | 4 | 13 | 9 |
| Crustacea + Mollusca | 3 | 6 | 0 | 5 | 9 | 5 | 6 | 5 | 6 |
| % Chironomidae | 3.96% | 10.89% | 10.00% | 18.18% | 11.71% | 64.08% | 7.48% | 27.52% | 14.29% |
| Orthocladiinae/Chir | 0 | 0.181818 | 0.125 | 0.055556 | 0.307692 | 0.757576 | 0.75 | 0.6 | 0.75 |
| %Amphipoda | 0.00% | 2.97% | 0.00% | 5.05% | 1.80% | 1.94% | 22.43% | 2.75% | 15.18% |
| %Crustacea + %Mollusca | 8.91% | 75.25% | 0.00% | 20.20% | 23.42% | 8.74% | 42.06% | 19.27% | 40.18% |
| HBI | 6.326733 | 6.940594 | 6 | 7.111111 | 7.585586 | 6.631068 | 6.719626 | 7.293578 | 7.321429 |
| %Dominant taxon | 70.30% | 38.61% | 83.75% | 25.25% | 42.34% | 47.57% | 28.04% | 20.18% | 16.07% |
| %Collector-Gatherers | 15.84% | 8.91% | 3.75% | 64.65% | 62.16% | 72.82% | 31.78% | 34.86% | 50.89% |
| %Filterers | 0.00% | 0.00% | 0.00% | 6.06% | 5.41% | 3.88% | 3.74% | 8.26% | 0.89% |
| | | | | | | | | | |
| **Total taxa** | 1 | 5 | 1 | 5 | 5 | 3 | 3 | 5 | 5 |
| POET | 1 | 1 | 1 | 5 | 5 | 1 | 1 | 3 | 5 |
| Chironomidae taxa | 1 | 5 | 3 | 3 | 3 | 5 | 3 | 5 | 5 |
| Crustacea + Mollusca | 1 | 5 | 1 | 3 | 5 | 3 | 5 | 3 | 5 |
| % Chironomidae | 5 | 5 | 5 | 3 | 5 | 1 | 5 | 3 | 5 |
| Orthocladiinae/Chir | 1 | 1 | 1 | 1 | 3 | 5 | 5 | 5 | 5 |
| %Amphipoda | 5 | 5 | 5 | 3 | 5 | 5 | 3 | 5 | 3 |
| %Crustacea + %Mollusca | 5 | 1 | 5 | 5 | 5 | 5 | 3 | 5 | 3 |
| HBI | 5 | 3 | 5 | 3 | 3 | 5 | 5 | 3 | 3 |
| %Dominant taxon | 1 | 3 | 1 | 5 | 3 | 3 | 5 | 5 | 5 |
| %Collector-Gatherers | 1 | 1 | 1 | 3 | 3 | 3 | 1 | 1 | 3 |
| %Filterers | 3 | 3 | 3 | 1 | 3 | 3 | 3 | 1 | 3 |
| | | | | | | | | | |
| **Total score** | 30 | 38 | 32 | 40 | 48 | 42 | 42 | 44 | 50 |
| **Percent of maximum score** | 0.5 | 0.633333 | 0.533333 | 0.666667 | 0.8 | 0.7 | 0.7 | 0.733333 | 0.833333 |
| **Impairment classification** | **poor** | **sub-optimal** | **poor** | **sub-optimal** | **optimal** | **optimal** | **optimal** | **optimal** | **optimal** |

**Table 4c.** Metric values and scores for Montana Department of Transportation mitigated wetland sites. 2006

| | SOUTH FORK SMITH RIVER | CAMP CREEK 1* | CAMP CREEK 2* | KLEINSCH MIDT POND | KLEINSCH MIDT STREAM* | CLOUD RANCH | COLLOID | JACK CREEK POND | JACK CREEK STREAM |
|---|---|---|---|---|---|---|---|---|---|
| Total taxa | 14 | 31 | 29 | 20 | 22 | 13 | 7 | 7 | 5 |
| POET | 4 | 8 | 8 | 5 | 1 | 1 | 2 | 0 | 0 |
| Chironomidae taxa | 3 | 10 | 8 | 6 | 8 | 6 | 4 | 4 | 0 |
| Crustacea + Mollusca | 4 | 1 | 3 | 2 | 5 | 3 | 0 | 2 | 2 |
| % Chironomidae | 18.02% | 45.87% | 16.07% | 8.04% | 77.68% | 23.81% | 84.21% | 75.00% | 0.00% |
| Orthocladiinae/Chir | 0.05 | 0.26 | 0.277778 | 0.222222 | 0.448276 | 0.65 | 0.25 | 0.555556 | 0 |
| %Amphipoda | 18.02% | 0.00% | 0.00% | 25.00% | 0.00% | 4.76% | 0.00% | 0.00% | 5.00% |
| %Crustacea + %Mollusca | 58.56% | 0.92% | 3.57% | 25.89% | 5.36% | 11.90% | 0.00% | 16.67% | 7.50% |
| HBI | 7.540541 | 4.504587 | 4.294643 | 7.241071 | 5.928571 | 7.535714 | 6.315789 | 8.833333 | 7.325 |
| %Dominant taxon | 25.23% | 24.77% | 37.50% | 25.00% | 33.93% | 36.90% | 52.63% | 33.33% | 60.00% |
| %Collector-Gatherers | 41.44% | 48.62% | 31.25% | 62.50% | 46.43% | 64.29% | 21.05% | 58.33% | 67.50% |
| %Filterers | 15.32% | 6.42% | 7.14% | 3.57% | 38.39% | 2.38% | 0.00% | 0.00% | 0.00% |
| | | | | | | | | | |
| Total taxa | 1 | 5 | 5 | 3 | 5 | 1 | 1 | 1 | 1 |
| POET | 5 | 5 | 5 | 5 | 1 | 1 | 1 | 1 | 1 |
| Chironomidae taxa | 3 | 5 | 5 | 3 | 5 | 3 | 3 | 3 | 1 |
| Crustacea + Mollusca | 3 | 1 | 1 | 1 | 3 | 1 | 1 | 1 | 1 |
| % Chironomidae | 3 | 1 | 5 | 5 | 1 | 3 | 1 | 1 | 5 |
| Orthocladiinae/Chir | 1 | 3 | 3 | 3 | 3 | 5 | 3 | 5 | 1 |
| %Amphipoda | 3 | 5 | 5 | 1 | 5 | 3 | 5 | 5 | 3 |
| %Crustacea + %Mollusca | 3 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| HBI | 3 | 5 | 5 | 3 | 5 | 3 | 5 | 1 | 3 |
| %Dominant taxon | 5 | 5 | 3 | 5 | 5 | 3 | 1 | 5 | 1 |
| %Collector-Gatherers | 1 | 3 | 1 | 3 | 3 | 3 | 1 | 3 | 3 |
| %Filterers | 1 | 1 | 1 | 3 | 1 | 3 | 3 | 3 | 3 |
| | | | | | | | | | |
| **Total score** | 32 | 44 | 44 | 40 | 42 | 34 | 30 | 34 | 28 |
| **Percent of maximum score** | 0.533333 | *0.733333* | *0.733333* | 0.666667 | *0.7* | 0.566667 | 0.5 | 0.566667 | 0.466667 |
| **Impairment classification** | **poor** | ***optimal*** | ***optimal*** | **sub-optimal** | ***optimal*** | **sub-optimal** | **poor** | **sub-optimal** | **poor** |

*Sites indicated by asterisks were dominated by lotic fauna, and were evaluated with the MDEQ index for streams in the text and charts. Scores and impairment classifications in this table (italicized) are included only for completeness and are not reliable indications of conditions at these sites. See text.

**Table 4d.** Metric values and scores for Montana Department of Transportation mitigated wetland sites. 2006.

| | NOREM | ROCK CREEK RANCH | WAGNER MARSH | ALKALI LAKE 1 | ALKALI LAKE 2 |
|---|---|---|---|---|---|
| Total taxa | 6 | 15 | 11 | 6 | 5 |
| POET | 1 | 0 | 0 | 0 | 0 |
| Chironomidae taxa | 2 | 4 | 4 | 3 | 0 |
| Crustacea + Mollusca | 1 | 4 | 3 | 1 | 1 |
| % Chironomidae | 82.93% | 8.40% | 13.51% | 42.86% | 0.00% |
| Orthocladiinae/Chir | 0 | 0.2 | 0.6 | 0.666667 | 0 |
| %Amphipoda | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| %Crustacea + %Mollusca | 7.32% | 65.55% | 23.42% | 7.14% | 9.52% |
| HBI | 7.317073 | 7.638655 | 7.036036 | 7.785714 | 7.904762 |
| %Dominant taxon | 65.85% | 47.06% | 45.95% | 42.86% | 52.38% |
| %Collector-Gatherers | 68.29% | 56.30% | 47.75% | 28.57% | 9.52% |
| %Filterers | 17.07% | 0.00% | 0.90% | 0.00% | 0.00% |
| | | | | | |
| Total taxa | 1 | 3 | 1 | 1 | 1 |
| POET | 1 | 1 | 1 | 1 | 1 |
| Chironomidae taxa | 1 | 3 | 3 | 3 | 1 |
| Crustacea + Mollusca | 1 | 3 | 1 | 1 | 1 |
| % Chironomidae | 1 | 5 | 5 | 1 | 5 |
| Orthocladiinae/Chir | 1 | 3 | 5 | 5 | 1 |
| %Amphipoda | 5 | 5 | 5 | 5 | 5 |
| %Crustacea + %Mollusca | 5 | 1 | 5 | 5 | 5 |
| HBI | 3 | 1 | 3 | 1 | 1 |
| %Dominant taxon | 1 | 3 | 3 | 3 | 1 |
| %Collector-Gatherers | 3 | 3 | 3 | 1 | 1 |
| %Filterers | 1 | 3 | 3 | 3 | 3 |
| | | | | | |
| **Total score** | 24 | 34 | 38 | 30 | 26 |
| **Percent of maximum score** | 0.4 | 0.566667 | 0.633333 | 0.5 | 0.433333 |
| **Impairment classification** | **poor** | **sub-optimal** | **sub-optimal** | **poor** | **poor** |

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# Taxa Listing

**Project ID:** MDT06PBSJ
**RAI No.:** MDT06PBSJ018

**RAI No.:** MDT06PBSJ018 **Sta. Name:** Norem
**Client ID:**
**Date Coll.:** **No. Jars:** 1 **STORET ID:**

| Taxonomic Name | Count | PRA | Unique | Stage | Qualifier | BI | Function |
|---|---|---|---|---|---|---|---|
| **Non-Insect** | | | | | | | |
| Acari | 1 | 2.44% | Yes | Unknown | | 5 | PR |
| Lymnaeidae | | | | | | | |
| *Stagnicola* sp. | 3 | 7.32% | Yes | Unknown | | 6 | SC |
| **Ephemeroptera** | | | | | | | |
| Caenidae | | | | | | | |
| *Caenis* sp. | 1 | 2.44% | Yes | Larva | | 7 | CG |
| **Diptera** | | | | | | | |
| Ceratopogonidae | | | | | | | |
| Ceratopogoninae | 2 | 4.88% | Yes | Larva | | 6 | PR |
| **Chironomidae** | | | | | | | |
| Chironomidae | | | | | | | |
| *Dicrotendipes* sp. | 27 | 65.85% | Yes | Larva | | 8 | CG |
| *Tanytarsus* sp. | 7 | 17.07% | Yes | Larva | | 6 | CF |
| **Sample Count** | **41** | | | | | | |

# Metrics Report

**Project ID:** MDT06PBSJ
**RAI No.:** MDT06PBSJ018
**Sta. Name:** Norem
**Client ID:**
**STORET ID:**
**Coll. Date:**

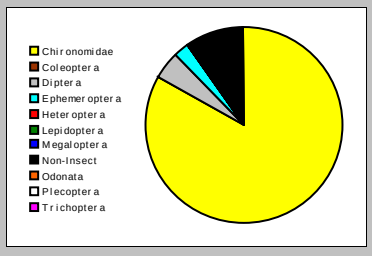
## Abundance Measures

**Sample Count:** 41
**Sample Abundance:** 41.00 100.00% of sample used

**Coll. Procedure:**
**Sample Notes:**

## Taxonomic Composition

| Category | R | A | PRA |
|---|---|---|---|
| Non-Insect | 2 | 4 | 9.76% |
| Odonata | | | |
| Ephemeroptera | 1 | 1 | 2.44% |
| Plecoptera | | | |
| Heteroptera | | | |
| Megaloptera | | | |
| Trichoptera | | | |
| Lepidoptera | | | |
| Coleoptera | | | |
| Diptera | 1 | 2 | 4.88% |
| Chironomidae | 2 | 34 | 82.93% |

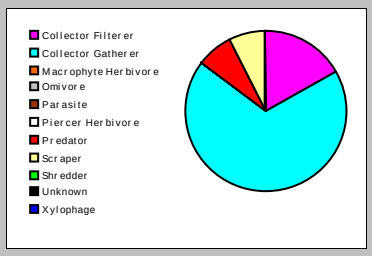



## Dominant Taxa

| Category | A | PRA |
|---|---|---|
| Dicrotendipes | 27 | 65.85% |
| Tanytarsus | 7 | 17.07% |
| Stagnicola | 3 | 7.32% |
| Ceratopogoninae | 2 | 4.88% |
| Caenis | 1 | 2.44% |
| Acari | 1 | 2.44% |

## Functional Composition

| Category | R | A | PRA |
|---|---|---|---|
| Predator | 2 | 3 | 7.32% |
| Parasite | | | |
| Collector Gatherer | 2 | 28 | 68.29% |
| Collector Filterer | 1 | 7 | 17.07% |
| Macrophyte Herbivore | | | |
| Piercer Herbivore | | | |
| Xylophage | | | |
| Scraper | 1 | 3 | 7.32% |
| Shredder | | | |
| Omivore | | | |
| Unknown | | | |

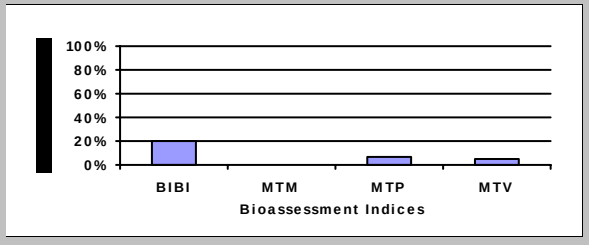



## Metric Values and Scores

| Metric | Value | BIBI | MTP | MTV | MTM |
|---|---|---|---|---|---|
| *Composition* | | | | | |
| Taxa Richness | 6 | 1 | 0 | | 0 |
| Non-Insect Percent | 9.76% | | | | |
| E Richness | 1 | 1 | | 0 | |
| P Richness | 0 | 1 | | 0 | |
| T Richness | 0 | 1 | | 0 | |
| EPT Richness | 1 | | 0 | | 0 |
| EPT Percent | 2.44% | | 0 | | 0 |
| Oligochaeta+Hirudinea Percent | | | | | |
| Baetidae/Ephemeroptera | 0.000 | | | | |
| Hydropsychidae/Trichoptera | 0.000 | | | | |
| *Dominance* | | | | | |
| Dominant Taxon Percent | 65.85% | | 0 | | 0 |
| Dominant Taxa (2) Percent | 82.93% | | | | |
| Dominant Taxa (3) Percent | 90.24% | 1 | | | |
| Dominant Taxa (10) Percent | 100.00% | | | | |
| *Diversity* | | | | | |
| Shannon H (loge) | 1.097 | | | | |
| Shannon H (log2) | 1.582 | | 0 | | |
| Margalef D | 1.346 | | | | |
| Simpson D | 0.459 | | | | |
| Evenness | 0.144 | | | | |
| *Function* | | | | | |
| Predator Richness | 2 | | 0 | | |
| Predator Percent | 7.32% | 1 | | | |
| Filterer Richness | 1 | | | | |
| Filterer Percent | 17.07% | | | 1 | |
| Collector Percent | 85.37% | | 1 | | 0 |
| Scraper+Shredder Percent | 7.32% | | 1 | | 0 |
| Scraper/Filterer | 0.429 | | | | |
| Scraper/Scraper+Filterer | 0.300 | | | | |
| *Habit* | | | | | |
| Burrower Richness | 2 | | | | |
| Burrower Percent | 70.73% | | | | |
| Swimmer Richness | 0 | | | | |
| Swimmer Percent | 0.00% | | | | |
| Clinger Richness | 1 | 1 | | | |
| Clinger Percent | 17.07% | | | | |
| *Characteristics* | | | | | |
| Cold Stenotherm Richness | 0 | | | | |
| Cold Stenotherm Percent | 0.00% | | | | |
| Hemoglobin Bearer Richness | 1 | | | | |
| Hemoglobin Bearer Percent | 65.85% | | | | |
| Air Breather Richness | 0 | | | | |
| Air Breather Percent | 0.00% | | | | |
| *Voltinism* | | | | | |
| Univoltine Richness | 3 | | | | |
| Semivoltine Richness | 0 | 1 | | | |
| Multivoltine Percent | 85.37% | | 0 | | |
| *Tolerance* | | | | | |
| Sediment Tolerant Richness | 1 | | | | |
| Sediment Tolerant Percent | 7.32% | | | | |
| Sediment Sensitive Richness | 0 | | | | |
| Sediment Sensitive Percent | 0.00% | | | | |
| Metals Tolerance Index | 4.415 | | | | |
| Pollution Sensitive Richness | 0 | 1 | | 0 | |
| Pollution Tolerant Percent | 75.61% | 1 | | 0 | |
| Hilsenhoff Biotic Index | 7.317 | | 0 | | 0 |
| Intolerant Percent | 0.00% | | | | |
| Supertolerant Percent | 65.85% | | | | |
| CTQa | 100.800 | | | | |

## Bioassessment Indices

| BioIndex | Description | Score | Pct | Rating |
|---|---|---|---|---|
| BIBI | B-IBI (Karr et al.) | 10 | 20.00% | |
| MTP | Montana DEQ Plains (Bukantis 1998) | 2 | 6.67% | Severe |
| MTV | Montana Revised Valleys/Foothills (Bollman 1998) | 1 | 5.56% | Severe |
| MTM | Montana DEQ Mountains (Bukantis 1998) | 0 | 0.00% | Severe |



# Appendix G

## NOREM PROPERTY WETLAND CREDIT ASSESSMENT LETTER (COE 2002)

***MDT Wetland Mitigation Monitoring***
***Norem Property***
***Big Timber, Montana***

U.S. ARMY CORPS OF ENGINEERS
HELENA REGULATORY OFFICE
10 WEST 15TH STREET, SUITE 2200
HELENA, MONTANA 59626



REPLY TO ATTENTION OF:

August 2, 2002

Helena Regulatory Office
Phone (406) 441-1375
Fax (406) 441-1380

Subject: Corps File Number 2002-90-260
Norem Property Wetland Project
Preliminary Wetland Credit Assessment

Mr. Mark Norem
116 West Second
PO Box 1285
Big Timber, Montana 59011

Dear Mr. Norem:

This letter is a response to a request that the US Army Corps of Engineers (Corps) estimate the amount of wetland mitigation credit that could be generated by the proposed work on your property adjacent to the Yellowstone River. The project is located near the community of Big Timber in Section 12, Township 1 North, Range 14 East, Sweetgrass County, Montana.

It is your intention to develop and enhance wetlands at the site to provide compensatory wetland mitigation credit to the Montana Department of Transportation. It is required that all creditable areas be protected by a perpetual conservation easement or other encumbrance that ensures the continued existence of the aquatic lands developed at the site. The following table summarizes the amount and type of wetland credit that the Corps will commit to, assuming that the site develops as presented in the April 2002 Conceptual Wetland Development Plan and in the subsequent application for Section 404 authorization:

| | | |
|---|---|---|
| Enhancement of Existing Wetland, 3:1 ratio | 6.98 acres enhanced | 2.32 acres credit |
| Creation of wetlands resulting from berm construction, 1:1 ratio | 9.46 acres created | 9.46 acres credit |
| Open water/shallow ponds created in upland, 1:1 ratio | 1.58 acres new shallow ponds | 1.58 acres credit |
| Allowable Buffer Zone, 4:1 ratio | 6.02 acres buffer | 1.50 acres credit |
| Area of existing wetland filled by berm, 1:1 ratio | -0.15 acres impacted | -0.15 acres credit |
| Low Impact Buffer | 0.64 acres | N/A |
| **Summary of Potential Wetland Credit Available:** | - | **14.7 acres credit** |

You will note that the amount of credit agreed to at this time was determined using ratios of compensation to impact rather than functional assessment. It was determined that slightly more creditable acreage could be calculated using ratios. This will also allow for straightforward adjustment of the final credit totals determined upon completion of the monitoring period. If

necessary, the Corps will adjust the amount of acreage available for use as mitigation credit by the Montana Department of Transportation after the monitoring period.

The monitoring period for this project will be five complete growing seasons after completion of construction and planting. If there are no appreciable changes expected after the fourth year of monitoring, the Corps might waive the fifth year. Monitoring must be done in accordance with the protocols established under the MDT Wetland Mitigation Monitoring Program, with annual reports supplied to this office either as part of that program or as stand-alone submittals.

At this time, there is no crediting mechanism available for the remaining upland parts of the property that will be protected by a permanent protective easement. It is recognized, however, that the creation, enhancement, and protection of areas such as the riparian cottonwood galleries along the Yellowstone River has great ecological benefit. As the Corps moves forward with watershed-based mitigation principles, it is likely that compensatory mitigation for impacts to riverine ecosystems will be required. As that need arises, the Corps will evaluate the area in question, and may allow up to 2 acres of additional credit for the upland riparian cottonwood area at that time. This credit would be used to offset similar impacts to river systems in the watershed, and would not be available to offset wetland impacts.

In closing, the requested Department of Army authorization for constructing this wetland project is still pending. Individual Section 401 Water Quality Certification for this project has been requested from the Montana Department of Environmental Quality, and Department of Army authorization can be provided after that certification has been issued.

Todd Tillinger of this office is the Corps' project manager. He may be reached by phone at (406) 441-1375 or by e-mail at todd.n.tillinger@usace.army.mil. Please reference Corps File Number 2002-90-260.

Sincerely,

Allan Steinle

Allan Steinle
Montana Program Manager

CC: Walt Vering, MAXIM Technologies, Inc.
Gordon Stockstad, Montana Department of Transportation - Environmental Services