MONTANA DEPARTMENT OF TRANSPORTATION
WETLAND MITIGATION MONITORING REPORT: YEAR 2005

Norem Property
Big Timber, Montana

Prepared for:

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

Prepared by:

LAND & WATER CONSULTING
~ A DIVISION OF PBS&J
P.O. Box 239
Helena, MT 59624

December 2005

Project No: B43054.00 - 0508

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PBS&J

LAND & WATER

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1.0 INTRODUCTION

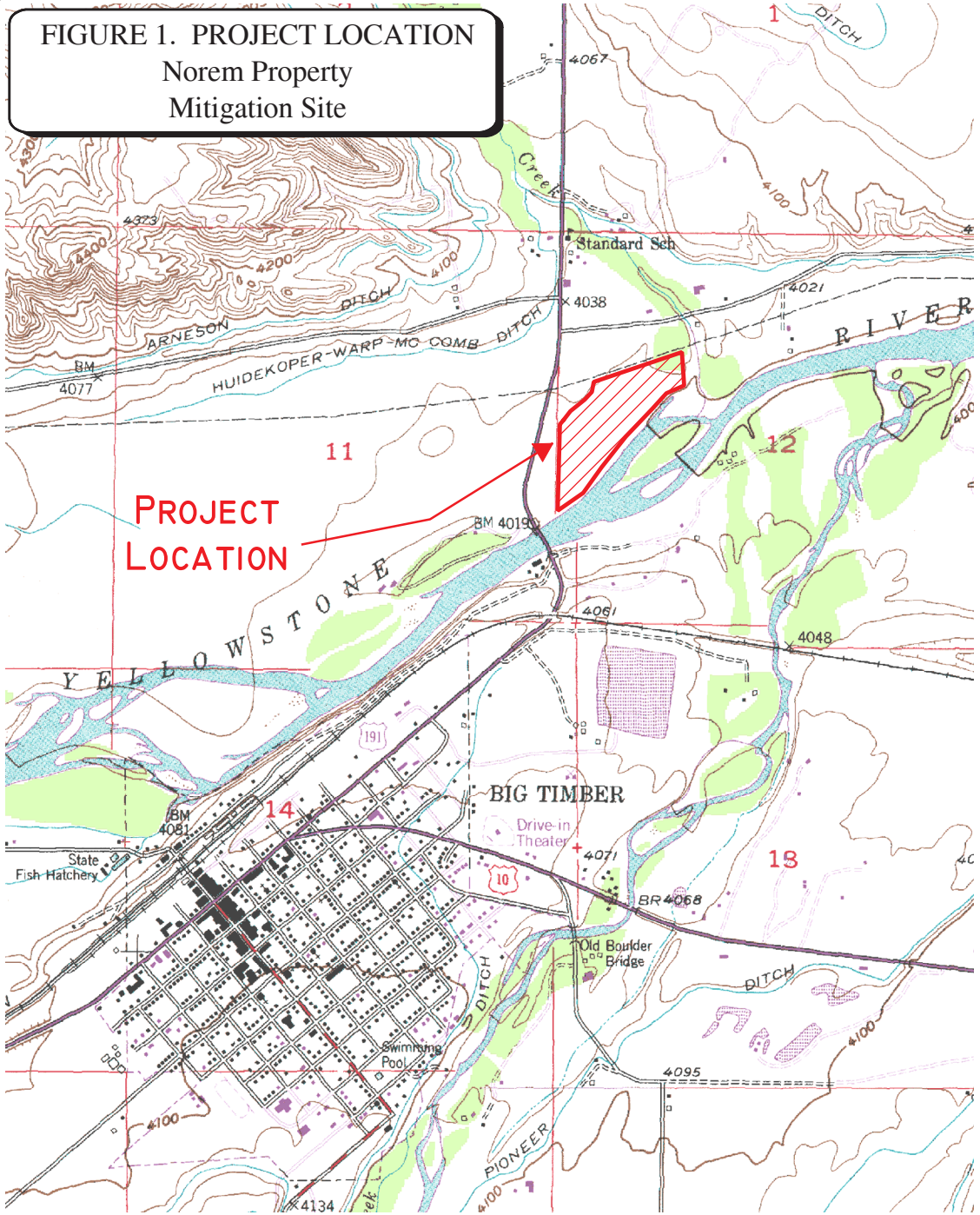
This annual report summarizes the methods and results of the 2005 (second year) monitoring at the Norem wetland project site. This project was constructed in the fall of 2002 by the landowner and Maxim Technologies, Inc. (Maxim) to provide the Montana Department of Transportation (MDT) with wetland mitigation 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 Sweetgrass County approximately two miles northeast of Big Timber, MT, in Section 12, Township 1 North, Range 14 East **(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.

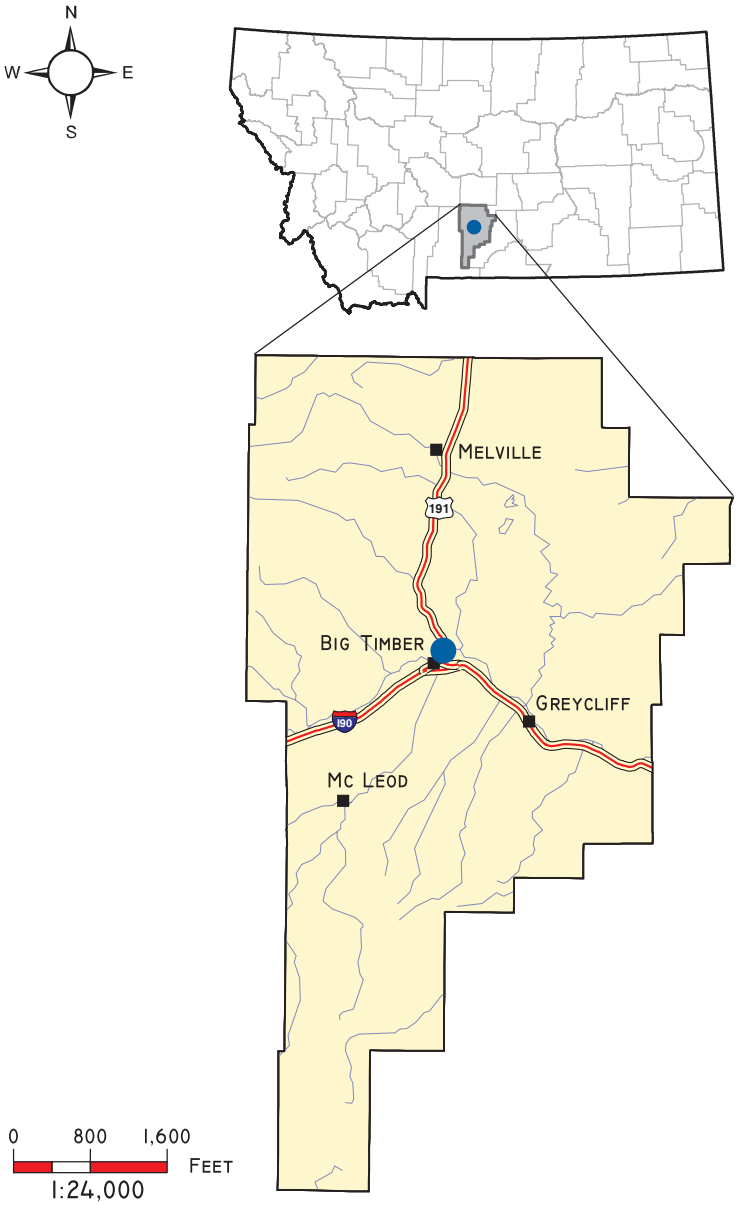
The project was intended to develop approximately 14.71 acres of wetland credit within a 26.88-acre conservation easement on property owned by Mark Norem. The site boundary is illustrated on **Figure 2** (**Appendix A**) and the original conceptual layout is provided in **Appendix D.** The overall wetland 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 July 19 to collect the primary wetland monitoring form data **(Appendix B)**. The primary monitoring area and monitoring activity locations are shown on **Figure 2**, **Appendix B**. Per MDT instruction (Urban, pers. comm.), monitoring activities were limited to the major restoration and enhancement areas within the site. 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 2005. However, their 2005 monitoring report was not available as of the printing of this report. Consequently, Maxim's 2005 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 2005 were compared to the 1894-2005 average (WRCC 2005).

All additional hydrologic data were recorded on the mitigation site monitoring form **(Appendix B)**. The boundary between emergent vegetation and open water was mapped on the aerial photograph **(Figure 3, 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 July site visit (**Figure 3, Appendix A)**. Coverage of the dominant species in each community type is listed on the 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 2005 to reflect changes in species composition and changing wetland boundaries. The transect location is shown on **Figure 2, 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 July 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 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) and is included in **Appendix D**.

2.6 Mammals, Reptiles, and Amphibians

Mammal, reptile, and amphibian species observations were recorded on the wetland 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 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 following the protocol **(Appendix F)**. Samples were preserved as outlined in the sampling procedure and sent to Rhithron Associates for analysis. The approximate sampling locations are indicated on **Figure 2, Appendix A**. Results are included in **Appendix F**.

2.9 Functional Assessment

A functional assessment form was completed for the site using the 1999 MDT Montana Wetland Assessment Method. 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, the results of which are included in **Table 4**.

2.10 Photographs

Photographs were taken showing the current land use surrounding the site, the wetland buffer, the monitored area, 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, 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 jurisdictional 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 2005.

2.12 Maintenance Needs

The condition of the outflow structures and potential problematic areas (erosive, barren or weedy areas) were evaluated. Minor maintenance needs and recommendations are presented in **Section 3.9**. 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 July 19, 2005 monitoring visit, approximately 35% of the assessment area was inundated with several inches of standing water. Ponds 3 and 4 were full-pond level, 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 is colonizing 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, Appendix A**.

According to the Western Regional Climate Center (WRCC, 2005), the Big Timber weather station has calculated a mean annual precipitation of 15.35 inches from 1894 through May 2005. The mean annual precipitation from January 2004 to May 2005 was 10.6 inches (WRCC 2005). Therefore the precipitation from January 2004 through May 2005 was 70% of the normal long-term average, indicating 2004 and the early spring of 2005 were 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, *Carex utriculata/C. nebrascensis;* Type 2, *Carex sp. /Juncus balticus*; Type 3, *Agropyron smithii*/*Bromus inermis;* 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. Other common species include water sedge (*Carex 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 3 occurs in the uplands and consists primarily of western

wheatgrass (*Agropyron smithii)* and/ or smooth brome *(Bromus inermis).* Other common species include meadow fescue (*Festuca pratensis),* 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 6 inches to 4 feet in height. Sandbar willow (*Salix exigua*)seedlings were also observed (volunteers). In 2004, yellow and white sweet clover (*Melilotus officinalis* and *Melilotus alba,* respectfully) were common species in this community type. During the 2005 monitoring, species such as quackgrass, meadow fescue, western wheatgrass (*Agropyron smithii*) 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 (*Carex utriculata).*

Woody species transplanted around the pond perimeter include primarily sandbar willow (*Salix exigua*), red-osier dogwood (*Cornus stolonifera*), hawthorn (*Crateagus douglasii*) and cottonwood. Other willow species were 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 likely develop into riparian corridor. There are approximately 27 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. In 2005 many of the red-osier seedlings thought to be dead in 2004 have re-sprouted from the base. Hawthorn seedlings appeared more abundant and robust around Pond 3. Red-osier and willow species were particularly robust and vigorous across the project site. **Appendix B** (page 5) provides details related to the species and quantities planted around each pond.

The 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 length of each community type as it is encountered from the start to the end of the transect is shown in **Chart 1**. The total length occupied by each community type within the transect is summarized in **Chart 2** for each year monitored. Overall, upland and open water habitats have shrunk while wetland has increased since 2004 (**Charts 1** and **2**). In 2004, two wetland communities were present (**Chart 2**). In 2005 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. 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 control methods. Effective weed control has lowered the size and frequency of the whitetop and leafy spurge infestations.

Table 1: ***2004 and 2005 Norem Property vegetation species list.***

Scientific Name	Region 9 (Northwest) Wetland Indicator Status [1, 2]
Agropyron dasystachyum	UPL
Agropyron smithii	FACU
Agropyron repens	FAC-
Agrostis alba	FAC*
Alopecurus arundinacea	(FACW)
Alopecurus pratensis	FACW
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+
Equisetum arvense	FAC
Erigeron lanatus	FACU
Euphorbia esula	(UPL)
Festuca pratensis	FACU+
Glyceria grandis	OBL
Glyceria striata	OBL
Juncus balticus	FACW+
Juncus longistylis	FACW
Juncus torreyi	FACW
Lithosperum arvense	(FAC)
Melilotus alba	FACU
Melilotus officinalis	FACU

Table 1 (continued): ***2004 and 2005 Norem Property vegetation species list.***

Scientific Name	Region 9 (Northwest) Wetland Indicator Status [1, 2]
Mentha arvense	FACW-
Phalaris arundinacea	FACW
Phleum pratense	FAC-
Poa pratensis	FAC
Polygonum punctatum	OBL
Populus trichocarpa	FAC
Potentilla anserine	OBL
Rumex crispus	FACW
Salix alba(lutea)	FACW/OBL
Salix exigua	OBL
Scirpus pungens	OBL
Scirpus acutus	OBL
Spartana pectinata	OBL
Sisymbrium altissmum	FACU-
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 2005.
[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.

Table 2: ***2004 and 2005 Transect 1 data summary.***

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

Chart 1. ***Transect map showing vegetation types from start of transect (0 feet) to end of transect (625 feet) for 2004 and 2005.***

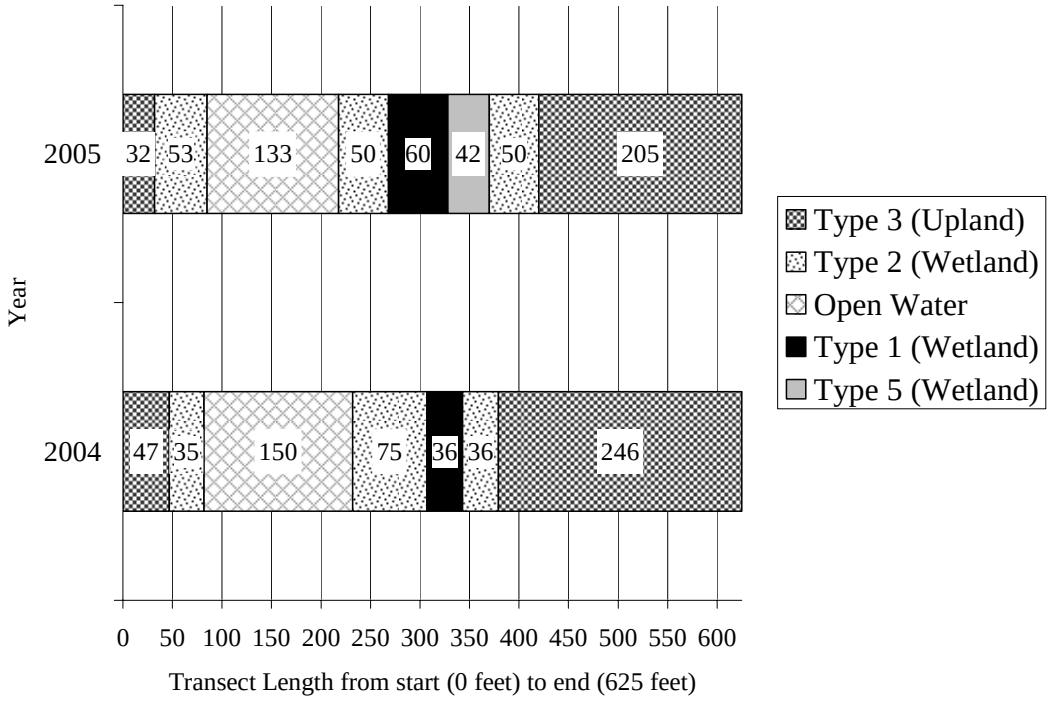
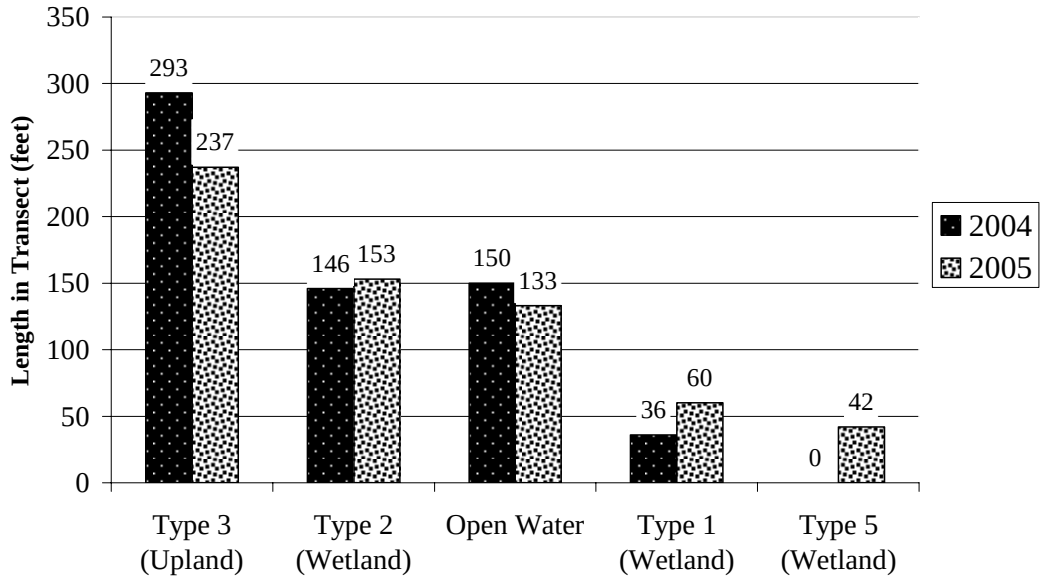


Chart 2: ***Length of vegetation communities within Transect 1 during 2004 to 2005.***



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 grayish brown (10YR 4/1) from 0-10 inches with yellowish red (10YR 5/6) mottles noted at 6 inches. The soil texture in the upper 10 inches was a silty loam. 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 4/2) silty clay from 0 to 12 inches without mottles. 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, Appendix A**. The COE data forms are included in **Appendix B**. Aquatic vegetation is developing around the edge of all four pond margins. The gross wetland boundary encompasses 11.39 acres, including 1.50 acres of shallow open water (<4 feet deep). However, it should be noted that this total does not include two small pre-existing wetland lobes (totaling 0.05 acre) within the easement that extend to the southeast outside of the MDT-defined monitoring area in the northeast corner of the site. Pre-existing wetland acreage totaled 6.98 acres, which did include the two wetland lobes outside of the current monitoring area. Therefore, pre-existing wetland within the current monitoring area was approximately 6.98 - 0.05 = 6.93 acres. Wetland / shallow open water acreage has therefore increased by approximately 11.39 – 6.93 = 4.46 acres since construction (2002).

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 and 2005 wildlife species observed within the Norem Property Mitigation Site[1].***

REPTILES and AMPHIBIANS	
Western Chorus Frog (*Pseudacris triseriata*)	
BIRDS	
American Kestrel (*Falco sparerius*)	**Red-winged Blackbird (*Agelaius phoeniceus*)**
Blue-winged Teal (*Anas discors)*	Sandhill Crane (*Grus canadensis*)[1]
Canada Goose (*Branta canadensis*)	Savanah Sparrow (*Passerculus sandwichensis*)
Common Snipe *(Gallinago gallinago)*	**Spotted Sandpiper *(Actitis macularia)***
Common Yellowthroat (*Geothlypis trichas*)	Tree Swallow *(Tachycineta bicolor*)
Eastern Kingbird (*Tyrannus tyrannus*)	Turkey Vulture (*Cathartes aura*)[1]
European Starling *(Sturnus vulgaris*)	Unidentified Gull species
Greater Yellowlegs (*Tringa melanoleuca*)	Western Meadowlark (*Sturnella neglecta*)
Killdeer (*Charadrius vociferous*)	Wild Turkey (*Meleagris gallopavo*)[1]
Least Sandpiper (*Calidris minitilla*)	Wilson's Phalarope (*Phalaropus tricolor)*
Mallard (*Anas platyrhynchos*)	
Osprey (*Pandion haliaetus*)	
Red-tailed Hawk (*Buteo jamaicensis*)	
MAMMALS	
Red fox (*vulpes vulpes*)	
White-tailed deer *(Odocoileus virginianus)*	

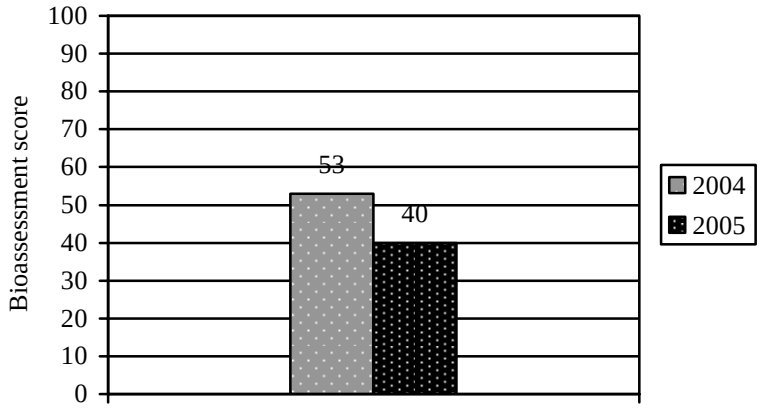
[1]Species observed by Landowner and Maxim Technologies.
Bolded species indicate those documented within the analysis area in 2005.

3.6 Macroinvertebrates

Macroinvertebrate sampling results are provided in **Appendix F** and were summarized by Rhithron Associates in the italicized sections below (Bollman 2005).

The bioassessment score indicated sub-optimal conditions at this site (Bollman 2005). The low abundance at this site in 2005 suggests that conditions deteriorated severely since 2004. Snails and midges were the only 2 faunal components present. The super tolerant physid Aplexa sp. was collected here; this snail may be associated with high ammonia concentrations in some situations. In any event, water quality impairment seems likely at this site. Hypoxic sediments are suggested by the hemoglobin-bearing midges taken in the sample. In addition to water quality problems, monotonous habitats may also limit the biota here. Bioassessment scores indicate poor conditions.

Chart 3: ***Bioassessment scores for 2004 and 2005.***



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) and results of that assessment are included in **Table 4**. The site rated as an overall Category II wetland and scores 75.17 function units. This represents an increase of approximately 41.57 units since 2001. Wildlife use, particularly migratory birds, would further increase with the survival, development and 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.

The site has four State of Montana Noxious Weeds (Canada thistle, leafy spurge, whitetop and spotted knapweed). Continued weed control measures are recommended.

During the July site visit, a few scattered Russian olive (*Elaeagnus angustifolia*) trees were noted within the assessment area. Russian olive is an introduced small tree that can potentially be a problematic species due to their successful ability to reseed and spread into existing native plant communities. It is likely that this plant may eventually be considered a candidate for the Montana Noxious Weed List. Future monitoring activities should closely note the spread of this tree.

Table 4: ***Summary of 2001, 2004 and 2005 wetland function/value ratings and functional points at the Norem Wetland Mitigation Project.***

Function and Value Parameters From the 1999 MDT Montana Wetland Assessment Method	2001 Pre-construction	2004 Post-construction	2005 Post-construction
Listed/Proposed T&E Species Habitat	Low (0)	Low (0.3)	Low (0.3)
MNHP Species Habitat	Low (0.1)	Mod (0.6)	Mod (0.6)
General Wildlife Habitat	Mod (0.5)	Mod (0.9)	Mod (0.9)
General Fish/Aquatic Habitat	Low (0.1)	NA	NA
Flood Attenuation	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)
Sediment, Nutrient, Toxicant Removal	High (1.0)	High (0.9)	High (0.9)
Sediment/Shoreline Stabilization	NA	NA	NA
Production Export/Food Chain Support	Mod (0.7)	Mod (0.7)	Mod (0.7)
Groundwater Discharge/Recharge	High (1.0)	High (1.0)	High (1.0)
Uniqueness	Low (0.2)	Mod (0.4)	Mod (0.4)
Recreation/Education Potential	Low (0.1)	Mod (0.7)	Mod (0.7)
Actual Points/Possible Points	4.8/11	6.6/10	6.6/10
% of Possible Score Achieved	50	66	66
Overall Category	III	II	II
Total Acreage of Assessed Wetlands within Easement	**7.0**	**10.82**	**11.39**
Functional Units (acreage x actual points) (fu)	**33.60**	**71.41**	**75.17**
Net Acreage Gain (ac)	**NA**	**3.89**	**4.46**
Net Functional Unit Gain (fu)	**NA**	**37.81**	**41.57**
Total Functional Unit Gain (fu)	**NA**	**37.81**	**41.57**

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 is provided in **Appendix G** (COE 2002 letter) and 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). 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 2005, the approximate assignable wetland credit at the site is 8.23 acres or 56% of the goal, as outlined in **Table 5**.

Table 5: ***2005 wetland mitigation monitoring results.***

Wetland Mitigation Type	2005 Net Acres	Ratio	2005 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	2.91	1:1	2.91	9.46	31% 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	2005 net buffer area was assumed within easement.
Berm impact	--	--	---	-0.15	
Total	**16.87**	**--**	**8.23**	**14.71**	**56% of goal**

The gross wetland boundary encompasses 11.39 acres, including 1.50 acres of shallow open water (<4 feet deep). However, it should be noted that this total does not include two small pre-existing wetland lobes (totaling 0.05 acre) within the easement that extend to the southeast outside of the MDT-defined monitoring area in the northeast corner of the site. Pre-existing wetland acreage totaled 6.98 acres, which included the two wetland lobes outside of the current monitoring area. Therefore, pre-existing wetland within the current monitoring area was approximately 6.98 - 0.05 = 6.93 acres. Wetland / shallow open water acreage has therefore increased by approximately 11.39 – 6.93 = 4.46 acres since construction (2002).

The net functional units have increased to 41.57 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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Appendix A

FIGURES 2 & 3

MDT Wetland Mitigation Monitoring
Norem Property
Big Timber, Montana

Figure 2 Monitoring Activity Locations 2005

LEGEND

- Monitoring Area Limits
- SP2 — Soil Sample
- Photograph Point
- Aerial Reference Point
- Vegetation Transect
- MS — Macro-invertebrate Sample Point

Base photograph July 7, 2005

Private Property

PP E-F-G

Vegetation Transect

SP2

MS

SP1

PP A-B

PP C-D

PP H-I-J

N

W E

S

SCALE 1"=150ft

PROJECT NAME: MDT Norem Wetland Mitigation

DRAWING TITLE: Monitoring Activity Locations 2005

PROJ NO: B43054.0508	DRAWN: SH			
LOCATION: Big Timber, MT	PROJ MGR: JB			
SCALE: 1"=150'	CHECKED: CH	APPVD: JB		
FILE NAME: 2005 Base.dwg				

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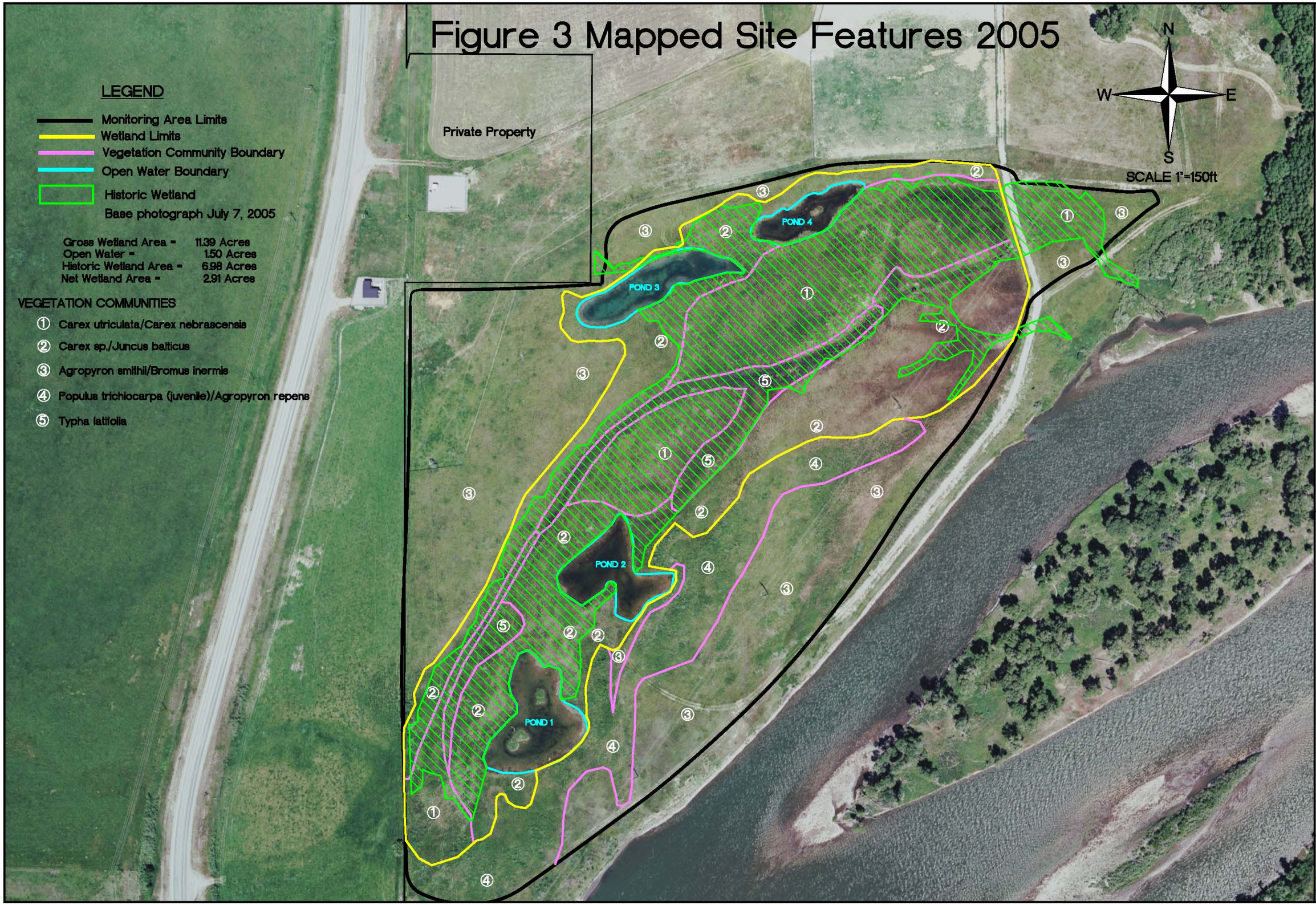
Figure 3 Mapped Site Features 2005



PROJECT NAME: MDT Norem Wetland Mitigation

DRAWING TITLE: Mapped Site Features 2005

PROJ NO: B43054.0508	DRAWN: SH		
LOCATION: Big Timber, MT	PROJ MGR: JB		
SCALE: 1"=150'	CHECKED: CH	APPVD: JB	
FILE NAME: 2005 Base.dwg			

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Appendix B

2005 WETLAND MITIGATION SITE MONITORING FORM
2005 BIRD SURVEY FORMS
2005 WETLAND DELINEATION FORMS
2005 FUNCTIONAL ASSESSMENT FORMS

MDT Wetland Mitigation Monitoring
Norem Wetland Project
Big Timber, Montana

LWC / MDT WETLAND MITIGATION SITE MONITORING FORM

Project Name: Norem Wetland Project Project Number: B43054-0508 Assessment Date: 7/19/05
Location: 2.0 mi NE of Big Timber MDT District: Billings District #13 Milepost:
Legal description: T 1N R 14E Section 12 Time of Day: 9 AM
Weather Conditions: warm/slight breeze Person(s) conducting the assessment: CH/LWC
Initial Evaluation Date: 7/19/05 Visit #: 1 Monitoring Year: 2005
Size of evaluation area: 26.53 acres Land use surrounding wetland: grazing/hay production/residential

HYDROLOGY

Surface Water Source:
Inundation: Present X Absent Average depths: 2 ft **Range of depths:** 1 - 3 ft
Assessment area under inundation: 35 %
Depth at emergent vegetation-open water boundary: 2 ft
If assessment area is not inundated are the soils saturated w/in 12" of surface**:** Yes X No
Other evidence of hydrology on site (drift lines, erosion, stained vegetation etc.): _____

Groundwater
Monitoring wells: Present X Absent
Record depth of water below ground surface

Well #	Depth	Well #	Depth	Well #	Depth

Additional Activities Checklist:
X Map emergent vegetation-open water boundary on air photo
X Observe extent of surface water during each site visit and look for evidence of past surface water elevations (drift lines, erosion, vegetation staining etc.)
- GPS survey groundwater monitoring wells locations if present

COMMENTS/PROBLEMS:

VEGETATION COMMUNITIES

Community No.:__1__ Community Title (main species*):__Carex utriculata/Carex nebrascensis*

Dominant Species	% Cover	Dominant Species	% Cover
Carex utriculuta	30	*Scirpus acutus*	<5
C. nebrascensis	15	*Typha latifolia*	5
C. aquatilis	10	*Mentha arvensis*	<5
Glyceria grandis	5	*Salix exigua*	5
C. lanuginosa	5	*Scirpus pungens*	5
Juncus balticus	5	*Juncus torreyi*	<5

COMMENTS/PROBLEMS: _Areas of surface water 1 to 2 inches deep. Overall, soil is saturated at surface, evidence of high water, sediment/silts on vegetation.

Community No.:__2__ Community Title (main species):___*Carex sp./Juncus balticus*_____

Dominant Species	% Cover	Dominant Species	% Cover
Carex nebrascensis	10	*Potentilla anserina*	<5
C. lanuginosa	10	*Spartana pectinata*	5
C. aquatilis	10	*Mentha arvensis*	5
C. arcta	5		
Juncus balticus	15		
Agrostia alba	10		
J. longistylis	5		
Scirpus pungens	10		
Poa pratensis	<5		
Hordeum jubatum	5		

COMMENTS/PROBLEMS: In 2005 there is a noticeable reduction of *Agrostis alba* compared to 2004 with an increase in the cover and diversity from *Carex* species. C*irsium arvense* noted in this wetland community type but overall less than 1 percent. Very diverse community, other species present in this community type include *Rumex crispus*, *Equiseum arvense*, *Alopecurus arundinacea*, *Glyceria striata*, *Deschampsia cespitosa*, and *Polygonum punctatum.*

Community No.:_3___ Community Title (main species*):___Agropyron smithii/Bromus inermis ___*

Dominant Species	% Cover	Dominant Species	% Cover
Agropyron smithii	15	*Equistem arvense*	5
Bromus inermis	15	*Juncus balticus*	5
Festuca pratensis	10	*Cirsum arvense*	<5
Poa pratensis	10	*Lithosperum arvense*	<5
Agropyron repens	5	*Melilotus officinalis*	<5
Agrostis alba	5	*Potentilla anserina*	<5
Agropyron dasytachyum	<5	*Taraxacum officinale*	<5

COMMENTS/PROBLEMS: Starting to see community type 2 encroaching into community 3 along the northern portion of the property.

Community No.:_4___ Community Title (main species*):___Populus trichocarpa/Agropyron repens_*

Dominant Species	% Cover	Dominant Species	% Cover
Populus angustifolia (6 inches to 3.5 ft)	30	*Bromus inermis*	5
Agropyron repens	15	*Phlaris arundinacea*	5
Festuca pratense	10	*Phleum pratense*	5
Agropyron smithii	5	*Alopecurus pratensis*	<5
Poa pratensis	5	*Salix exigua*	5
Melilotus officinalis	<5	*Agropyron dasytachyum*	<5
Agrostis alba	5		

COMMENTS/PROBLEMS: This riparian community type will potentially be a very valuable ecological asset to the Yellowstone River ecosystem. A few scattered annual weeds such as *Bromus tectorum* and *Thalaspi dubius* were noted.

Community No.:_5___ Community Title (main species*):___Typha latifolia ___*

Dominant Species	% Cover	Dominant Species	% Cover
Typha latifolia	65	*Spartana pectinata*	<5
Scirpus acutus	10		
Carex utriculuta	10		
Eleocharis palustris	5		
Scirpus pungens	5		

COMMENTS/PROBLEMS: This community represents the wettest vegetation type within the project site.

Additional Activities Checklist:
__X__Record and map vegetative communities on air photo

Comprehensive Vegetation List

Species	Vegetation Community Number(s)	Species	Vegetation Community Number(s)
Agropyron dasytachyum	3, 4	*Salix exigua*	1, 2, 4
Agropyron smithii	3, 4	*Scirpus pungens*	1, 2, 5
Agropyron repens	3, 4	*Scirpus* acutus	1,2, 5
Agrostis alba	1, 2, 3, 4	***Sisymbrium altissmum***	3
Alopecurus arundinacea	2	*Spartana pentinata*	2, 5
Alopecurus pratensis	2, 4	*Solidago occidentalis*	2
Bromus inermis	3,4	***Taraxacum officinale***	3
Bromus tectorum	4	*Thlaspi arvense*	3
Cardaria draba	4	*Tragopogon dubius*	3
Carex aquatilis	1, 2	*Typha latifolia*	1, 5
Carex arcta	2		
Carex lanuginosa	1, 2		
Carex nebrascensis	1, 2		
Carex utriculata	1, 2		
Centaurea maculosa	3, 4		
Cirsium arvense	2, 3, 4		
Cornus stolonifera	1, 2		
Crateagus douglasii	1, 2		
Crepis acuminata	3, 4		
Deschamspia cespitosa	2		
Eleocharis palustris	1, 5		
Equisetum arvense	2, 3		
Erigeron lanatus	3		
Euphorbia esula	3, 4		
Festuca pratensis	3, 4		
Glyceria grandis	1, 5		
Glyceria striata	2		
Juncus balticus	1, 2, 3		
Juncus longistylis	2		
Juncus torreyi	1		
Lithosperum arvense	3		
Melilotus alba	3, 4		
Melilotus officinalis	3, 4		
Mentha arvense	1, 2		
Phalaris arundinacea	3, 4		
Phleum pratense	4		
Poa pratensis	2, 3, 4		
Polygonum punstatum	2		
Populus trichocarpa	2, 3, 4		
Potentilla anserina	2, 3		
Rumex crispus	2		
Salix alba	2		

COMMENTS/PROBLEMS: _____

_____

_____

_____

_____

PLANTED WOODY VEGETATION SURVIVAL

Species	Number Originally Planted	Mortality Causes
Pond #1		
Cornus stolonifera	522	
Salix sp. (primarily exigua)	561	
Crateagus douglasii	15	
Populus trichocarpa	46	
In 2004, a visual assessment of the woody species around the perimeter of this pond estimated a 60 to 65% survival. The red-osier dogwood and willows were particularly robust. The 2005 visual assessment around the perimeter of this pond noted only 1 dead willow cutting. Overall the planted trees and shrubs were doing well – a few damaged cottonwood seedlings. Excellent survival and vigor of the willow cuttings along the northern and northwest portion of the pond. Many of the red-osier dogwoods thought to be dead in 2004 have re-sprouted from the base. Overall excellent shrub establishment around the eastern perimeter of this pond. The percent survival in 2005 is increased to **65 to 70%** and takes into account re-growth from red-osier dogwood.		Potentially lack of adequate soil moisture following planting (if planted too early in the spring prior to river rise) or lack of adequate soil moisture during mid to late summer, damage due to deer or rodents or transplant shock. Greatest plant loss in 2004 was along the southern bank of the pond.
Pond #2		
Cornus stolonifera	200+	
Salix sp. (primarily exigua)	314+	
Crateagus douglasii	100	
Populus trichocarpa	30	
In 2004 a total of 10 dead plants were counted out of 35 woody species or a 69% survival of the planted species within the transect line. In 2005 no new mortality to trees and shrubs within the transect line were noted. Woody species were particularly robust along the north side of this pond. The **69%** survival would remain the same in 2005.		Same as above
Pond #3		
Cornus stolonifera	200	
Salix sp. (primarily exigua)	314	
Crateagus douglasii	100	
Populus trichocarpa	300	
In 2004, a total of 12 dead plants were counted out of 52 woody species or a 77% survival of the planted species along the western pond perimeter. In 2005, more transplanted trees and shrubs, particularly red-osier dogwood, cottonwood and hawthorne were observed around the pond perimeter. Hawthorne seedlings were 6 to 12 inches tall. Red-osier dogwood seedlings along the northern side of the pond which appeared dead in 2004 have re-sprouted from the base. The **77%** survival would remain the same in 2005		Same as above

Pond #4		
Cornus stolonifera	126+	
Salix sp. (primarily exigua)	275+	
Populus trichocarpa	70	
In 2004, the visual assessment of the survival of the woody species planted around this pond was estimated at 75 to 80% survival. Water depth in this pond was estimated between 3 to 4 feet. Island had fewer weeds and excellent survival and vigor of woody species. Red-osier dogwood was especially vigorous. In 2005, the visual assessment of the survival of the woody species would remain between **75 to 80%.** Cottonwood seedlings along the north side are impressive – 18 to 22 inches tall.		Same as above

COMMENTS/PROBLEMS: _____

WILDLIFE

BIRDS

(Attach Bird Survey Field Forms)

Were man made nesting structures installed? Yes__X*_ No____Type:_Osprey on tel-pole ____ How many?__1____ Are the nesting structures being utilized? Yes__X__ No____ Do the nesting structures need repairs? Yes____ No_X___

MAMMALS AND HERPTILES

Species	Number Observed	Indirect indication of use			
		Tracks	Scat	Burrows	Other
7/19/05					
Red Fox	1	X			
White-tailed deer (two bucks and 1 doe)	2				

Additional Activities Checklist:
___X__Macroinvertebrate sampling (if required)

COMMENTS/PROBLEMS: __*Osprey nest platform was in place prior to the project.

PHOTOGRAPHS

Using a camera with a 50 mm lenses and color film take photographs of the following permanent reference points listed in the checklist below. Record the direction of the photograph using a compass. (The first time at each site establish a permanent reference point by setting a ½ inch rebar or fencepost extending 2-3' above ground, survey the location with a resource grade GPS and mark the location on the air photo.)
Checklist:

__X__ One photo for each of the 4 cardinal directions surrounding wetland
__X__ At least one photo showing upland use surrounding wetland – if more than one upland use exists, take additional photos
__X__ At least one photo showing buffer surrounding wetland
__X__ One photo from each end of vegetation transect showing transect

Location	Photograph Description	Compass Reading
A	Transect 1: Southern end	NW
B	Transect 1: Southern end	SW
C	Shallow open water pond #2	SE
D	SW wetland corner	North
E	Transect 1: Northern end	South
F	Transect 1: Northern end	SW
G	Shallow open water pond #4	East
H	Wetland/upland transitions	SW
I	Wetland/upland transitions	NW
J	Buffer between Yellowstone River and wetlands	SW
C-1	Pond #1, red-osier dogwood seedling	
C-2	Pond #1, wetland vegetation colonizing around pond edges	

COMMENTS/PROBLEMS: _____

_____

_____

GPS SURVEYING

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

Checklist:

__X___ Jurisdictional wetland boundary
__X___ 4-6 landmarks recognizable on the air photo
__X___ Start and end points of vegetation transect(s)
_2004_ Photo reference points
__-___ Groundwater monitoring well locations

COMMENTS/PROBLEMS:

_____

_____

WETLAND DELINEATION

(Attach Corps of Engineers delineation forms)

At each site conduct the items on the checklist below:
__X__Delineate wetlands according to the 1987 Army Corps manual.
__X__Delineate wetland-upland boundary on the air photo
__X__Survey wetland-upland boundary with a resource grade GPS survey

COMMENTS/PROBLEMS:

FUNCTIONAL ASSESSMENT

(Complete and attach full MDT Montana Wetland Assessment Method field forms; also attach abbreviated field forms, if used)

COMMENTS/PROBLEMS:

MAINTENANCE

Were man-made nesting structures installed at this site? YES___ NO__X_
If yes, do they need to be repaired? YES____ NO____
If yes, describe problems below and indicate if any actions were taken to remedy the problems.

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

COMMENTS/PROBLEMS:

MDT WETLAND MONITORING – VEGETATION TRANSECT

Site: Norem Property Date: 7/19/05 Examiner: CH/LWC Transect # 1

Approx. transect length: 625 ft Compass Direction from Start (Upland): NW

Vegetation type A:	CT 3 (upland)	
Length of transect in this type:	0-32 (32')	feet
Species:		Cover:
AGRREP		15
AGRSMI		10
POPTRI		10
JUNBAL		10
POAPRA		5
CIRARV		5
EQUARV		5
SALEXI		15
PHLARU		5
FESPRA		5
MELOFF		5
	Total Vegetative Cover:	90%

Vegetation type B:	CT 2 (wetland)	
Length of transect in this type:	32–85 (53')	feet
Species:		Cover:
JUNBAL		20
CARNEB		15
POTANS		10
CARAQU		10
CARLAN		5
HORJUB		<5
SALEXU		5
ALOPRA		5
TYPLAT		<5
CARUTR		<5
	Total Vegetative Cover:	85%

Vegetation type C:	OPEN WATER<4 FT	
Length of transect in this type:	85-218 (133')	feet
Species:		Cover:
open water		95
TYPLAT		5
GLYGRA		5
SCIPUN		5
Mud flats		10
	Total Vegetative Cover:	15%

Vegetation type D:	CT 2 (wetland)	
Length of transect in this type:	218-268 (50')	feet
Species:		Cover:
JUNBAL		20
CARNEB		15
CARLAN		15
CARUTR		10
SISALT		5
POTARV		5
CARAQU		5
GLYPAL		5
AGRALB		5
	Total Vegetative Cover:	75%

MDT WETLAND MONITORING – VEGETATION TRANSECT

Site: Norem Property Date: 7/19/05 Examiner: CH/LB/LWC Transect # 1

Approx. transect length: 625 Compass Direction from Start (Upland): _____

Vegetation type E:	CT 1 (wetland)	
Length of transect in this type:	268-328 (60')	Feet
Species:		Cover:
CARUTR		25
CARNEB		10
JUNBAL		15
GLYGRA		5
CARAQU		5
MENARV		5
SCIACU		5
	Total Vegetative Cover:	70%

Vegetation type F:	CT 5 (wetland)	
Length of transect in this type:	328-367' (42')	feet
Species:		Cover:
TYPLAT		35
CARUTR		15
SCIACU		10
SCIPUL		5
GLYGRA		10
CARNEB		5
POLPUN		5
Surface water		15
	Total Vegetative Cover:	85%

Vegetation type G:	CT 2 (wetland)	
Length of transect in this type:	367-417 (50')	Feet
Species:		Cover:
CARUTR		15
CARLAN		10
CARNEB		5
JUNBAL		10
JUNLON		10
AGRALB		10
SCIPUN		10
CARAQU		5
Surface water		25
	Total Vegetative Cover:	75%

Vegetation type H:	CT 3 (upland)	
Length of transect in this type:	417–625 (208')	feet
Species:		Cover:
AGRSMI		20
AGRREP		10
BROINE		10
JUNBAL		10
FESPRA		10
AGRALB		5
POAPRA		5
CIRARV		<5
MELOFF		<5
	Total Vegetative Cover	80%

MDT WETLAND MONITORING – VEGETATION TRANSECT (back of form)

Cover Estimate		**Indicator Class:**	**Source:**
+ = <1%	3 = 11-20%	+ = Obligate	P = Planted
1 = 1-5%	4 = 21-50%	- = Facultative/Wet	V = Volunteer
2 = 6-10%	5 = >50%	0 = Facultative	

Percent of perimeter 75% % developing wetland vegetation – excluding dam/berm structures.

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 food depth (in open water), or at a point where water depths or saturation are maximized. Mark this location with another metal fencepost.

Estimate cover within a 10 ft 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.

Notes:

Community Type 3 will likely develop into a wetland with time. A mix of wetland and upland vegetation, currently the upland vegetation is dominant. Woody species such as *Salix exigua* and *Populus trichocarpa* are present.

BIRD SURVEY – FIELD DATA SHEET

Page_1___of_1__
Date: varies
Survey Time: 8-9 AM

SITE: Mark Norem Wetland

Bird Species	#	Behavior	Habitat	Bird Species	#	Behavior	Habitat
July 19, 2005							
Common Snipe	1	N	MA				
Eastern Kingbird	2	F	MA/OW				
Greater Yellowlegs	2	F	Mod/OW				
Killdeer	1	F	MA				
Least Sandpiper	1	F	MA				
Osprey	2	FO	WM				
Red-winged Blackbird	8	FO					
Spotted Sandpiper	1	F	mud/pond				

Notes:

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

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

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

Project/Site: Norem Property	Date: 7/19/05
Applicant/Owner: MDT	County: Sweetgrass
Investigator: CH/LWC	State: MT

Do Normal Circumstances exist on the site:	X	Yes		No	Community ID: Wetland
Is the site significantly disturbed (Atypical Situation)?		Yes	X	No	Transect ID: 1
Is the area a potential Problem Area?:		Yes	X	No	Plot ID: SP-1
(If needed, explain on reverse.)					Soil pit located at the 40 ft mark

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1	JUNBAL	H	OBL	9			
2	SCIPUN	H	OBL	10			
3	POPTRI	T	FAC	11			
4	PHLARU	H	FACW	12			
5	SALEXI	S	OBL	13			
6	ALOPRA	H	FACW	14			
7	POPANS	H	OBL	15			
8	AGRSMI	H	FACU	16			

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-). 7/8 =87.5% hydrophytic vegetation

HYDROLOGY

Recorded Data (Describe in Remarks):
- ____ Stream, Lake, or Tide Gauge
- X Aerial Photographs
- ____ Other

____ No Recorded Data Available

Field Observations:

Depth of Surface Water:	--	(in.)
Depth to Free Water in Pit:	--	(in.)
Depth to Saturated Soil:	10	(in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ____ Inundated
- X Saturated in Upper 12 Inches
- ____ Water Marks
- ____ Drift Lines
- ____ Sediment Deposits
- ____ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ____ Oxidized Root Channels in Upper 12 Inches
- ____ Water-Stained Leaves
- ____ Local Soil Survey Data
- ____ FAC-Neutral Test
- ____ Other (Explain in Remarks)

Remarks:

Soils were saturated at 10 inches.

SOILS

Map Unit Name (Series and Phase): Nesda-McIlwaine loam (107A)
Taxonomy (Subgroup): Fine sandy loam
Drainage Class: Well-drained
Field Observations
Confirm Mapped Type? ____ Yes ____ No

Profile Description:

Depth inches	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
10	A	10YR 4/1	10YR 5/6	Small/faint	Silty loam

Hydric Soil Indicators:

____	Histosol	____	Concretions
____	Histic Epipedon	____	High Organic Content in surface Layer in Sandy Soils
____	Sulfidic Odor	____	Organic Streaking in Sandy Soils
____	Aquic Moisture Regime	____	Listed on Local Hydric Soils List
____	Reducing Conditions	____	Listed on National Hydric Soils List
X	Gleyed or Low-Chroma Colors	____	Other (Explain in Remarks)

Mottles noted at 6 inches.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? X Yes ____ No
Wetland Hydrology Present? X Yes ____ No
Hydric Soils Present? X Yes ____ No

Is this Sampling Point Within a Wetland? X Yes ____ No

Remarks:

This sampling point meets the three wetland parameters.

Approved by HQUSACE 2/92

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

Project/Site: Norem Property				Date: 7/19/05	
Applicant/Owner: MDT				County: Sweetgrass	
Investigator: CH/MDT				State: MT	
Do Normal Circumstances exist on the site:	X Yes		No	Community ID: Upland	
Is the site significantly disturbed (Atypical Situation)?	Yes	X	No	Transect ID: 1	
Is the area a potential Problem Area?:	Yes	X	No	Plot ID: SP-2	
(If needed, explain on reverse.)				Soil pit located ~100 ft north of cattails	

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1	AGRSMI	H	FACU	9			
2	FESPRA	H	FACU+	10			
3	BROINE	H	(FACU)	11			
4	AGRALB	H	FACW	12			
5	ERILAN	H	FACU	13			
6				14			
7				15			
8				16			

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-). 1/5 = 20% hydrophytic vegetation

HYDROLOGY

Recorded Data (Describe in Remarks):
- ____ Stream, Lake, or Tide Gauge
- X Aerial Photographs
- ____ Other
- ____ No Recorded Data Available

Field Observations:
- Depth of Surface Water: -- (in.)
- Depth to Free Water in Pit: -- (in.)
- Depth to Saturated Soil: >12 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ____ Inundated
- ____ Saturated in Upper 12 Inches
- ____ Water Marks
- ____ Drift Lines
- ____ Sediment Deposits
- ____ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ____ Oxidized Root Channels in Upper 12 Inches
- ____ Water-Stained Leaves
- ____ Local Soil Survey Data
- ____ FAC-Neutral Test
- ____ Other (Explain in Remarks)

Remarks: No primary wetland indicators, and 1 secondary indicator (oxidized root channels).

SOILS

Map Unit Name (Series and Phase): Lallie family (250A)
Taxonomy (Subgroup): Silty clay
Drainage Class: Poorly drained
Field Observations
Confirm Mapped Type? ____ Yes X No

Profile Description:

Depth inches	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
12	A	10YR 4/2			Silty clay

Hydric Soil Indicators:

____ Histosol	____ Concretions
____ Histic Epipedon	____ High Organic Content in surface Layer in Sandy Soils
____ Sulfidic Odor	____ Organic Streaking in Sandy Soils
____ Aquic Moisture Regime	____ Listed on Local Hydric Soils List
____ Reducing Conditions	____ Listed on National Hydric Soils List
____ Gleyed or Low-Chroma Colors	____ Other (Explain in Remarks)

Not a hydric soil

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ____ Yes X No
Wetland Hydrology Present? ____ Yes X No
Hydric Soils Present? ____ Yes X No

Is this Sampling Point Within a Wetland? ____ Yes X No

Remarks:
This sampling site meets not meet any of the three wetland criteria.

Approved by HQUSACE 2/92

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

1. Project Name: Norem Wetland Project **2. Project #:** B43054 **Control #:** _____

3. Evaluation Date: 7/19/2005 **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 LWC

B. Purpose of Evaluation:

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

8. Wetland Size (total acres): 11.39 (visually estimated)
_____ (measured, e.g. GPS)

9. Assessment Area (total acres): _____ (visually estimated)
11.39 (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 and young Russian olive plants (1.5 ft to 3 ft tall).

iii. Briefly describe AA and surrounding land use / habitat: grazing agricultural and residential

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	--	--	--	--
Moderate	.9 (H)	--	--	--
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	M	0.90	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:	6.60	10.00	75.17
	Percent of Total Possible Points:		**66%** (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.)

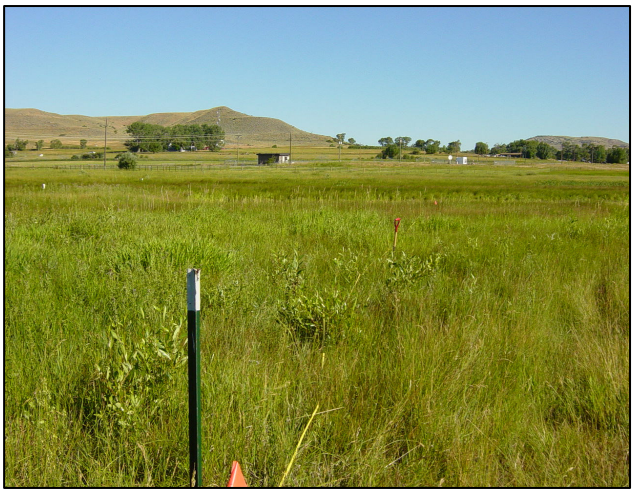
☐ **I** ☒ **II** ☐ **III** ☐ **IV**

Appendix C

REPRESENTATIVE PHOTOGRAPHS

MDT Wetland Mitigation Monitoring
Norem Property
Big Timber, Montana

NOREM PROPERTY WETLAND MITIGATION SITE 2005



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:** SE

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

NOREM PROPERTY WETLAND MITIGATION SITE 2005

Location: G **Description:** Transect 1 northern end. Pond 4 and willow cuttings. **Compass Reading:** East

Location: H **Description:** Looking across wetland/upland transitions. **Compass Reading:** SW

Location: I **Description:** WL/UPL interface **Compass Reading:** NW

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

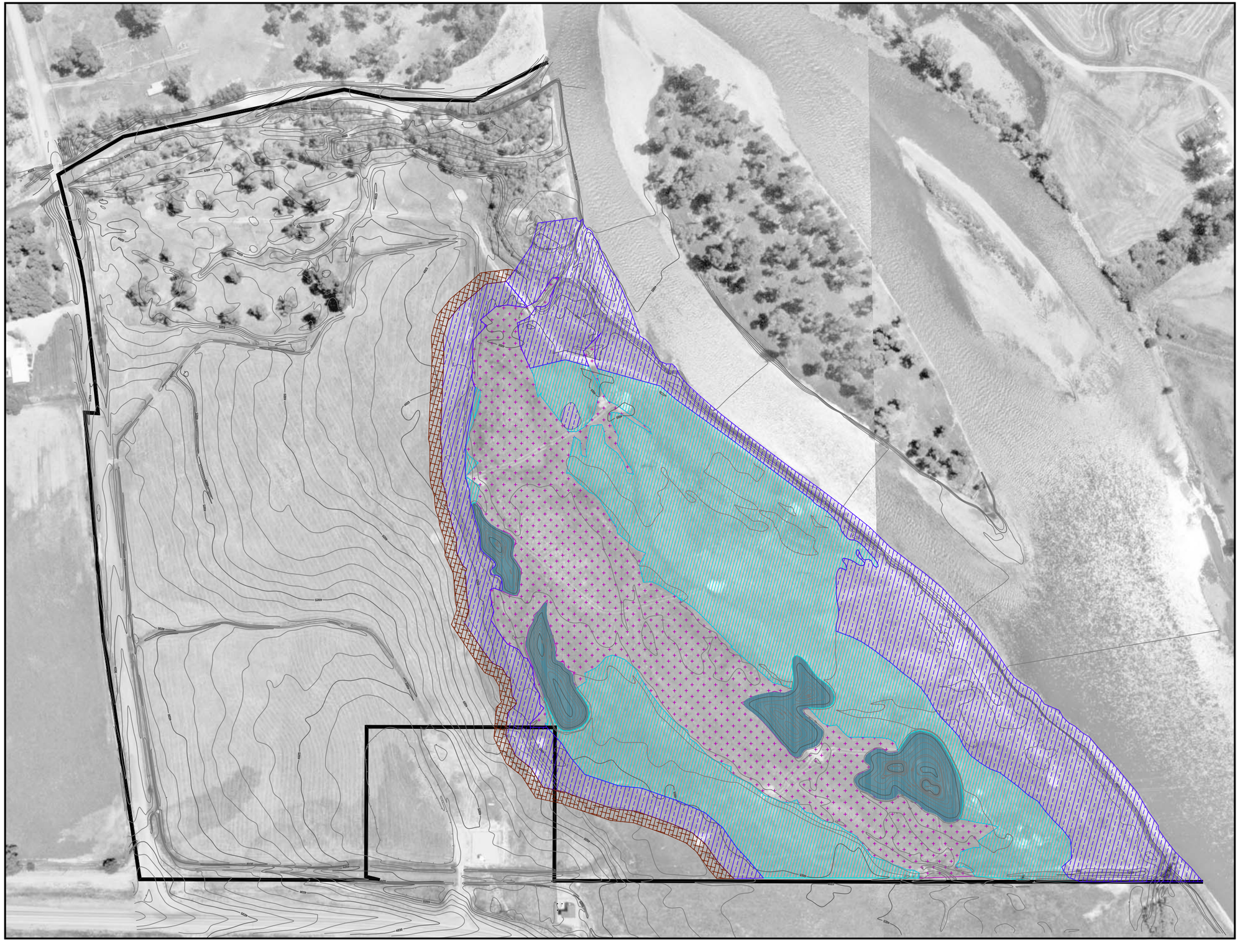
Location: C-1 **Description:** Pond 1, red-osier dogwood seedlings re-sprouting from the base. **Compass Reading**:

Location: C-2 **Description:** Pond 1wetland vegetation colonizing around pond edges. **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

BIRD SURVEY PROTOCOL
GPS PROTOCOL

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

2005 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 - 2005

METHODS

Among other monitoring activities, aquatic invertebrate assemblages were collected at a number of mitigated wetlands throughout Montana. This report summarizes data generated from five years of collection. In 2001, 29 sites were sampled statewide. Nineteen of these sites were revisited in 2002, and 13 new sites were sampled. In 2003, 17 sites that had been visited in both 2001 and 2002 were re-sampled, and 11 sites sampled for the first time in 2001 were re-visited. In addition, 2 new sites were sampled. In 2004, 25 sites were re-visited, and 6 new sites were sampled. In 2005, an additional 2 sites were added. Over all years of sampling, a total of 151 sites were sampled for invertebrates. Table 2 summarizes sites and sampling years.

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, and 2005, and Kleinschmidt Creek, sampled in 2003, 2004, and 2005, were assessed using the tested metric battery developed for montane streams of Western Montana (Bollman 1998).Invertebrate assemblages at these sites were different from that 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; our understanding of the interrelationships of natural environmental factors and anthropogenic disturbances are tentative. Thus, the further interpretive remarks accompanying the raw taxonomic and metric data are offered cautiously.

Table 1. Montana Department of Transportation Mitigated Wetlands Monitoring Project sites, 2001 – 2005.

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

Sample Processing

Aquatic invertebrate samples were collected at mitigation wetland sites in the summer months of 2001, 2002, 2003, 2004, and 2005 by personnel of Land and Water Consulting, 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, over the water surface, and included disturbing and scraping substrates at each sampled sites. Samples were preserved in ethanol at each wetland site and subsequently 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, when possible, from each sample. In some cases, the entire sample contained fewer than 100 organisms; in these cases, all organisms from the sample were taken. Taxa were identified in general accordance with the taxonomic resolution standards set out in the MT DEQ Standard Operating Procedures for Sampling and Sample Analysis (Bukantis 1998). All samples were re-identified by a second taxonomist for quality assurance purposes. The identified samples have been archived at Rhithron's laboratory. Taxonomic data and organism counts were entered into an Excel 2000 spreadsheet, and metrics were calculated and scored using spreadsheet formulae.

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 2005 data, no changes were made to scoring criteria this year. Summary metric values and scores for the 2005 samples are given in Tables 3a-3d.

Table 2. Aquatic invertebrate metrics employed in the MTDT mitigation 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 times that taxon's modified Hilsenhoff Biotic Index 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 Land &Water Consulting / PBS&J and are included in the Macro-Invertebrate sections of individual reports. Summary tables are provided on the following pages.*)

Table 3a. Metric values and scores for Montana Department of Transportation mitigated wetland sites in 2005.

	BEAVERHEAD #1	BEAVERHEAD #3	BEAVERHEAD #5	BEAVERHEAD #6	BIG SPRING CREEK	STILLWATER	ROUNDUP	WIDGEON
Total taxa	22	9	14	18	28	17	7	19
POET	2	0	0	2	4	4	0	0
Chironomidae taxa	7	4	4	4	9	5	3	11
Crustacea + Mollusca	4	3	1	4	7	5	2	4
% Chironomidae	59.80%	7.55%	50.00%	16.67%	33.65%	9.43%	22.22%	76.47%
Orthocladiinae/Chir	0.197	0.625	0.059	0.067	0.457	0.500	0.000	0.205
%Amphipoda	1.96%	0.94%	0.00%	1.11%	18.27%	7.55%	0.00%	10.78%
%Crustacea + %Mollusca	10.78%	90.57%	2.94%	55.56%	33.65%	53.77%	72.65%	15.69%
HBI	7.71	7.88	7.88	7.98	7.55	7.28	8.33	8.25
%Dominant taxon	34.31%	76.42%	35.29%	25.56%	18.27%	33.02%	71.79%	44.12%
%Collector-Gatherers	56.86%	93.40%	47.06%	21.11%	70.19%	64.15%	82.05%	26.47%
%Filterers	0.00%	0.00%	0.00%	0.00%	0.96%	3.77%	0.00%	6.86%
Total taxa	5	1	1	3	5	3	1	3
POET	1	1	1	1	5	5	1	1
Chironomidae taxa	5	3	3	3	5	3	3	5
Crustacea + Mollusca	3	1	1	3	5	3	1	3
% Chironomidae	1	5	1	5	3	5	3	1
Orthocladiinae/Chir	3	5	1	1	5	5	1	3
%Amphipoda	5	5	5	5	3	3	5	3
%Crustacea + %Mollusca	5	1	5	3	3	3	1	5
HBI	1	1	1	1	3	3	1	1
%Dominant taxon	3	1	3	5	5	5	1	3
%Collector-Gatherers	3	5	3	1	3	3	5	1
%Filterers	3	3	3	3	3	3	3	1
Total score	**38**	**32**	**28**	**34**	**48**	**44**	**26**	**30**
Percent of maximum score	**0.633333**	**0.533333**	**0.466667**	**0.566667**	**0.8**	**0.733333**	**0.433333**	**0.5**
Impairment classification	**sub-optimal**	**poor**	**poor**	**sub-optimal**	**optimal**	**optimal**	**poor**	**poor**

Table 3b. Metric values and scores for Montana Department of Transportation mitigated wetland sites in 2005.

	RIDGEWAY	MUSGRAVE REST. 1	MUSGRAVE REST. 2	MUSGRAVE ENH. 1	HOSKINS LANDING	PETERSON RANCH 1	PETERSON RANCH 2	PETERSON RANCH 4	PETERSON RANCH 5
Total taxa	19	19	23	19	27	29	16	25	16
POET	3	1	3	1	5	4	2	4	4
Chironomidae taxa	6	6	8	3	6	11	6	8	7
Crustacea + Mollusca	5	5	3	7	6	6	5	6	2
% Chironomidae	9.26%	14.55%	22.00%	2.80%	17.58%	17.48%	13.91%	24.55%	16.96%
Orthocladiinae/Chir	0.600	0.750	0.136	0.667	0.188	0.556	0.563	0.630	0.632
%Amphipoda	6.48%	3.64%	0.00%	0.93%	0.00%	0.97%	7.83%	1.82%	8.04%
%Crustacea + %Mollusca	22.22%	30.91%	38.00%	58.88%	27.47%	31.07%	72.17%	20.00%	8.93%
HBI	7.71	7.22	7.77	7.16	6.81	7.16	7.43	7.65	8.08
%Dominant taxon	53.70%	21.82%	35.00%	28.04%	14.29%	26.21%	33.04%	18.18%	31.25%
%Collector-Gatherers	68.52%	40.00%	15.00%	11.21%	31.87%	59.22%	28.70%	43.64%	68.75%
%Filterers	0.00%	0.00%	0.00%	2.80%	0.00%	4.85%	33.91%	5.45%	1.79%
Total taxa	3	3	5	3	5	5	3	5	3
POET	3	1	3	1	5	5	1	5	5
Chironomidae taxa	3	3	5	3	3	5	3	5	5
Crustacea + Mollusca	3	3	1	5	5	5	3	5	1
% Chironomidae	5	5	3	5	5	5	5	3	5
Orthocladiinae/Chir	5	5	1	5	3	5	5	5	5
%Amphipoda	3	5	5	5	5	5	3	5	3
%Crustacea + %Mollusca	5	5	3	3	5	5	1	5	5
HBI	1	3	1	3	5	3	3	1	1
%Dominant taxon	1	5	3	5	5	5	5	5	5
%Collector-Gatherers	3	1	1	1	1	3	1	1	3
%Filterers	3	3	3	3	3	3	1	3	3
Total score	**38**	**42**	**34**	**42**	**50**	**54**	**34**	**48**	**44**
Percent of maximum score	**0.633333**	**0.7**	**0.566667**	**0.7**	**0.833333**	**0.9**	**0.566667**	**0.8**	**0.733333**
Impairment classification	**sub-optimal**	**optimal**	**sub-optimal**	**optimal**	**optimal**	**optimal**	**sub-optimal**	**optimal**	**optimal**

Table 3c. Metric values and scores for Montana Department of Transportation mitigated wetland sites in 2005.

	CRESTON	PERRY RANCH	SOUTH FORK SMITH RIVER	CAMP CREEK	KLEINSCH MIDT POND	KLEINSCH MIDT STREAM	CLOUD RANCH POND	COLLOID	JACK CREEK
Total taxa	16	18	19	36	27	23	22	9	16
POET	0	0	4	14	6	5	2	1	1
Chironomidae taxa	4	8	6	13	6	9	11	4	9
Crustacea + Mollusca	6	4	5	0	2	3	3	1	4
% Chironomidae	27.62%	43.69%	21.67%	45.54%	8.85%	45.08%	37.50%	25.83%	29.41%
Orthocladiinae/Chir	0.931	0.622	0.192	0.804	0.200	0.473	0.256	0.000	0.467
%Amphipoda	0.00%	0.00%	29.17%	0.00%	5.31%	0.82%	0.00%	0.00%	0.98%
%Crustacea + %Mollusca	52.38%	38.83%	62.50%	0.00%	7.96%	3.28%	7.69%	67.50%	41.18%
HBI	7.52	7.31	7.54	5.06	7.40	5.83	6.96	8.53	7.39
%Dominant taxon	25.71%	25.24%	29.17%	18.81%	30.09%	32.79%	41.35%	67.50%	35.29%
%Collector-Gatherers	64.76%	47.57%	65.00%	47.52%	37.17%	50.82%	75.96%	88.33%	91.18%
%Filterers	6.67%	27.18%	8.33%	5.94%	0.88%	2.46%	2.88%	0.00%	2.94%
Total taxa	3	3	3	5	5	5	5	1	3
POET	1	1	5	5	5	5	1	1	1
Chironomidae taxa	3	5	3	5	3	5	5	3	5
Crustacea + Mollusca	5	3	3	1	1	1	1	1	3
% Chironomidae	3	1	3	1	5	1	3	3	3
Orthocladiinae/Chir	5	5	3	5	3	5	3	1	1
%Amphipoda	5	5	1	5	3	5	5	5	5
%Crustacea + %Mollusca	3	3	3	5	5	5	5	1	3
HBI	3	3	3	5	3	5	3	1	3
%Dominant taxon	5	5	5	5	5	5	3	1	3
%Collector-Gatherers	3	3	3	3	1	3	3	5	5
%Filterers	1	1	1	3	3	3	3	3	3
Total score	**40**	**38**	**36**	**48**	**42**	**48**	**40**	**26**	**38**
Percent of maximum score	**0.666667**	**0.633333**	**0.6**	**0.8**	**0.7**	**0.8**	**0.666667**	**0.433333**	**0.633333**
Impairment classification	**sub-optimal**	**sub-optimal**	**sub-optimal**	**optimal**	**optimal**	**optimal**	**sub-optimal**	**poor**	**sub-optimal**

Table 3d. Metric values and scores for Montana Department of Transportation mitigated wetland sites in 2005.

	NOREM	ROCK CREEK RANCH	WAGNER MARSH
Total taxa	4	24	23
POET	0	2	5
Chironomidae taxa	2	8	8
Crustacea + Mollusca	2	4	5
% Chironomidae	37.50%	22.00%	24.00%
Orthocladiinae/Chir	0.000	0.318	0.167
%Amphipoda	0.00%	3.00%	7.00%
%Crustacea + %Mollusca	62.50%	40.00%	19.00%
HBI	7.50	7.61	8.58
%Dominant taxon	56.25%	18.00%	38.00%
%Collector-Gatherers	6.25%	57.00%	40.00%
%Filterers	0.00%	0.00%	3.00%
Total taxa	1	5	5
POET	1	1	5
Chironomidae taxa	1	5	5
Crustacea + Mollusca	1	3	3
% Chironomidae	3	3	3
Orthocladiinae/Chir	1	3	1
%Amphipoda	5	5	3
%Crustacea + %Mollusca	3	3	5
HBI	3	1	1
%Dominant taxon	1	5	3
%Collector-Gatherers	1	3	1
%Filterers	3	3	3
Total score	**24**	**40**	**38**
Percent of maximum score	**0.4**	**0.666667**	**0.633333**
Impairment classification	**poor**	**sub-optimal**	**sub-optimal**

Literature Cited

Bollman, W. 1998. Montana Valleys and Foothill Prairies Ecoregion. Master's Thesis. (M.S.) University of Montana. Missoula, Montana.

Bukantis, R. 1998. Rapid bioassessment macroinvertebrate protocols: Sampling and sample analysis SOP's. Working draft. Montana Department of Environmental Quality. Planning Prevention and Assistance Division. Helena, Montana.

McCune, B. and J.B. Grace. 2002. Analysis of Ecological Communities. MjM Software Design, Gleneden Beach, Oregon, USA.

McCune, B. and M.J. Mefford. 2002. PC-ORD. Multivariate Analysis of Ecological Data, Version 4. MjM Software Design, Gleneden Beach, Oregon, USA.

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

Taxa Listing

Project ID: MDT05LW
RAI No.: MDT05LW022

RAI No.: MDT05LW022 **Sta. Name:** NOREM
Client ID:
Date Coll.: **No. Jars:** 1 **STORET ID:**

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Non-Insect							
Lymnaeidae							
Stagnicola sp.	9	56.25%	Yes	Unknown		6	SC
Physidae							
Aplexa sp.	1	6.25%	Yes	Unknown		8	SC
Chironomidae							
Chironomidae							
Dicrotendipes sp.	1	6.25%	Yes	Larva		8	CG
Endochironomus sp.	5	31.25%	Yes	Larva		10	SH
Sample Count	**16**						

Metrics Report

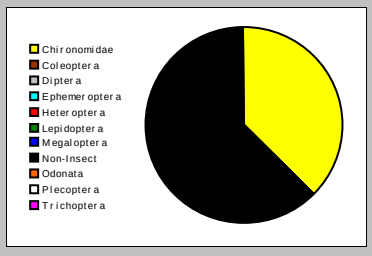
Project ID: MDT05LW
RAI No.: MDT05LW022
Sta. Name: NOREM
Client ID:
STORET ID
Coll. Date:

Abundance Measures

Sample Count:	16	
Sample Abundance:	16.00	100.00% of sample used
Total Abundance:	21.52	
Coll. Procedure:		
Sample Notes:		

Taxonomic Composition

Category	R	A	PRA
Non-Insect	2	10	62.50%
Odonata			
Ephemeroptera			
Plecoptera			
Heteroptera			
Megaloptera			
Trichoptera			
Lepidoptera			
Coleoptera			
Diptera			
Chironomidae	2	6	37.50%

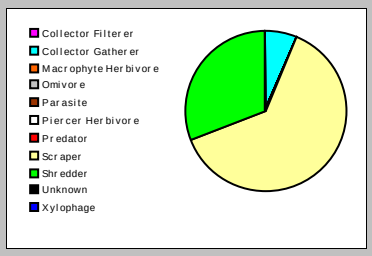


Dominant Taxa

Category	A	PRA
Stagnicola	9	56.25%
Endochironomus	5	31.25%
Dicrotendipes	1	6.25%
Aplexa	1	6.25%

Functional Composition

Category	R	A	PRA
Predator			
Parasite			
Collector Gatherer	1	1	6.25%
Collector Filterer			
Macrophyte Herbivore			
Piercer Herbivore			
Xylophage			
Scraper	2	10	62.50%
Shredder	1	5	31.25%
Omivore			
Unknown			

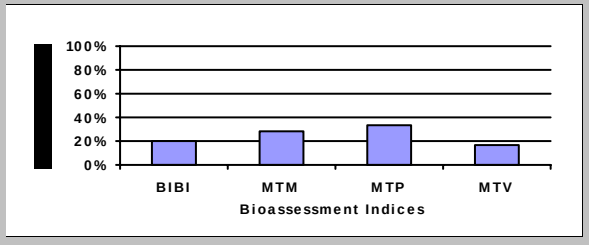


Metric Values and Scores

Metric	Value	BIBI	MTP	MTV	MTM
Composition					
Taxa Richness	4	1	0		0
Non-Insect Percent	62.50%				
E Richness	0	1		0	
P Richness	0	1		0	
T Richness	0	1		0	
EPT Richness	0		0		0
EPT Percent	0.00%		0		0
Oligochaeta+Hirudinea Percent					
Baetidae/Ephemeroptera	0.000				
Hydropsychidae/Trichoptera	0.000				
Dominance					
Dominant Taxon Percent	56.25%		1		0
Dominant Taxa (2) Percent	87.50%				
Dominant Taxa (3) Percent	93.75%	1			
Dominant Taxa (10) Percent	100.00%				
Diversity					
Shannon H (loge)	1.034				
Shannon H (log2)	1.491		0		
Margalef D	1.082				
Simpson D	0.383				
Evenness	0.229				
Function					
Predator Richness	0		0		
Predator Percent	0.00%	1			
Filterer Richness	0				
Filterer Percent	0.00%			3	
Collector Percent	6.25%		3		3
Scraper+Shredder Percent	93.75%		3		3
Scraper/Filterer	0.000				
Scraper/Scraper+Filterer	0.000				
Habit					
Burrower Richness	1				
Burrower Percent	6.25%				
Swimmer Richness	0				
Swimmer Percent	0.00%				
Clinger Richness	0	1			
Clinger Percent	0.00%				
Characteristics					
Cold Stenotherm Richness	0				
Cold Stenotherm Percent	0.00%				
Hemoglobin Bearer Richness	2				
Hemoglobin Bearer Percent	37.50%				
Air Breather Richness	0				
Air Breather Percent	0.00%				
Voltinism					
Univoltine Richness	1				
Semivoltine Richness	0	1			
Multivoltine Percent	37.50%		3		
Tolerance					
Sediment Tolerant Richness	1				
Sediment Tolerant Percent	56.25%				
Sediment Sensitive Richness	0				
Sediment Sensitive Percent	0.00%				
Metals Tolerance Index	4.133				
Pollution Sensitive Richness	0	1		0	
Pollution Tolerant Percent	93.75%	1		0	
Hilsenhoff Biotic Index	7.500		0		0
Intolerant Percent	0.00%				
Supertolerant Percent	43.75%				
CTQa	108.000				

Bioassessment Indices

BioIndex	Description	Score	Pct	Rating
BIBI	B-IBI (Karr et al.)	10	20.00%	
MTP	Montana DEQ Plains (Bukantis 1998)	10	33.33%	Moderate
MTV	Montana Revised Valleys/Foothills (Bollman 1998)	3	16.67%	Severe
MTM	Montana DEQ Mountains (Bukantis 1998)	6	28.57%	Moderate



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