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# MONTANA DEPARTMENT OF TRANSPORTATION FINAL WETLAND MITIGATION MONITORING REPORT: YEAR 2005

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## *Stillwater River Absarokee, 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 - 0512



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**Cover Photo:** Northwest side of west impoundment; H end of transect and Wood Duck box.

## 1.0 INTRODUCTION

This report documents the fifth and final year of monitoring at the Stillwater River wetland mitigation site. Located in watershed #13 in the MDT Billings District, the Stillwater River wetland was constructed in the spring of 1999 to mitigate wetland impacts associated with a proposed Federal Aviation Administration expansion of the Columbus airport and a proposed MDT roadway improvement project between Absarokee and Columbus. The site is located in Stillwater County approximately eight miles southwest of the interstate interchange at Columbus, Section 22, Township 3 South, Range 19 East (**Figure 1**). Elevations within the assessment area range from approximately 3,382 to 3,387 feet above sea level. The surrounding land uses include pastures, cropland and residential areas.

The project was intended to develop approximately 10.69 acres of wetland credit within a 20-acre conservation easement on property owned by Virginia K. Thompson. Two dikes were constructed across a former channel of the Stillwater River to impound return irrigation water from the nearby Whitebird irrigation ditch and groundwater. The two dikes were constructed to create 3.79 acres of wetland behind Dike #1 and 6.90 acres of wetland behind Dike #2 (total 10.69 acres). The mitigation activities were to impact approximately 3.77 acres of existing wetlands, and also enhance 3.77 acres of existing wetlands behind dikes 1 and 2.

The impoundments have standing water with depths ranging from 0-6 feet. Outflow from the west (#1) to the east impoundment (#2) is through a beaver control device installed in the central dike separating the two impoundments. A similar device allows outflow through the second dike into a small stream connecting to the Stillwater River. The site boundary is illustrated on **Figure 2, Appendix A**.

## 2.0 METHODS

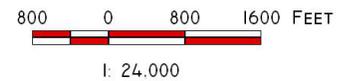
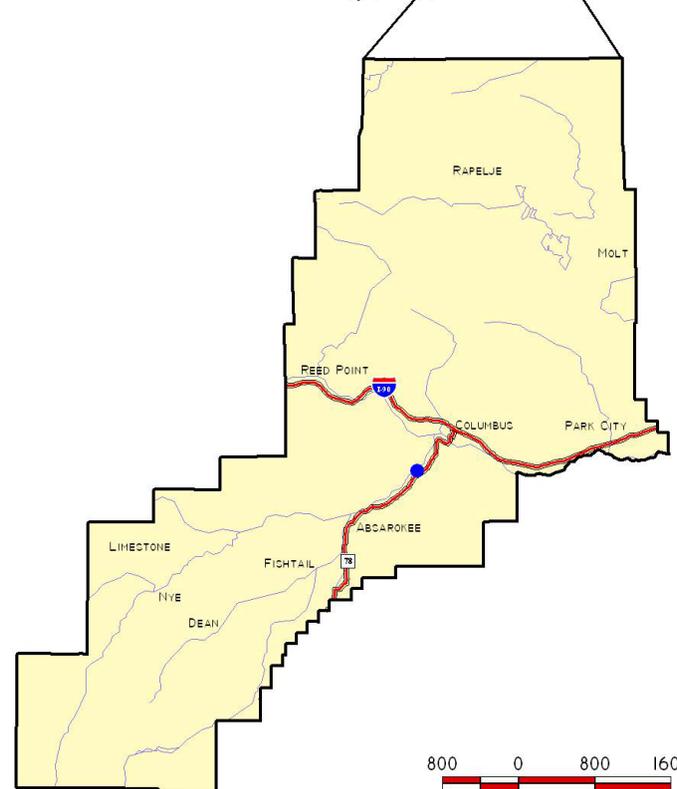
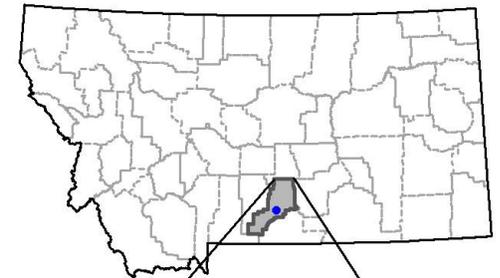
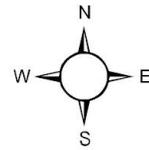
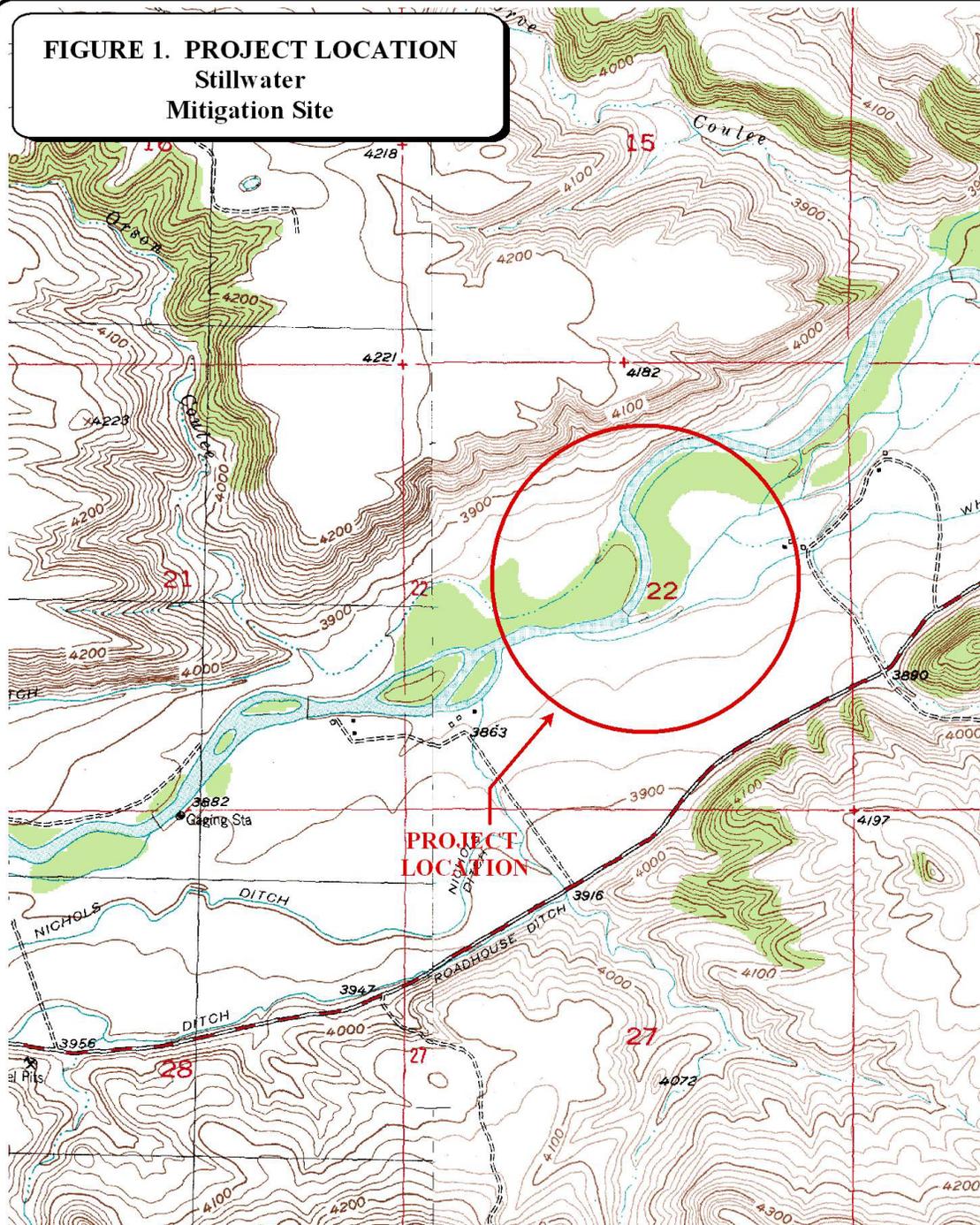
### 2.1 Monitoring Dates and Activities

The site was visited during 2005 on May 16 for spring avian migration use, and on August 8 to collect the wetland monitoring form data (**Appendix B**). 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 any bird nesting structures and inflow and outflow structures (non-engineering).

### 2.2 Hydrology

Wetland hydrology indicators were recorded using procedures outlined in the COE 1987 Wetland Delineation Manual. Hydrology data were recorded on the COE Routine Wetland Delineation Data Form (**Appendix B**) at each wetland determination point. Precipitation data for 2005 were compared to the 1948-2005 average (WRCC 2005).

**FIGURE 1. PROJECT LOCATION**  
**Stillwater**  
**Mitigation Site**



PROJECT #: 130091.032  
 DATE: APRIL 2001  
 LOCATION:  
 PROJECT MANAGER: B. DUTTON  
 DRAWN BY: B. NOECKER  
 M. ARTHUR

**LAND & WATER** CONSULTING, INC.  
 1120 CEDAR PO BOX 8254 MISSOULA, MT 59807

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**). There are no groundwater monitoring wells within the assessment area.

### 2.3 Vegetation

General vegetation types were delineated on the aerial photograph during the August 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 updated as new species were encountered. Observations from past years were compared with new data to document vegetation changes over time. The assessment area is fenced and woody species were not planted on this site.

Two (2) transects were established during the 2001 monitoring event to represent the range of current vegetation conditions; the transect in the vicinity of impoundment #2 was relocated during 2002. These transects locations are shown on **Figure 2, Appendix A**. Percent cover for each species was recorded on the vegetation transect form (**Appendix B**). The transects were 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 were taken during the mid-season visit.

### 2.4 Soils

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

### 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 the 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 Stillwater River wetland. A pre-construction wetland map was completed by the MDT (Urban 1998) 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 each 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 updated as new species were encountered.

## 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.

## 2.8 Macroinvertebrates

One macroinvertebrate composite sample was collected during the site visit following the protocol (**Appendix F**); a sample was collected from each impoundment and mixed. 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 assessments were completed by MDT and are included in the 2001 monitoring report.

## 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 2001 monitoring season, each photograph point was marked on the ground with a wooden stake and the location recorded with a resource grade GPS. The approximate locations are shown on **Figure 2, Appendix A**. Photos were taken from the same locations during the mid-season visits. All photographs were taken using a digital camera.

## 2.11 GPS Data

During the 2002 monitoring season survey points were collected using a resource grade Trimble, Geoplotter 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 (4) landmarks recognizable on the air photo for purposes of line fitting to the topography. In 2005, the wetland delineation boundary was recorded on an aerial photo; GPS data were not collected.

## 2.12 Maintenance Needs

The condition of inflow and outflow structures, habitat enhancement structures or other mitigation related structures were evaluated. Minor maintenance needs and recommendations are presented in **Section 3.9**. This examination did not entail an engineer-level analysis.

## 3.0 RESULTS

### 3.1 Hydrology

The source of hydrology for the Stillwater River mitigation wetland includes groundwater from the river and irrigation return water from the nearby Whitebird irrigation ditch. The historic river channel to the south and adjacent to the Stillwater River was excavated and diked to create the mitigation wetlands. Water is conveyed from the first to the second impoundment through a standing corrugated round riser with a debris guard that has been modified with beaver excluders (due to beavers having plugged the pipe in the past). A similar device allows outflow through the second dike into a small stream connecting to the Stillwater River.

During the August 8, 2005 monitoring visit approximately 57% of the assessment area was inundated with 0-6 feet of standing water and was at full-pond level. Open water, or the area without emergent or visible (top vegetative growth on the surface) aquatic vegetation, is depicted on **Figure 3, Appendix A**.

According to the Western Regional Climate Center (WRCC, 2005), the Columbus station annual mean (1948-May 2005) precipitation was 14.19 inches, and the average annual precipitation from January through May (June and July not available) over this period was 6.41 inches. Precipitation through May, 2005 was 9.59 inches or 150% of the average annual precipitation from January through May. Yearly precipitation has been below average since 1999 at the Columbus weather station; these 2005 data suggest at least a temporary relief of the drought conditions.

### 3.2 Vegetation

Vegetation species identified on the site are presented in **Table 1** and in the monitoring form (**Appendix B**). The upland community continues to decrease in size as a result of the increase in wetland acreage within the cottonwood area (**Figure 3, Appendix A** and **Charts 1** and **3**).

The Stillwater vegetation types include: Type 1, *Typha latifolia*; Type 2, *Carex* spp./*Juncus* spp./*Scirpus* spp; and Type 3, *Agropyron trachycaulus*/*Poa pratensis*. Dominant species within each community are listed on the monitoring form (**Appendix B**). Hydrophytic vegetation communities have also increased in diversity over time; changes in communities along the vegetation transects are presented in **Table 2** and the adjoining figure.

The site has developed wetland vegetation along 100% of the upland impoundment periphery and the shallow fingers of open water within the cottonwood areas. There are approximately 30 known species of wetland plants with a FACW to OBL status within the assessment area.

The vegetation transect results are detailed in the monitoring form (**Appendix B**) and are summarized in **Table 2** and **Charts 1-4**. Both transects are located on the northwest side of the impoundments; one adjacent to each impoundment. Transect 2 on the east impoundment was moved during 2002 to better represent wetland changes over time.

The upland area along Transect 1 continues to decrease slightly each year (**Charts 1 and 2**). Wetland community types remained stable between 2004 and 2005 (**Charts 3 and 4**).

Noxious weeds continue to spread within the Stillwater wetland. There are five (5) State of Montana declared Category 1 noxious weeds and one county-declared weed. Concentrated infestations of leafy spurge (*Euphorbia esula*) occur in the uplands along the northwest side of the east impoundment and the beaver-lodge peninsula. Knapweed (*Centaurea maculosa*) is expanding along the northwest end of the west dike (Dike 1). Noxious weeds within all of these heavily infested areas have spread since 2004. Other listed noxious weed species scattered throughout the site include: mullein (*Verbascum thapsus*, Stillwater CO. Noxious Weed), houndstongue (*Cynoglossum officinale*), field bindweed (*Convolvulus arvensis*), and Canada thistle (*Cirsium arvensis*).

**Table 1: 2001-2005 Stillwater River vegetation species list.**

Scientific Name <sup>1</sup>	Region 4 (Northwest) Wetland Indicator Status
<i>Agropyron trachycaulum</i>	FAC
<i>Agrostis alba</i>	FACW
<i>Alnus incana</i>	FACW
<i>Alopecurus arundinaceus</i>	NI (FAC+)
<i>Beckmannia syzigachne</i>	OBL
<i>Bromus inermis</i>	-(UPL)
<i>Bromus japonicus</i>	FACU
<i>Calamagrostis canadensis</i>	FACW+
<i>Callitriche palustris (verna)</i>	OBL
<i>Carex hystericina</i>	OBL
<i>Carex limnophilia</i>	FACW
<i>Carex nebrascensis</i>	OBL
<i>Carex stipata</i>	-(FACW)
<i>Carex utriculata</i>	OBL
<i>Centaurea maculosa</i>	-(UPL)
<i>Cirsium arvensis</i>	FACU+
<i>Convolvulus arvensis</i>	-(UPL)
<i>Cynoglossum officinale</i>	-(UPL)
<i>Dactylis glomerata</i>	FACU
<i>Eleocharis palustris</i>	OBL
<i>Epilobium spp.</i>	-(OBL)
<i>Equisetum arvensis</i>	FAC
<i>Euphorbia esula</i>	-(UPL)

**Table 1 (continued): 2001-2005 Stillwater River vegetation species list.**

Scientific Name <sup>1</sup>	Region 4 (Northwest) Wetland Indicator Status
<i>Gallium sp.</i>	-(UPL)
<i>Glyceria grandis</i>	OBL
<i>Hordeum jubatum</i>	FAC+
<i>Juncus balticus</i>	OBL
<i>Juncus ensifolius (confirm 2005)</i>	FACW
<i>Juncus nevadensis</i>	FACW
<i>Juncus tenuis</i>	FAC
<i>Juniperus scopulorum</i>	-(UPL)
<i>Lemna minor</i>	OBL
<i>Linaria vulgaris</i>	-(UPL)
<i>Melilotus officinalis</i>	FACU
<i>Mimulus spp.</i>	-(OBL)
<i>Phalaris arundinacea</i>	FACW
<i>Phleum pretense</i>	FACU
<i>Poa pratensis</i>	FACU+
<i>Polygonum amphibium</i>	OBL
<i>Populus angustifolia</i>	FACW
<i>Potentilla argentea</i>	FAC-
<i>Prunus virginiana</i>	FACU
<i>Ranunculus sceleratus</i>	OBL
<i>Ribes spp.</i>	-(FACU)
<i>Rumex crispus</i>	FACW
<i>Sagittaria cuneata</i>	OBL
<i>Salix bebbiana</i>	FACW
<i>Salix exigua</i>	OBL
<i>Salix lasiandra</i>	FACW+
<i>Scirpus acutus</i>	OBL
<i>Scirpus microcarpus</i>	OBL
<i>Scirpus pallidus</i>	OBL
<i>Solanum dulcamara</i>	FAC
<i>Symphoricarpos albus</i>	FACU
<i>Trifolium sp.</i>	Likely UPL
<i>Typha latifolia</i>	OBL
<i>Verbascum thapsus (Stillwater CO. Noxious Weed)</i>	-(UPL)
<i>Veronica wormskjoldii (?)</i>	FAC+

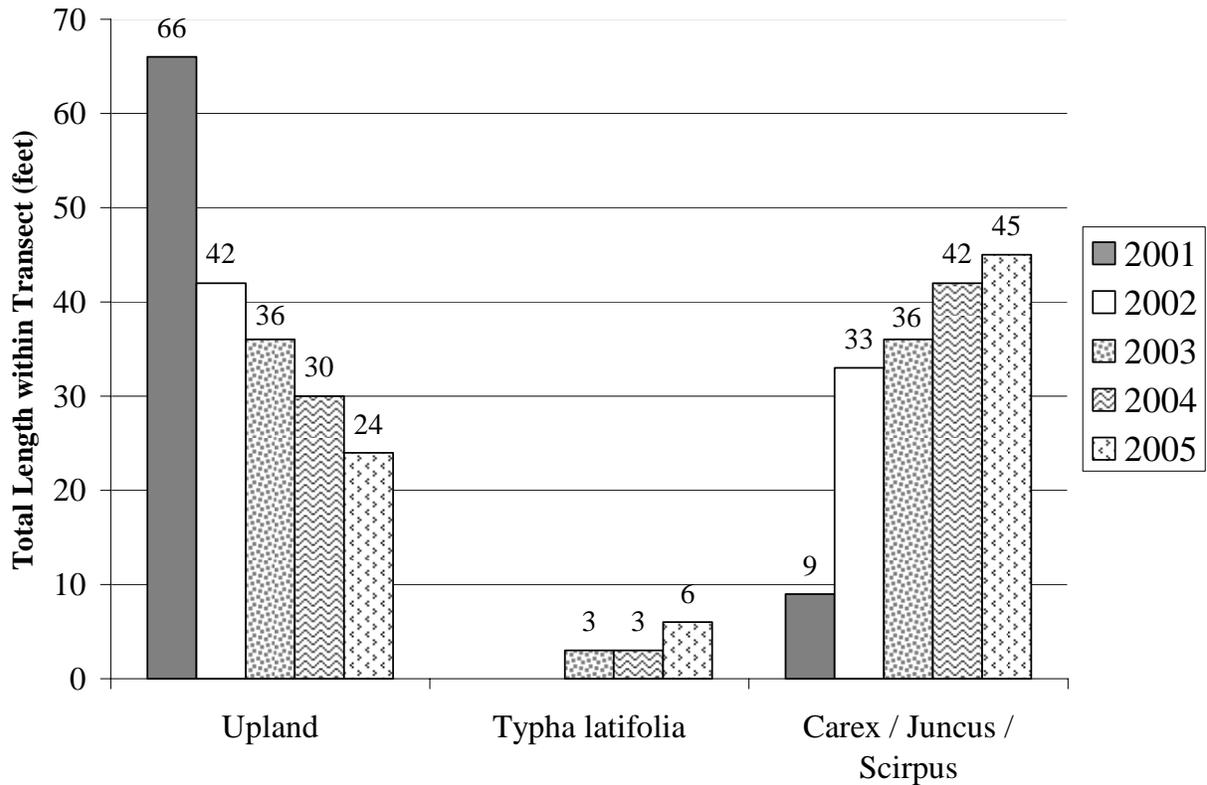
<sup>1</sup> **Bolded** species indicate those documented within the analysis area for the first time in 2005.

-Species either not included or classified as “non-indicator” for the Northwest Region in the National List of Plant Species that Occur in Wetlands (Reed 1988); status in parentheses are probable based on national indicators and classifications for adjacent regions.

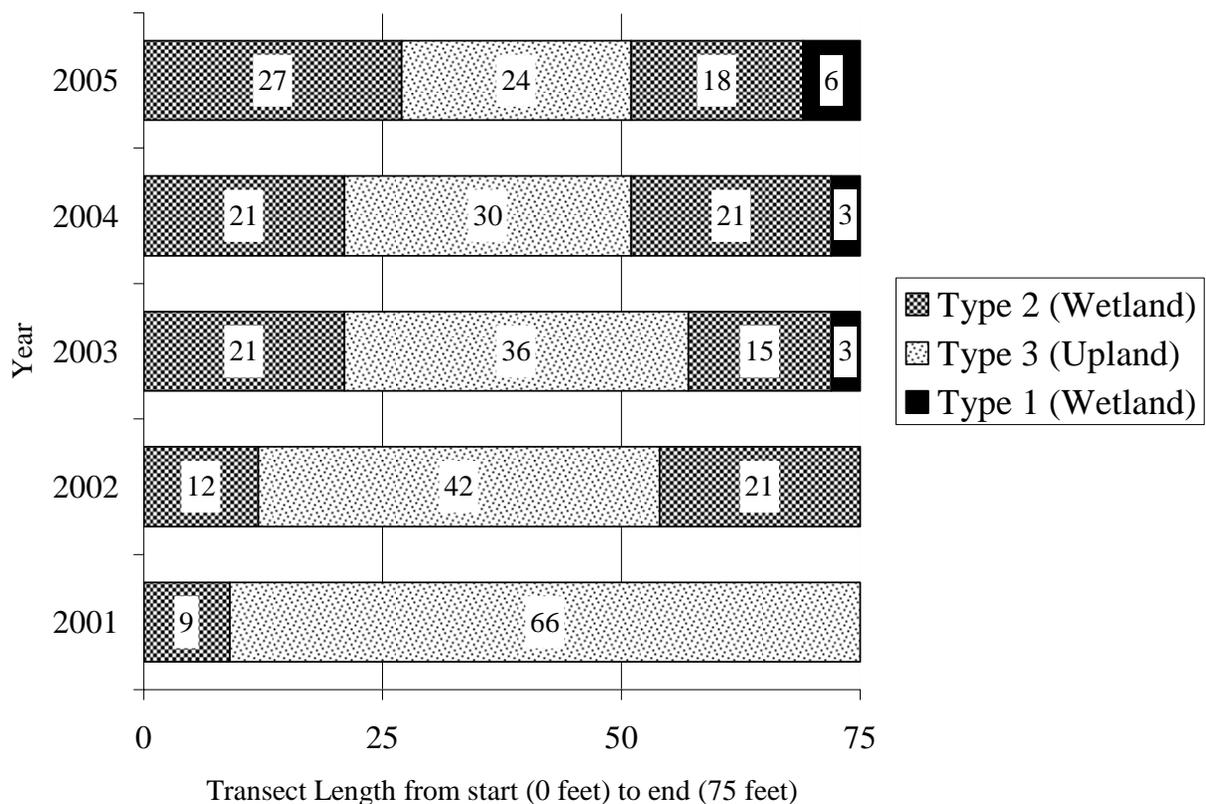
**Table 2a: 2001-2005 Transect 1 data summary.**

Monitoring Year	2001	2002	2003	2004	2005
Transect Length (feet)	75	75	75	75	75
# Vegetation Community Transitions along Transect	2	3	3	3	3
# Vegetation Communities along Transect	1	2	3	3	3
# Hydrophytic Vegetation Communities along Transect	1	2	2	2	2
Total Vegetative Species	7	19	20	18	20
Total Hydrophytic Species	2	16	17	14	16
Total Upland Species	5	3	3	4	4
Estimated % Total Vegetative Cover	99	100	100	100	100
% Transect Length Comprised of Hydrophytic Vegetation Communities	11	26	46	60	68
% Transect Length Comprised of Upland Vegetation Communities	89	74	54	40	32
% Transect Length Comprised of Unvegetated Open Water	0	0	0	0	0
% Transect Length Comprised of Bare Substrate	0	0	0	0	0

**Chart 1: Length of vegetation communities along Transect 1.**



**Chart 2: Transect maps showing vegetation types of Transect 1 from the start (0 feet) to the end (75 feet). Vegetation species within community types are not static across years.**

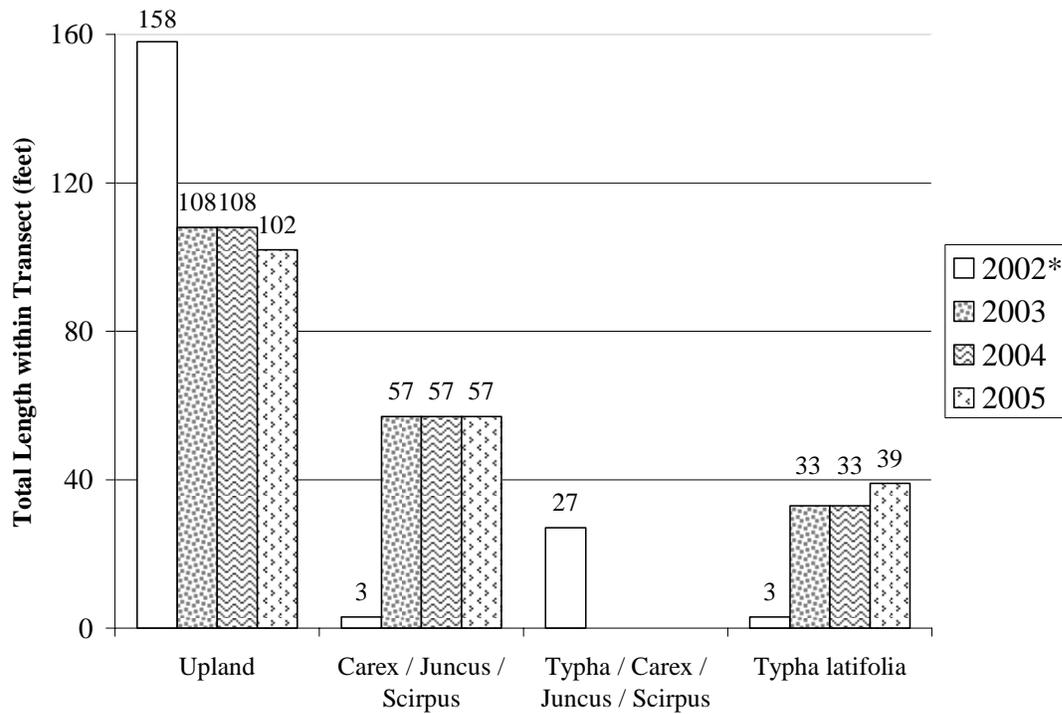


**Table 2b: 2001-2005 Transect 2 data summary.**

Monitoring Year	2001	2002	2003	2004	2005
Transect Length (feet)	60 <sup>1</sup>	198	198	198	198
# Vegetation Community Transitions along Transect	2	2	9	9	8
# Vegetation Communities along Transect	1	1	3	3	3
# Hydrophytic Vegetation Communities along Transect	1	1	2	2	2
Total Vegetative Species		17	19	21	25
Total Hydrophytic Species	6	13	15	15	17
Total Upland Species	6	4	4	6	8
Estimated % Total Vegetative Cover	85	78	94	99	99
% Transect Length Comprised of Hydrophytic Vegetation Communities	20	38	45	45	48
% Transect Length Comprised of Upland Vegetation Communities	80	61	55	55	52
% Transect Length Comprised of Unvegetated Open Water	6	0	0	0	0
% Transect Length Comprised of Bare Substrate	0	0	0	0	0

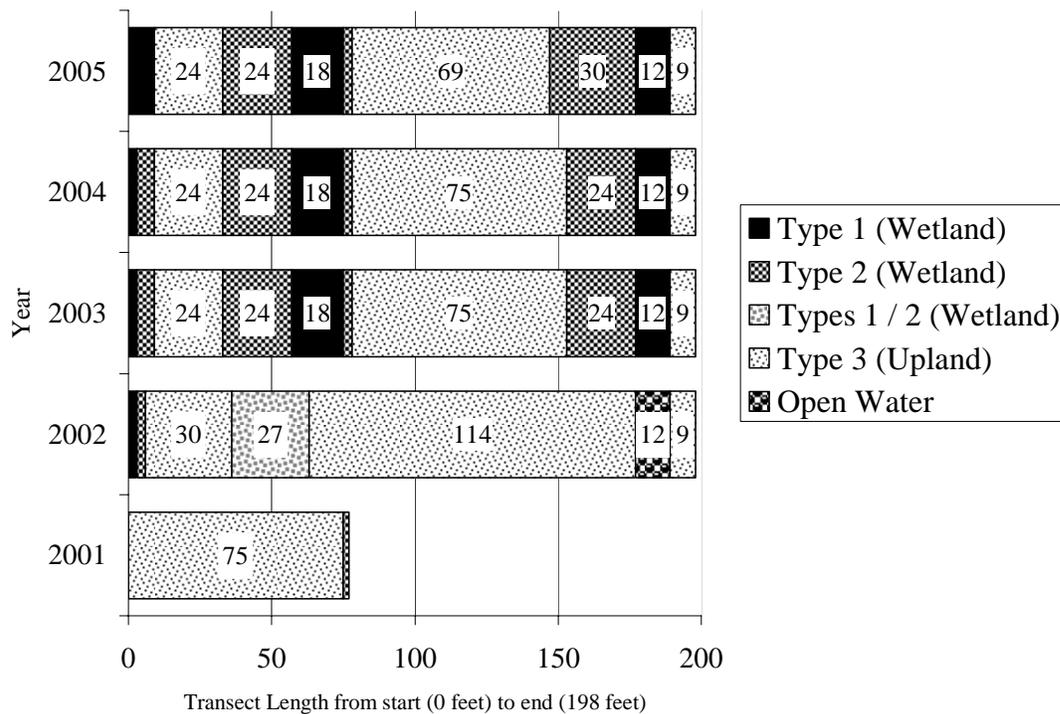
<sup>1</sup> Transect moved in 2002.

**Chart 3: Length of vegetation communities within Transect 2.**



\* The 2001 data is not included in the bar chart as the transect location was moved in 2002.

**Chart 4: Transect maps showing vegetation types of Transect 2 from the start (0 feet) to the end (198 feet) for each year monitored. Vegetation species within community types are not static across years.**



### 3.3 Soils

The site was mapped as part of the Carter County Stillwater Soil Survey (USDA 1980). The dominant soil on the site is mapped as the undifferentiated Lolo and Nesda soils, flooded (38). These soils are found on low stream terraces and flood plains. Lolo is a very gravelly loam that is taxonomically classified as a Pachic Haploboroll and Nesda is a gravelly loam with the classification of Fluventic Haploboroll. The Lolo-Nesda soil complex has four inclusions with only the Larry inclusion being hydric; neither component is hydric. The Larry inclusion is typical of wooded terraces like the Stillwater site.

Soils were sampled at two wetland sample points: SP-1, Transect 1 and SP-3, Transect 2. Soils at SP-1 were black (10YR 2/1) loam from 0-5 inches; at a depth greater than 5 inches cobbles were encountered. Saturation in SP-1 was to the surface. At SP-2 (Transect 1, upland) the same soil profile was encountered and saturation was at 1 inch below the surface. This upland area has been converting to wetland since the onset of monitoring. The soils at SP-3 were a black (10YR 2/1) cobbly loam to a depth of 10 inches. Saturation was at the surface. SP-4 (Transect 2, upland) soils were also a black (10YR 2/1) cobbly loam from 0 to 10 inches and were saturated at the surface. This upland segment of Transect 2 may also convert to wetland over time given the soil saturation level.

### 3.4 Wetland Delineation

The delineated wetland boundary is depicted on **Figure 3, Appendix A**. The COE data forms are included in **Appendix B**. Emergent vegetation has developed beyond the edge of inundation around the entire wetland periphery. Aquatic vegetation has also developed in the shallow backwater areas and on the east end of the east impoundment. Submerged aquatic vegetation (species not identified) appears to occur throughout the wetland as far into the open water as can be observed from shore (unable to depict on map). According to MDT (Urban, pers. comm.), submerged aquatics have been observed during the aerial flights throughout the open water component of the impoundments. The wetland boundary encompasses 9.72 acres of gross wetland that includes 5.56 acres of shallow open water (<6 feet deep); open water acreage remains fairly stable (within 0.1-0.2 acre) from year to year. Gross wetland acreage has increased 0.5 acre since 2004.

### 3.5 Wildlife

Wildlife species observed on the site between 2001 and 2005 are listed in **Table 3**. Activities and densities associated with these observations are included on the monitoring form in **Appendix B**. No mammals were observed within the assessment area during the monitoring event. Most of the bluebird boxes were inhabited with breeding tree swallows during the spring visit. Damaged or missing wood duck boxes were moved or replaced; 7 boxes are located within the cottonwood stand on the northwest side of the ponds. All of the wood duck boxes were scratched beneath the entrance hole but no activity was observed. Avian species diversity is high for the Stillwater wetland and totals 51 species.

**Table 3: 2001-2005 wildlife species observed within the Stillwater River mitigation site<sup>1</sup>.**

<b>REPTILES and AMPHIBIANS</b>	
Painted turtle ( <i>Chrysemys picta</i> )	
Western Chorus Frog ( <i>Pseudacris triseriata</i> )	
<b>BIRDS</b>	
American Goldfinch ( <i>Carduelis tristis</i> )	Killdeer ( <i>Charadrius vociferous</i> )
American Robin ( <i>Turdus migratorius</i> )	Least Flycatcher ( <i>Empidonax minimus</i> )
American Coot ( <i>Fulica americana</i> )	<b>House Wren (<i>Troglodytes aedon</i>)</b>
Bald Eagle ( <i>Haliaeetus leucocephalus</i> )	<b>Mallard (<i>Anas platyrhynchos</i>)</b>
<b>Belted Kingfisher (<i>Ceryle alcyon</i>)</b>	<b>Marsh Wren (<i>Cistothorus palustris</i>)</b>
Black-capped Chickadee ( <i>Poecile atricapillus</i> )	<b>Mourning Dove (<i>Zenaida macroura</i>)</b>
<b>Black-headed Grosbeak (<i>Pheucticus melanocephalus</i>)</b>	<b>Northern Flicker (<i>Colaptes auratus</i>)</b>
<b>Canada Goose (<i>Branta canadensis</i>)</b>	Pied-billed Grebe ( <i>Podilymbus podiceps</i> )
<b>Cedar Waxwing (<i>Bombycilla cedrorum</i>)</b>	Pileated Woodpecker ( <i>Dryocopus pileatus</i> )
Cinnamon Teal ( <i>Anas cyanoptera</i> )	Red-breasted Merganser ( <i>Mergus serrator</i> )
<b>Common Grackle (<i>Quiscalus quiscula</i>)</b>	<b>Red-winged Blackbird (<i>Agelaius phoeniceus</i>)</b>
Common Merganser ( <i>Mergus merganser</i> )	Ruddy Duck ( <i>Oxyura jamaicensis</i> )
<b>Common Nighthawk (<i>Chordeiles minor</i>)</b>	Sandhill Crane ( <i>Grus canadensis</i> )
<b>Common Snipe (<i>Gallinago gallinago</i>)</b>	<b>Song Sparrow (<i>Melospiza melodia</i>)</b>
Common Yellowthroat ( <i>Geothlypis trichas</i> )	Sora ( <i>Porzana Carolina</i> )
<b>Double-crested Cormorant (<i>Phalacrocorax auritus</i>)</b>	<b>Spotted Sandpiper (<i>Actitis macularia</i>)</b>
Downy Woodpecker ( <i>Picoides villosus</i> )	<b>Tree Swallow (<i>Tachycineta bicolor</i>)</b>
<b>Eastern Kingbird (<i>Tyrannus tyrannus</i>)</b>	Turkey Vulture ( <i>Cathartes aura</i> )
European Starling ( <i>Sturnus vulgaris</i> )	Western Bluebird ( <i>Sialis mexicana</i> )
<b>Gray Catbird (<i>Dumetella carolinensis</i>)</b>	<b>Western Kingbird (<i>Tyrannus verticalis</i>)</b>
<b>Great Blue Heron (<i>Ardea herodias</i>)</b>	Western Meadowlark ( <i>Sturnella neglecta</i> )
Great Horned Owl ( <i>Bubo virginianus</i> )	Western Wood Pewee ( <i>Contopus sordidulus</i> )
Greater Yellowlegs ( <i>Tringa melanoleuca</i> )	Willet ( <i>Catoptrophorus semipalmatus</i> )
Green-winged Teal ( <i>Anas crecca</i> )	<b>Wood Duck (<i>Aix sponsa</i>)</b>
<b>Hairy Woodpecker (<i>Picoides villosus</i>)</b>	<b>Yellow Warbler (<i>Dendroica petechia</i>)</b>
	Yellow-rumped Warbler ( <i>Dendroica coronata</i> )
<b>MAMMALS</b>	
Beaver ( <i>Castor canadensis</i> )	
White-tailed Deer ( <i>Odocoileus virginianus</i> )	
Muskrat ( <i>Ondatra zibethica</i> )	
Striped Skunk ( <i>Mephitis mephitis</i> )	
Rabbit ( <i>Lepus spp.</i> )	

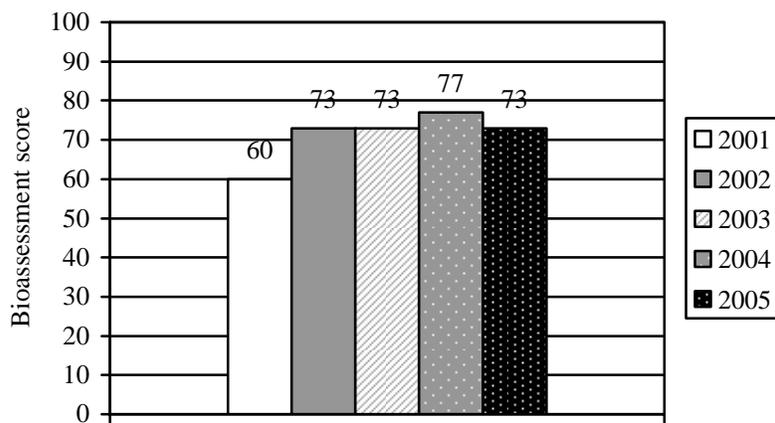
<sup>1</sup>**Bolded** species indicate those documented within the analysis area in 2005.

### 3.6 Macroinvertebrates

Macroinvertebrate sampling results are provided in **Appendix F** and **Chart 5** and were summarized by Rhithron Associates in the italicized section below (Bollman 2005).

According to this bioassessment method, optimal biotic conditions persisted at the Stillwater River site in 2005. According to this bioassessment method, optimal biotic conditions persisted at the Stillwater River site in 2005. Although taxa richness fell between 2004 and 2005, the number of relatively sensitive taxa in the POET group remained stable in the same period. Habitat complexity was apparently high, since substrates, water column, macrophytes, and filamentous algae all appeared to contribute colonization potential for invertebrates. The biotic index value remained lower than the median value for all sites in this study, implying water quality conditions appropriate for the site.

**Chart 5: Bioassessment scores for 2001-2005.**



### 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 the MDT (Urban 1998) and results of that assessment are included in **Table 4**. The net functional units have increased by 39 points since 2001 due to several high to exceptional ranking variables. The wetland attained the Category 1 Wetland status in 2002. Ten of the 12 evaluated parameters received high to exceptional ratings, six with functional points of 1.0.

### 3.8 Photographs

Representative photos taken from photo points and transect ends are included in **Appendix C**. A presentation of 2000-2005 aerial photographs for the site is also provided in **Appendix C**.

**Table 4: Summary of 1998 and 2001-2005 wetland function/value ratings and functional points at the Stillwater River wetland mitigation project.**

Function and Value Parameters From the 1999 MDT Montana Wetland Assessment Method	Pre-construction 1998	Post-construction 2001	Post-construction 2002	Post-construction 2003	Post-construction 2004	Post-construction 2005
Listed/Proposed T&E Species Habitat	High (1.0)	Moderate (0.8)				
MNHP Species Habitat	Low (0.1)	Moderate (0.7)	Low (.1)	Low (.1)	Low (.1)	Low (.1)
General Wildlife Habitat	Moderate (0.5)	Moderate (0.7)	Exceptional (1.0)	Exceptional (1.0)	Exceptional (1.0)	Exceptional (1.0)
General Fish/Aquatic Habitat	High (0.8)	Moderate (0.6)	High (0.8)	High (0.8)	High (0.8)	High (0.8)
Flood Attenuation	Moderate (0.5)	Moderate (0.6)	High (0.7)	High (0.9)	High (0.9)	High (0.9)
Short and Long Term Surface Water Storage	NA	High (1.0)				
Sediment, Nutrient, Toxicant Removal	Moderate (0.5)	Moderate (0.6)	High (1.0)	High (1.0)	High (1.0)	High (1.0)
Sediment/Shoreline Stabilization	NA	High (1.0)				
Production Export/Food Chain Support	High (1.0)	High (0.9)				
Groundwater Discharge/Recharge	Low (0.1)	High (1.0)				
Uniqueness	Moderate (0.4)	Moderate (0.5)	Moderate (0.6)	High (0.6)	High (0.9)	High (0.9)
Recreation/Education Potential	Low (0.1)	Low (0.3)	Moderate (0.7)	High (1.0)	High (1.0)	High (1.0)
Actual Points/Possible Points	5/10	8.7/12	9.6/12	10.1/12	10.4/12	10.4/12
% of Possible Score Achieved	50%	73%	80%	84%	87%	87%
Overall Category	III	II	II	I	I	I
Total Acreage of Assessed Wetlands within Easement	3.77	8.49	9.24	9.39	9.25 <sup>1</sup>	9.72
Functional Units (acreage x actual points)	15	73.82	88.7	94.84	98.1	101.88
Net Acreage Gain	NA	4.72	5.47	5.62	5.48	5.95
Net Functional Unit Gain		58.82	73.7	79.84	83.1	86.88
Total Functional Unit "Gain"		58.82	73.7	79.84	83.1	86.88

<sup>1</sup> Slight decrease in acreage in 2004 was the result of higher quality aerial photo and subsequent higher accuracy in photo interpretation.

### 3.9 Maintenance Needs/Recommendations

The site contains five State of Montana Noxious Weeds (Canada thistle, spotted knapweed, field bindweed, houndstongue, and leafy spurge) and one (1) on the Stillwater County list (mullein). The site requires aggressive weed control measures, including a spring and fall spraying program, to eradicate all noxious weeds.

### 3.10 Current Credit Summary

Emergent vegetation has developed around 100% of the open water circumference. The gross wetland boundary encompasses 9.72 acres of wetland that include 5.56 acres of shallow open water (<6 feet deep). Gross wetland acreage has increased 5.95 acres since the site was constructed. The wetland has been classified as a Category 1 wetland since 2002. Eleven of the 12 evaluated function and value parameters rated as high, seven of which earned actual functional points of 1.0.

MDT anticipated creating 10.69 acres of wetland credit within a 15 to 20-acre conservation easement (MDT 1998). The mitigation efforts have thus far resulted in 9.72 gross wetland acres or 91% of the goal. The 10.69-acre goal included the enhancement of 3.77 acres of pre-existing wetlands, which were generally comprised of closely cropped pasture similar to current adjacent lands (Urban pers. comm.). The gross wetland acreage has been fairly stable since 2002; however, the open water areas have decreased as a result of emergent wetland encroachment. Aquatic vegetation is floating on the surface of the east pond and from the air aquatic vegetation has been observed throughout much of the inundated area.

At a minimum, as of 2005 the 9.72 gross wetland acres at site appear to have mitigated for the wetland impacts associated with the Federal Aviation Administration expansion of the Columbus airport (1.04 acres [see plans in **Appendix D**]) and the MDT roadway improvement project between Absarokee and Columbus (2.23 acres [Urban pers. comm.]).

#### 4.0 REFERENCES

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- Reed, P.B. 1988. National list of plant species that occur in wetlands: North West (Region 9). Biological Report 88(26.9), May 1988. U.S. Fish and Wildlife Service. Washington, D.C.
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- Western Regional Climate Center, 2005. Columbus Station: <http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?mtcolu>.

## **Appendix A**

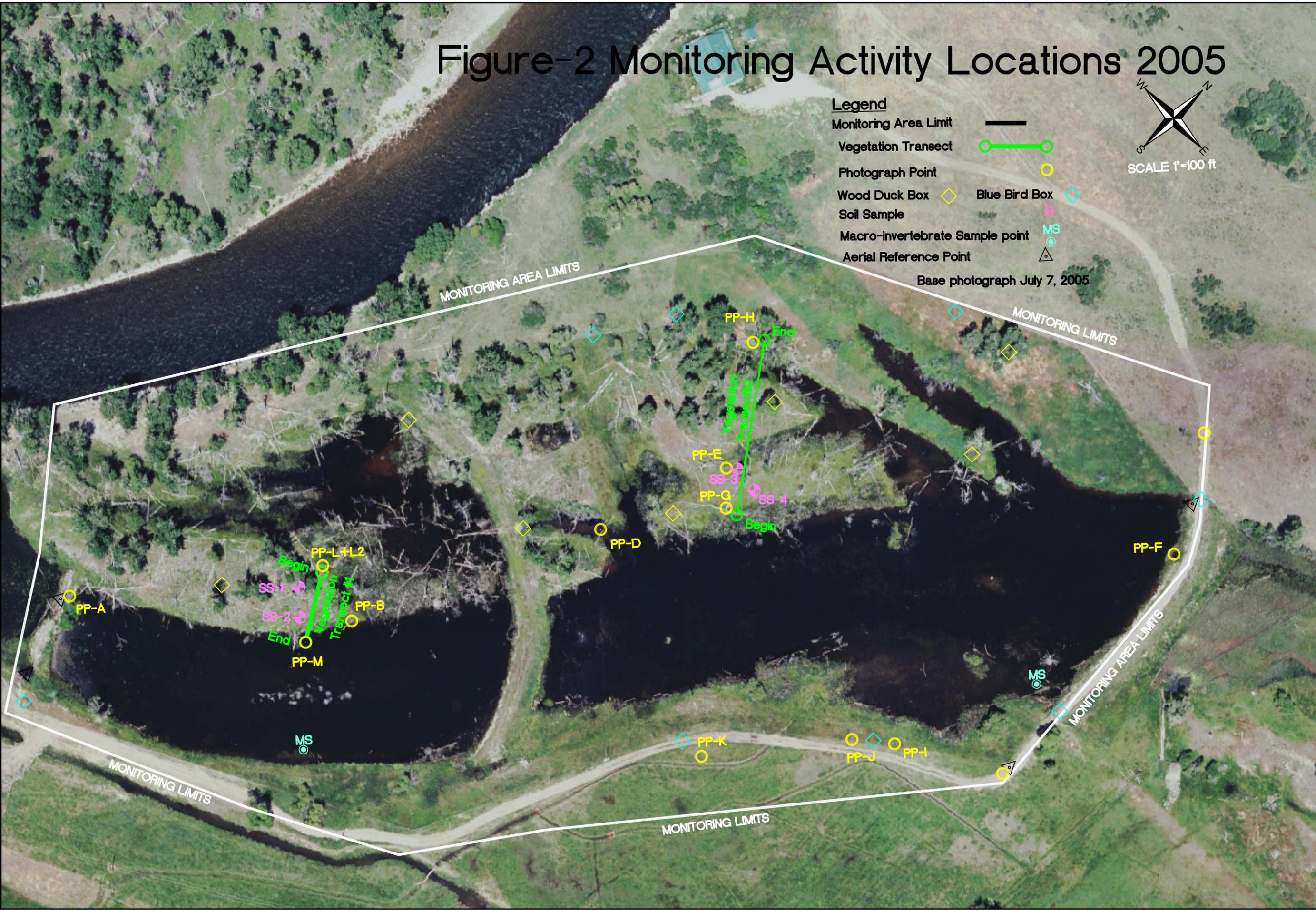
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### **FIGURES 2 - 3**

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*MDT Wetland Mitigation Monitoring  
Stillwater River  
Absarokee, Montana*

# Figure-2 Monitoring Activity Locations 2005



- Legend**
- Monitoring Area Limit
  - Vegetation Transect
  - Photograph Point
  - Wood Duck Box
  - Soil Sample
  - Macro-invertebrate Sample point
  - Aerial Reference Point
  - Blue Bird Box



Base photograph July 7, 2005

PROJECT NAME <b>MDT Stillwater Wetland Mitigation</b>	
DRAWING TITLE <b>Monitoring Activity Locations 2005</b>	
PROJ NO: B43054.00 0512	DRAWN: SH
LOCATION: Stillwater River	PROJ MGR: JB
SCALE: 1"=100'	CHECKED: LB
FILE NAME: BASE2005.dwg	APPVD: JB
A division of <b>FBSJ</b>	
LAND & WATER CONSULTING P.O. BOX 1122 Bozeman, MT 59771	
SHEET <b>2</b> OF	
REV 01 Nov/09/2005	

# Figure 3 - Mapped Site Features 2005

## Legend

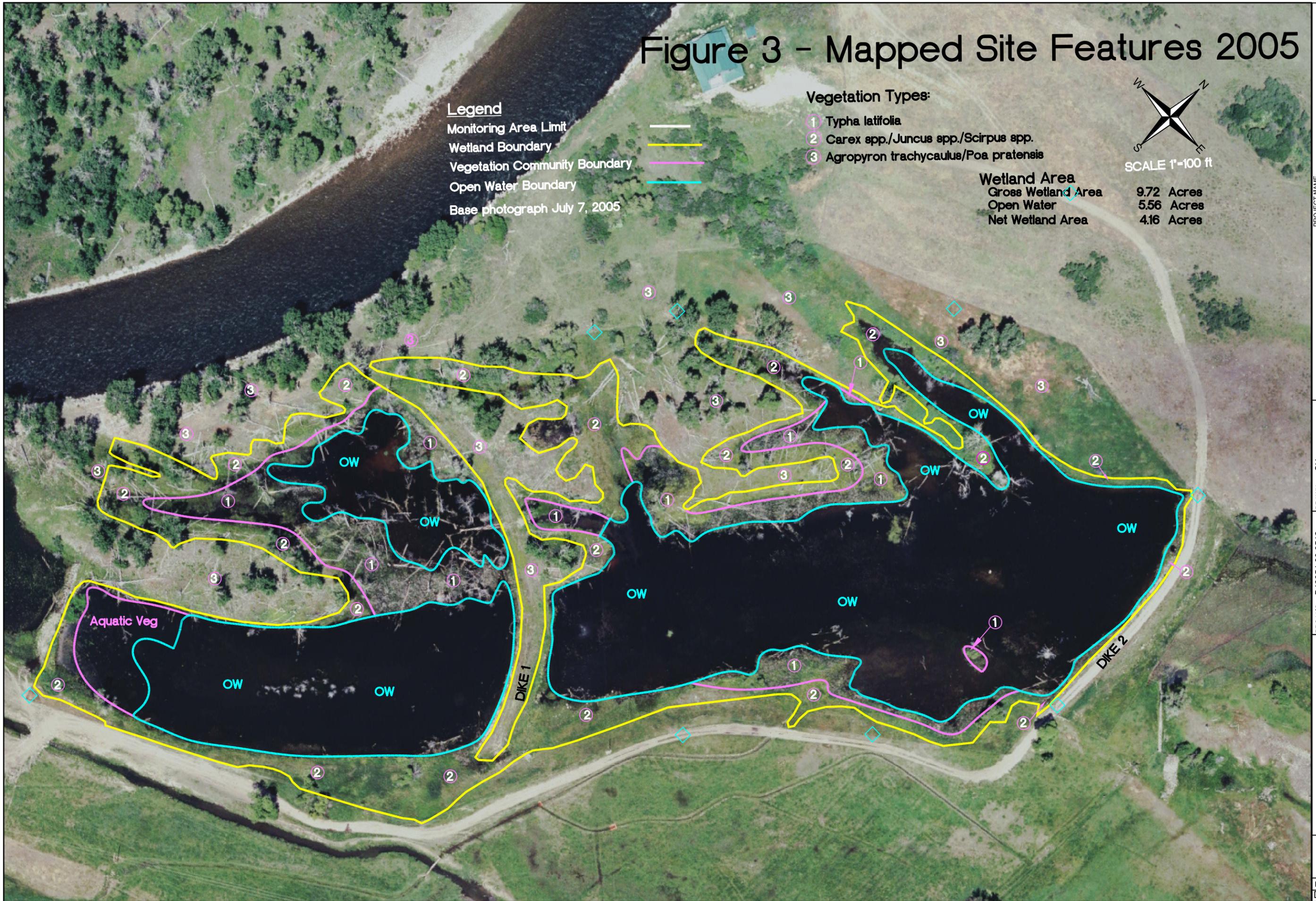
- Monitoring Area Limit
- Wetland Boundary
- Vegetation Community Boundary
- Open Water Boundary
- Base photograph July 7, 2005

## Vegetation Types:

- 1 *Typha latifolia*
- 2 *Carex* spp./*Juncus* spp./*Scirpus* spp.
- 3 *Agropyron trachycaulus*/*Poa pratensis*

## Wetland Area

Gross Wetland Area	9.72 Acres
Open Water	5.56 Acres
Net Wetland Area	4.16 Acres



PROJECT NAME		MDT Stillwater Wetland Mitigation	
DRAWING TITLE		Mapped Site Features 2005	
PROJ NO: B43054.00 0512	DRAWN: SH	PROJ MGR: JB	APPVD: JB
LOCATION: Stillwater River	CHECKED: LB	FILE NAME: BASE2005.dwg	
SCALE: 1"=100'			
SHEET		3 OF	
REV 01		Dec/05/2005	

## **Appendix B**

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**2005 WETLAND MITIGATION SITE MONITORING FORM**

**2005 BIRD SURVEY FORMS**

**2005 WETLAND DELINEATION FORMS**

**2005 FUNCTIONAL ASSESSMENT FORMS**

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*MDT Wetland Mitigation Monitoring*

*Stillwater River*

*Absarokee, Montana*

# LWC / MDT WETLAND MITIGATION SITE MONITORING FORM

Project Name: Stillwater Project Number: B43054.512 Assessment Date: 8 / 8 / 05  
 Location: 8.6 mi sw of Columbus MDT District: Billings District #13 Milepost: 37.31  
 Legal description: T\_3S R\_19E Section 22 Time of Day: 9AM  
 Weather Conditions: overcast/windy Person(s) conducting the assessment: LB/LWC-PBSJ  
 Initial Evaluation Date: 8 / 12 /01 Visit #: 5 Monitoring Year: 2005  
 Size of evaluation area: 9.24 acres Land use surrounding wetland: livestock grazing

## HYDROLOGY

**Surface Water** Source: Stillwater River  
 Inundation: Present  Absent  Average depths: 3 ft Range of depths: 0 - 6 ft  
 Assessment area under inundation: 57 %  
 Depth at emergent vegetation-open water boundary: 1-2 ft  
 If assessment area is not inundated are the soils saturated w/in 12" of surface: Yes  No   
 Other evidence of hydrology on site (drift lines, erosion, stained vegetation etc.): (all 3)

### Groundwater

Monitoring wells: Present  Absent

Record depth of water below ground surface

Well #	Depth	Well #	Depth	Well #	Depth

### Additional Activities Checklist:

- Map emergent vegetation-open water boundary on air photo
- 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:** \_\_\_\_\_  
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## VEGETATION COMMUNITIES

Community No.: 1 Community Title (main species): *Typha latifolia*

Dominant Species	% Cover	Dominant Species	% Cover
<i>Typha latifolia</i>	70	<i>Glyceria grandis</i>	1
<i>Epilobium</i> spp.	5	<i>Scirpus acutus</i>	5
<i>Lemna minor</i>	2	<i>Eleocharis palustris</i>	5
<i>Polygonum amphibium</i>	1	<i>Scirpus microcarpus</i>	1
<i>Carex utriculata</i>	5	<i>Scirpus pallidus</i>	5

**COMMENTS/PROBLEMS:**

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Community No.: 2 Community Title (main species): *Carex* spp./ *Juncus* spp./ *Scirpus* spp.

Dominant Species	% Cover	Dominant Species	% Cover
<i>Carex nebrascensis</i>	10	<i>J. tenuis</i>	10
<i>C. stipata</i>	10	<i>J. nevadensis</i>	2
<i>C. limnophila</i>	2	<i>Scirpus</i> spp. ( <i>acutus</i> , <i>pallidus</i> , <i>microcarpus</i> )	10
<i>C. hystricina</i>	2	<i>Typha latifolia</i>	10
<i>Juncus balticus</i>	2	<i>Glyceria grandis</i>	5
<i>Agrostis alba</i>	25	<i>Populus angustifolia</i>	2
<i>Eleocharis palustris</i>	10	<i>Scirpus pungens</i>	<1

**COMMENTS/PROBLEMS:** \_\_\_\_\_ other spp observed in this rich community: LEMMIN, PHAARUN, VERsp., MIMsp., SOLDUL, RUMCRI, CARUTR, CARLAN, JUNBAL, MENARV., HORJUB, \_\_\_\_\_

Community No.: 3 Community Title (main species): *Agropyron trachycaulus*/*Poa pratensis*

Dominant Species	% Cover	Dominant Species	% Cover
<i>Agropyron trachycaulus</i>	30		
<i>Poa pratensis</i>	30		
<i>Bromus inermis</i>	30		
<i>Populus angustifolia</i> (overstory)	10		

**COMMENTS/PROBLEMS:** New cottonwood growth noted.

**Additional Activities Checklist:**

Record and map vegetative communities on air photo

# Comprehensive Vegetation List

Species	Vegetation Community Number(s)	Species	Vegetation Community Number(s)
<i>Agropyron trachycaulum</i>	3	<i>Rumex crispus</i>	2
<i>Agrostis alba</i>	2	<i>Salix bebbiana</i>	2
<i>Alnus incana</i>		<b><i>Sagittaria cuneata</i></b>	1
<i>Alopecurus arundinaceus</i>	2	<i>Salix exigua</i>	2
<i>Beckmannia syzigachne</i>	2	<i>Salix lasiandra</i>	2
<i>Bromus inermis</i>	2	<i>Scirpus accutus</i>	2
<i>Bromus japonicus</i>	3	<i>Scirpus microcarpus</i>	2
<i>Calamagrostis canadensis</i>	3	<i>Scirpus pallidus</i>	2
<i>Callitriche palustris (verna)</i>	2	<i>Solanum dulcamara</i>	2
<i>Carex hystericina</i>	1	<i>Symphoricarpos albus</i>	3
<i>Carex limnophila</i>	2	<i>Trifolium sp.</i>	1
<i>Carex nebrascensis</i>	2	<i>Typha latifolia</i>	1, 2
<i>Carex stipata</i>	2	<u><i>Verbascum thapsusm</i> (Stillwater CO. Noxious Weed)</u>	2, 3
<i>Carex utriculata</i>	2	<i>Veronica wormskjoldii (?)</i>	1, 2
<i>Centaurea maculosa</i>	1		
<i>Cirsium arvense</i>	3		
<i>Cynoglossum officinale</i>	2, 3		
<i>Dactylis glomerata</i>	3		
<b><i>Eleagnus angustifolia</i></b>	3		
<i>Eleocharis palustris</i>	1, 2		
<i>Epilobium sp.</i>	1		
<i>Equisetum arvense</i>	2		
<i>Euphorbia esula</i>	3		
<i>Gallium sp</i>	3		
<i>Glyceria grandis</i>	1, 2		
<i>Hordeum jubatum</i>	2		
<i>Juncus balticus</i>	2		
<i>Juncus ensifolius (confirm 2005)</i>	2		
<i>Juncus nevadensis</i>	2		
<i>Juncus tenuis</i>	1, 2		
<i>Juniperus scopulorum</i>	3		
<i>Lemna minor</i>	1,2		
<i>Linaria sp. (may be State Noxious Weed)</i>	3		
<i>Melilotus officinalis</i>	3		
<i>Mimulus sp.</i>	2		
<i>Phalaris arundinacea</i>	2		
<i>Phleum pretense</i>	2, 3		
<i>Poa pratensis</i>	2, 3		
<i>Polygonum amphibium</i>	1		
<i>Populus angustifolia</i>	2, 3		
<i>Potentilla argentea</i>	2		
<i>Prunus virginiana</i>	2	Bold denotes observed in 2004 for the first time.	
<i>Ranunculus sceleratus</i>	2		
<i>Ribes sp.</i>	3		

**COMMENTS/PROBLEMS:** \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



**WILDLIFE**

**BIRDS**

(Attach Bird Survey Field Forms)

Were man made nesting structures installed? Yes  No  Type: BB/Woodie How many? 10/2  
Are the nesting structures being utilized? Yes  No  Do the nesting structures need repairs?  
Yes  No

**MAMMALS AND HERPTILES**

Species	Number Observed	Indirect indication of use			
		Tracks	Scat	Burrows	Other
Painted turtle	1				

<sup>1</sup> MDT Observations

**Additional Activities Checklist:**

Macroinvertebrate sampling (if required)

**COMMENTS/PROBLEMS:** \_\_\_\_\_  
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## 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:

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

Location	Photograph Description	Compass Reading
B	pond #1: PHOTO not developed	SE
D	pond #2 interior OW finger	NE
E	pond #2	NE
F	pond #2	SW
G	Transect 2: pond #2 transect from WL end	NW
H	Transect 2: pond #2 transect from UPL end	SE
I	pond #2	NW
J	UPL adjacent to pond #2	SW
K	UPL/WL interface pond #2	SW
L	Transect 1: Pond #1 interior	SE
L-2	Transect 1: View into WL fingers inside pond #1 from L-stake	NW
M	Transect 1: from M-stake toward L-stake	NW

**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:

- Jurisdictional wetland boundary
- 4-6 landmarks recognizable on the air photo
- Start and end points of vegetation transect(s)
- 2001 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:

- Delineate wetlands according to the 1987 Army Corps manual.
- Delineate wetland-upland boundary on the air photo
- 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 \_\_\_\_\_

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  NO \_\_\_\_\_

If yes, are the structures working properly and in good working order? YES  NO \_\_\_\_\_

If no, describe the problems below.

**COMMENTS/PROBLEMS:**

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\_\_\_\_\_

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### MDT WETLAND MONITORING – VEGETATION TRANSECT

Site: Stillwater Date: 8/5/05 Examiner: LB/LWC Transect # 1

Approx. transect length: 75' Compass Direction from Start (Upland): 148 deg

<b>Vegetation type A:</b>		CT 2
Length of transect in this type:	27'	feet
Species:	Cover:	
ELEPAL	1	
CARLIM	5	
CLOVERsp.	15	
AGRTRA	20	
CARNEB	3	
TYPLAT	2	
JUNTEN	20	
AGRALB	25	
SCIPAL	1	
GLYGRA	1	
JUNNEV: <5; JUNENS	5	
Total Vegetative Cover:		100%

<b>Vegetation type B:</b>		CT 3
Length of transect in this type:	24'	feet
Species:	Cover:	
POAPRA	5	
CLOVERsp.	<1	
POPANG	<1	
SYMALB	20	
AGRALB	10	
PHLPRA	65	
Total Vegetative Cover:		100%

<b>Vegetation type C:</b>		CT 2
Length of transect in this type:	18	feet
Species:	Cover:	
JUNENS	20	
JUNTEN	<5	
CARLIM	20	
AGRALB	25	
ELEPAL	<5	
CARNEB	50	
JUNNEV	<5	
Total Vegetative Cover:		100%

<b>Vegetation type D:</b>		CT 1
Length of transect in this type:	6'	feet
Species:	Cover:	
TYPLAT	25	
CARHYS	40	
SCIACU	1	
GLYGRA	<5	
ELEPAL	25	
SCIPAL	<1	
CARLAN	<5	
ALOARU6666	6<5	
Total Vegetative Cover:		100%









**BIRD SURVEY – FIELD DATA SHEET**

Page 1\_\_of 1\_\_  
 Date: see dates within table  
 Survey Time: varied

**SITE:** Stillwater

Bird Species	#	Behavior	Habitat	Bird Species	#	Behavior	Habitat
<b>5/16/05</b>							
American Goldfinch	1	BD	MA/UPL				
American Robin	3	BD/F	MA/UPL				
Black-headed Grosbeak	1	BD	UPL/MA				
Canada Goose	21	L/BR	OW/UPL				
Common Grackle	4	BR	MA/UPL				
Common Snipe	1	BR	MA				
Eastern Kingbird	1	F	UPL/MA				
Great Blue Heron	1	FO	OW				
Hairy Woodpecker	2	BR/F	UPL/MA				
House Wren	5	BD	MA/UPL				
Killdeer	3	BR	MA				
Kingfisher	1	F	OW				
Mallard	1	FO	OW				
Marsh Wren	1	BR	MA				
Mourning Dove	1	FO	MA				
Northern Flicker	1	FO	MA/UPL				
Red-winged Blackbird	15*	BD	OW/MA				
Song Sparrow	5	F	MA/UPL				
Spotted Sandpiper	1	F	MA				
Tree Swallow	~20	F/BD	OW/UPL/MA				
Yellow Warbler	1	BD	UPL				
<b>8/5/05</b>							
Cedar Waxwings	1	F	UPL/MA				
Common Nighthawk	1	F	MA/UPL				
Double-crested Cormorant	1	LO	OW				
Eastern Kingbird	1	FO	UPL/MA				
Gray Catbird	1	BR	MA/UPL				
Great Blue Heron	1	(flushed)	MA				
Kingfisher	2		MA				
Spotted Sandpiper	1	F	OW				
Tree Swallow	many	F	OW				
Western Kingbird	1	BR	UPL				
Wood Duck	1	FO	UPL/MA/OW				
Yellow Warbler	1	BR	UPL				

<b>Notes:</b>
Spring 2005 2 CAGO broods total of 11 chicks

**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: <u>Stillwater</u> Applicant/Owner: <u>MDT</u> Investigator: <u>LB/LWC</u>	Date: <u>8/5/05</u> County: <u>Stillwater</u> State: <u>MT</u>
Do Normal Circumstances exist on the site: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Is the site significantly disturbed (Atypical Situation)? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is the area a potential Problem Area?: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No (If needed, explain on reverse.)	Community ID: <u>Impoundment #1</u> Transect ID: <u>1</u> Plot ID: <u>SP-1</u>

**VEGETATION**

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1	JUNTEN	H	FAC	9	
2	JUNENS	H	FACW	10	
3	AGRALB	H	FACW	11	
4	CARLIM	H	FACW	12	
5	CARNEB	H	OBL	13	
6				14	
7				15	
8				16	

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-).      5/5

Community changed slightly since 2004.

**HYDROLOGY**

<input checked="" type="checkbox"/> Recorded Data (Describe in Remarks): <input type="checkbox"/> Stream, Lake, or Tide Gauge <input checked="" type="checkbox"/> Aerial Photographs <input type="checkbox"/> Other <input type="checkbox"/> No Recorded Data Available	Wetland Hydrology Indicators: Primary Indicators: <input type="checkbox"/> Inundated <input checked="" type="checkbox"/> Saturated in Upper 12 Inches <input checked="" type="checkbox"/> Water Marks <input type="checkbox"/> Drift Lines <input type="checkbox"/> Sediment Deposits <input type="checkbox"/> Drainage Patterns in Wetlands Secondary Indicators (2 or more required): <input type="checkbox"/> Oxidized Root Channels in Upper 12 Inches <input type="checkbox"/> Water-Stained Leaves <input type="checkbox"/> Local Soil Survey Data <input type="checkbox"/> FAC-Neutral Test <input type="checkbox"/> Other (Explain in Remarks)
Field Observations:  Depth of Surface Water: <u>     -      </u> (in.)  Depth to Free Water in Pit: <u>     -      </u> (in.)  Depth to Saturated Soil: <u>     0      </u> (in.)	
Remarks: Saturated edge of OW area.	

**SOILS**

Map Unit Name		Lolo - Nesda		Drainage Class: well	
(Series and Phase):				Field Observations	
Taxonomy (Subgroup):		Pachic Haploboroll; Fluventic Haploboroll.		Confirm Mapped Type? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
<b>Profile Description:</b>					
Depth inches	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-5	A	10YR 2/1			loamy sand
5+	C				cobbles
<b>Hydric Soil Indicators:</b>					
<input type="checkbox"/> Histosol		<input type="checkbox"/> Concretions			
<input type="checkbox"/> Histic Epipedon		<input type="checkbox"/> High Organic Content in surface Layer in Sandy Soils			
<input type="checkbox"/> Sulfidic Odor		<input type="checkbox"/> Organic Streaking in Sandy Soils			
<input type="checkbox"/> Aquic Moisture Regime		<input type="checkbox"/> Listed on Local Hydric Soils List			
<input type="checkbox"/> Reducing Conditions		<input type="checkbox"/> Listed on National Hydric Soils List			
<input checked="" type="checkbox"/> Gleyed or Low-Chroma Colors		<input type="checkbox"/> Other (Explain in Remarks)			
Hydric soil at 5" and assumed between cobbles at 10" depth, impenetrable.					

**WETLAND DETERMINATION**

Hydrophytic Vegetation Present?	<input checked="" type="checkbox"/>	Yes	<input type="checkbox"/>	No	Is this Sampling Point Within a Wetland? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Wetland Hydrology Present?	<input checked="" type="checkbox"/>	Yes	<input type="checkbox"/>	No	
Hydric Soils Present?	<input checked="" type="checkbox"/>	Yes	<input type="checkbox"/>	No	
<b>Remarks:</b>					
Wetland boundary still gaining ground into cottonwood upland area.					

Approved by HQUSACE 2/92

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

Project/Site: <u>Stillwater</u> Applicant/Owner: <u>MDT</u> Investigator: <u>LB/MDT</u>	Date: <u>8/5/05</u> County: <u>Stillwater</u> State: <u>MT</u>
Do Normal Circumstances exist on the site: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Is the site significantly disturbed (Atypical Situation)? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is the area a potential Problem Area?: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No (If needed, explain on reverse.)	Community ID: <u>Impoundment #1; CT 3</u> Transect ID: <u>1</u> Plot ID: <u>SP-2</u>

**VEGETATION**

Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1	VERTHA	H	no listing	9		
2	SYMALB	S	UPL	10		
3	POPANG	T	FACW	11		
4	AGRALB	H	FACW	12		
5	PHLPRA		FACU	13		
6	Trifolium sp.		(UPL)	14		
7	MEDLUP	H	FAC	15		
8				16		

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-).      3/7

UPL veg area decreasing in size.

**HYDROLOGY**

<input checked="" type="checkbox"/> Recorded Data (Describe in Remarks): Stream, Lake, or Tide Gauge <input checked="" type="checkbox"/> Aerial Photographs <input type="checkbox"/> Other <input type="checkbox"/> No Recorded Data Available	Wetland Hydrology Indicators: Primary Indicators: <input type="checkbox"/> Inundated <input checked="" type="checkbox"/> Saturated in Upper 12 Inches <input type="checkbox"/> Water Marks <input type="checkbox"/> Drift Lines <input type="checkbox"/> Sediment Deposits <input checked="" type="checkbox"/> Drainage Patterns in Wetlands Secondary Indicators (2 or more required): <input type="checkbox"/> Oxidized Root Channels in Upper 12 Inches <input type="checkbox"/> Water-Stained Leaves <input type="checkbox"/> Local Soil Survey Data <input type="checkbox"/> FAC-Neutral Test <input type="checkbox"/> Other (Explain in Remarks)
Field Observations:  Depth of Surface Water: <u>        </u> (in.)  Depth to Free Water in Pit: <u>        </u> (in.)  Depth to Saturated Soil: <u>1"</u> (in.)	
Remarks:	

**SOILS**

Map Unit Name		Lolo - Nesda		Drainage Class: <u>well</u>	
(Series and Phase):				Field Observations	
Taxonomy (Subgroup):		<u>Pachic Haploboroll; Fluventic Haploboroll.</u>		Confirm Mapped Type? <u>X</u> Yes <u>    </u> No	
<b>Profile Description:</b>					
Depth inches	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-5	A	10YR 2/1			organic loam
5+					lg. cobbles
<b>Hydric Soil Indicators:</b>					
<u>    </u> Histosol		<u>    </u> Concretions			
<u>    </u> Histic Epipedon		<u>    </u> High Organic Content in surface Layer in Sandy Soils			
<u>    </u> Sulfidic Odor		<u>    </u> Organic Streaking in Sandy Soils			
<u>    </u> Aquic Moisture Regime		<u>    </u> Listed on Local Hydric Soils List			
<u>    </u> Reducing Conditions		<u>    </u> Listed on National Hydric Soils List			
<u> X </u> Gleyed or Low-Chroma Colors		<u>    </u> Other (Explain in Remarks)			
Hydric because of low-chroma.					

**WETLAND DETERMINATION**

Hydrophytic Vegetation Present?	<u>    </u> Yes	<u> X </u> No	Is this Sampling Point Within a Wetland? <u>    </u> Yes <u> X </u> No
Wetland Hydrology Present?	<u> X </u> Yes	<u>    </u> No	
Hydric Soils Present?	<u> X </u> Yes	<u>    </u> No	
<b>Remarks:</b>			
Upland area still shrinking, POPANG regenerating in this area.			

Approved by HQUSACE 2/92

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

Project/Site: <u>Stillwater</u> Applicant/Owner: <u>MDT</u> Investigator: <u>LB/LWC</u>	Date: <u>8/5/05</u> County: <u>Stillwater</u> State: <u>MT</u>
Do Normal Circumstances exist on the site: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Is the site significantly disturbed (Atypical Situation)? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is the area a potential Problem Area?: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No (If needed, explain on reverse.)	Community ID: <u>Impoundment #2</u> Transect ID: <u>2</u> Plot ID: <u>SP-3</u>

**VEGETATION**

Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1 CARHYS	H	OBL		9		
2 AGRALB	H	FACW		10		
3 CARSTI (likely FACW-OBL)	H	no ind.		11		
4 PHAARU	H	FACW		12		
5				13		
6				14		
7				15		
8				16		

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-).    3-4/4

**HYDROLOGY**

<input checked="" type="checkbox"/> Recorded Data (Describe in Remarks): Stream, Lake, or Tide Gauge <input checked="" type="checkbox"/> Aerial Photographs <input type="checkbox"/> Other <input type="checkbox"/> No Recorded Data Available	Wetland Hydrology Indicators: Primary Indicators: <input type="checkbox"/> Inundated <input checked="" type="checkbox"/> Saturated in Upper 12 Inches <input type="checkbox"/> Water Marks <input type="checkbox"/> Drift Lines <input type="checkbox"/> Sediment Deposits <input checked="" type="checkbox"/> Drainage Patterns in Wetlands Secondary Indicators (2 or more required): <input type="checkbox"/> Oxidized Root Channels in Upper 12 Inches <input type="checkbox"/> Water-Stained Leaves <input type="checkbox"/> Local Soil Survey Data <input type="checkbox"/> FAC-Neutral Test <input type="checkbox"/> Other (Explain in Remarks)
Field Observations:  Depth of Surface Water: <u>      -      </u> (in.)  Depth to Free Water in Pit: <u>      -      </u> (in.)  Depth to Saturated Soil: <u>  surface  </u> (in.)	
Remarks:	

**SOILS**

Map Unit Name		Lolo - Nesda		Drainage Class:	well
(Series and Phase):				Field Observations	
Taxonomy (Subgroup):		Pachic Haploboroll; Fluventic Haploboroll.		Confirm Mapped Type?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
<b>Profile Description:</b>					
Depth inches	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-10	A	10 YR 2/1			Cobbly loam
<b>Hydric Soil Indicators:</b>					
<input type="checkbox"/> Histosol		<input type="checkbox"/> Concretions			
<input type="checkbox"/> Histic Epipedon		<input type="checkbox"/> High Organic Content in surface Layer in Sandy Soils			
<input type="checkbox"/> Sulfidic Odor		<input type="checkbox"/> Organic Streaking in Sandy Soils			
<input type="checkbox"/> Aquic Moisture Regime		<input type="checkbox"/> Listed on Local Hydric Soils List			
<input type="checkbox"/> Reducing Conditions		<input type="checkbox"/> Listed on National Hydric Soils List			
<input checked="" type="checkbox"/> Gleyed or Low-Chroma Colors		<input type="checkbox"/> Other (Explain in Remarks)			
Pits difficult to excavate; cobbles close to surface.					

**WETLAND DETERMINATION**

Hydrophytic Vegetation Present?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Is this Sampling Point Within a Wetland? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Wetland Hydrology Present?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Hydric Soils Present?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
<b>Remarks:</b>		
Pit excavated adjacent to inside edge of impoundment; wetland boundary expanding.		

Approved by HQUSACE 2/92

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

Project/Site: <u>Stillwater</u> Applicant/Owner: <u>MDT</u> Investigator: <u>LB/LWC</u>	Date: <u>8/5/05</u> County: <u>Stillwater</u> State: <u>MT</u>
Do Normal Circumstances exist on the site: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Is the site significantly disturbed (Atypical Situation)? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is the area a potential Problem Area?: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No (If needed, explain on reverse.)	Community ID: <u>Impoundment #2</u> Transect ID: <u>2</u> Plot ID: <u>SP-4</u>

**VEGETATION**

Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1	DACGLO	H	FACU	9		
2	LINVUL	H	(UPL)	10		
3	CYNOFF	H	(UPL)	11		
4				12		
5				13		
6				14		
7				15		
8				16		

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-).      0/3

Area has been grazed very recently.

**HYDROLOGY**

<input checked="" type="checkbox"/> Recorded Data (Describe in Remarks): Stream, Lake, or Tide Gauge <input checked="" type="checkbox"/> Aerial Photographs <input type="checkbox"/> Other <input type="checkbox"/> No Recorded Data Available	Wetland Hydrology Indicators: Primary Indicators: <input type="checkbox"/> Inundated <input checked="" type="checkbox"/> Saturated in Upper 12 Inches <input type="checkbox"/> Water Marks <input type="checkbox"/> Drift Lines <input type="checkbox"/> Sediment Deposits <input type="checkbox"/> Drainage Patterns in Wetlands Secondary Indicators (2 or more required): <input type="checkbox"/> Oxidized Root Channels in Upper 12 Inches <input type="checkbox"/> Water-Stained Leaves <input type="checkbox"/> Local Soil Survey Data <input type="checkbox"/> FAC-Neutral Test <input type="checkbox"/> Other (Explain in Remarks)
Field Observations:  Depth of Surface Water: <u>NA</u> (in.) Depth to Free Water in Pit: <u>NA</u> (in.) Depth to Saturated Soil: <u>0</u> (in.)	
Remarks:  This area between the impoundment and finger of vegetated open water finger may convert to wetlands given saturation at surface.	

## SOILS

Map Unit Name		Lolo - Nesda		Drainage Class: <u>well</u>	
(Series and Phase):				Field Observations	
Taxonomy (Subgroup):		<u>Pachic Haploboroll; Fluventic Haploboroll.</u>		Confirm Mapped Type? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
<b>Profile Description:</b>					
Depth inches	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-10	A	10YR 2/1			org. loam/cobbles
<b>Hydric Soil Indicators:</b>					
<input type="checkbox"/> Histosol		<input type="checkbox"/> Concretions			
<input type="checkbox"/> Histic Epipedon		<input type="checkbox"/> High Organic Content in surface Layer in Sandy Soils			
<input type="checkbox"/> Sulfidic Odor		<input type="checkbox"/> Organic Streaking in Sandy Soils			
<input type="checkbox"/> Aquic Moisture Regime		<input type="checkbox"/> Listed on Local Hydric Soils List			
<input type="checkbox"/> Reducing Conditions		<input type="checkbox"/> Listed on National Hydric Soils List			
<input checked="" type="checkbox"/> Gleyed or Low-Chroma Colors		<input type="checkbox"/> Other (Explain in Remarks)			
Hydric soil given low-chroma and likelihood between cobbles at 10".					

## WETLAND DETERMINATION

Hydrophytic Vegetation Present?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Is this Sampling Point Within a Wetland? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Wetland Hydrology Present?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
Hydric Soils Present?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
<b>Remarks:</b>			
Current upland areas between impoundment and OW fingers may convert to wetland given high saturation in some areas.			

Approved by HQUSACE 2/92



**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 Bald Eagle  
 Incidental habitat (list species)  D  S  
 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	---	---	.8 (M)	---	---	---	---

If documented, list the source (e.g., observations, records, etc.): Land owner's son, Blake, noted Bald Eagle fishing in ponds; 2004 MDT biologist observed eagle roosting in cottonwood in wetland and FWP has observed a nest within 1/2 mile of the mitigation site.

**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 \_\_\_\_\_  
 Incidental habitat (list species)  D  S yellowstone cutthroat  
 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	---	---	---	---	---	.1 (L)	---

If documented, list the source (e.g., observations, records, etc.): \_\_\_\_\_

**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)	<input checked="" type="checkbox"/> High								<input type="checkbox"/> Moderate								<input type="checkbox"/> Low			
Class Cover Distribution (all vegetated classes)	<input type="checkbox"/> Even				<input checked="" type="checkbox"/> Uneven				<input type="checkbox"/> Even				<input type="checkbox"/> Uneven				<input type="checkbox"/> 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
<b>Low</b> disturbance at AA (see #12)	--	--	--	--	E	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
<b>Moderate</b> disturbance at AA (see #12)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
<b>High</b> 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)	<b>Wildlife Habitat Features Rating from 14C(ii)</b>			
	<input checked="" type="checkbox"/> Exceptional	<input type="checkbox"/> High	<input type="checkbox"/> Moderate	<input type="checkbox"/> Low
Substantial	1 (E)	--	--	--
Moderate	--	--	--	--
Low	--	--	--	--

Comments: \_\_\_\_\_

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

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

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

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

Duration of Surface Water in AA	<input checked="" type="checkbox"/> Permanent/Perennial			<input type="checkbox"/> Seasonal / Intermittent			<input type="checkbox"/> 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.	--	H	--	--	--	--	--	--	--
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)			
	<input type="checkbox"/> Exceptional	<input checked="" type="checkbox"/> High	<input type="checkbox"/> Moderate	<input type="checkbox"/> Low
Native game fish	--	--	--	--
Introduced game fish	--	.8 (H)	--	--
Non-game fish	--	--	--	--
No fish	--	--	--	--

Comments: unknown if native game fish thrive in ponds, suspected YCutThroat

**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	<input checked="" type="checkbox"/> ≥ 10 acres			<input type="checkbox"/> <10, >2 acres			<input type="checkbox"/> ≤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 <b>no outlet or restricted outlet</b>	--	.9 (H)	--	--	--	--	--	--	--
AA contains <b>unrestricted outlet</b>	--	--	--	--	--	--	--	--	--

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.	<input checked="" type="checkbox"/> >5 acre feet			<input type="checkbox"/> <5, >1 acre feet			<input type="checkbox"/> ≤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	1 (H)	--	--	--	--	--	--	--	--
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.			
	<input checked="" type="checkbox"/> ≥ 70%		<input type="checkbox"/> < 70%		<input type="checkbox"/> ≥ 70%		<input type="checkbox"/> < 70%	
% cover of wetland vegetation in AA	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		<input type="checkbox"/> Yes <input type="checkbox"/> No		<input type="checkbox"/> Yes <input type="checkbox"/> No		<input type="checkbox"/> Yes <input type="checkbox"/> No	
Evidence of flooding or ponding in AA	1 (H)		--		--		--	
AA contains <b>no or restricted outlet</b>	--		--		--		--	
AA contains <b>unrestricted outlet</b>	--		--		--		--	

Comments: \_\_\_\_\_

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

Applies only if AA occurs on or within the banks of a river, stream, or other natural or man-made drainage, or on the shoreline of a standing water body that is subject to wave action. If this does not apply, 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		
	<input checked="" type="checkbox"/> Permanent / Perennial	<input type="checkbox"/> Seasonal / Intermittent	<input type="checkbox"/> Temporary / Ephemeral
≥ 65 %	1 (H)	--	--
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	<input type="checkbox"/> Vegetated component >5 acres						<input checked="" type="checkbox"/> Vegetated component 1-5 acres						<input type="checkbox"/> Vegetated component <1 acre					
B	<input type="checkbox"/> High		<input type="checkbox"/> Moderate		<input type="checkbox"/> Low		<input checked="" type="checkbox"/> High		<input type="checkbox"/> Moderate		<input type="checkbox"/> Low		<input type="checkbox"/> High		<input type="checkbox"/> Moderate		<input type="checkbox"/> Low	
C	<input type="checkbox"/> Y	<input type="checkbox"/> N	<input type="checkbox"/> Y	<input type="checkbox"/> N	<input type="checkbox"/> Y	<input type="checkbox"/> N	<input checked="" type="checkbox"/> Y	<input type="checkbox"/> N	<input type="checkbox"/> Y	<input type="checkbox"/> N	<input type="checkbox"/> Y	<input type="checkbox"/> N	<input type="checkbox"/> Y	<input type="checkbox"/> N	<input type="checkbox"/> Y	<input type="checkbox"/> N	<input type="checkbox"/> Y	<input type="checkbox"/> N
P/P	--	--	--	--	--	--	.9H	--	--	--	--	--	--	--	--	--	--	--
S/I	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
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	<input type="checkbox"/> rare	<input checked="" type="checkbox"/> common	<input type="checkbox"/> abundant	<input type="checkbox"/> rare	<input type="checkbox"/> common	<input type="checkbox"/> abundant	<input type="checkbox"/> rare	<input type="checkbox"/> common	<input type="checkbox"/> abundant
Low disturbance at AA (#12i)	--	.9H	--	--	--	--	--	--	--
Moderate disturbance at AA (#12i)	--	--	--	--	--	--	--	--	--
High disturbance at AA (#12i)	--	--	--	--	--	--	--	--	--

Comments: 80 yr old cottonwood forest should be acknowledged in this rating.

**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)	
	<input type="checkbox"/> Low	<input type="checkbox"/> High
Public ownership	--	--
Private ownership	--	--

Comments: \_\_\_\_\_

**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	M	0.80	1	
B. MT Natural Heritage Program Species Habitat	L	0.10	1	
C. General Wildlife Habitat	E	1.00	1	
D. General Fish/Aquatic Habitat	H	0.80	1	
E. Flood Attenuation	H	0.90	1	
F. Short and Long Term Surface Water Storage	H	1.00	1	
G. Sediment/Nutrient/Toxicant Removal	H	1.00	1	
H. Sediment/Shoreline Stabilization	H	1.00	1	
I. Production Export/Food Chain Support	H	0.90	1	
J. Groundwater Discharge/Recharge	H	1.00	1	
K. Uniqueness	H	0.90	1	
L. Recreation/Education Potential	H	1.00	1	
<b>Totals:</b>		10.40	12.00	96
<b>Percent of Total Possible Points:</b>			<b>87%</b> (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.)

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**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**

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### **REPRESENTATIVE PHOTOGRAPHS 2000-2005 AERIAL PHOTOGRAPHS**

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*MDT Wetland Mitigation Monitoring  
Stillwater River  
Absarokee, Montana*

**STILLWATER RIVER MITIGATION SITE 2005**



**Location: D Description: Pond #2 interior OW finger  
Compass Reading: NE**



**Location: E Description: Pond #2  
Compass Reading: NE**



**Location: F Description: Pond #2  
Compass Reading: SW**



**Location: G Description: Transect 2: pond #2  
transect from WL end Compass Reading: NW**



**Location: H Description: Transect 2: pond #2  
transect from WL end Compass Reading: SE**



**Location: I Description: Pond #2  
Compass Reading: NW**

STILLWATER RIVER MITIGATION SITE 2005



**Location:** J    **Description:** UPL adjacent to pond #2  
**Compass Reading:** SW



**Location:** K    **Description:** UPL/WL interface pond #2  
**Compass Reading:** SW



**Location:** L    **Description:** Transect 1: pond #1 interior  
**Compass Reading:** SE



**Location:** L-2    **Description:** Transect 1: view into WL fingers inside pond #1 from L-stake  
**Compass Reading:** NW



**Location:** M    **Description:** Transect 1: from M-stake toward L-stake  
**Compass Reading:** NW

# STILLWATER RIVER WETLAND MITIGATION

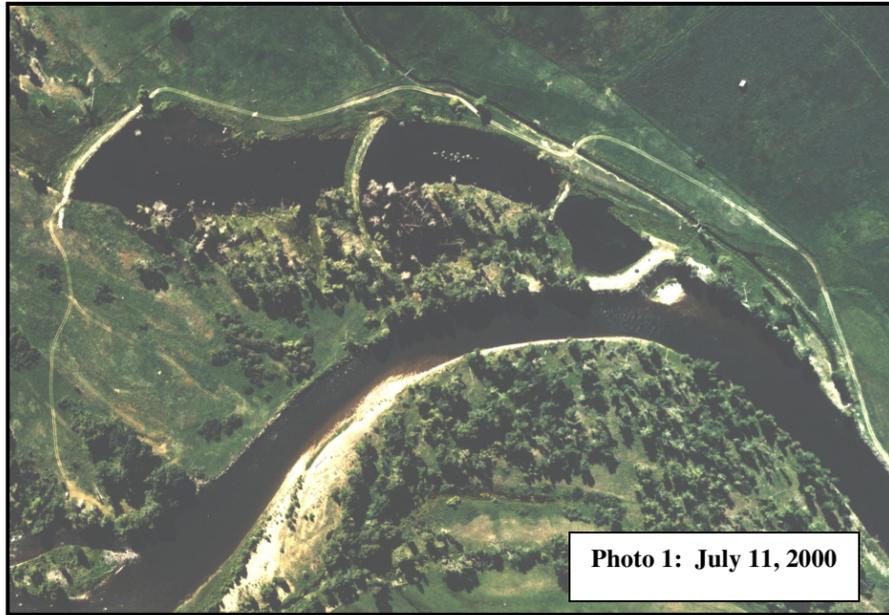


Photo 1: July 11, 2000



Photo 2: July 22, 2002

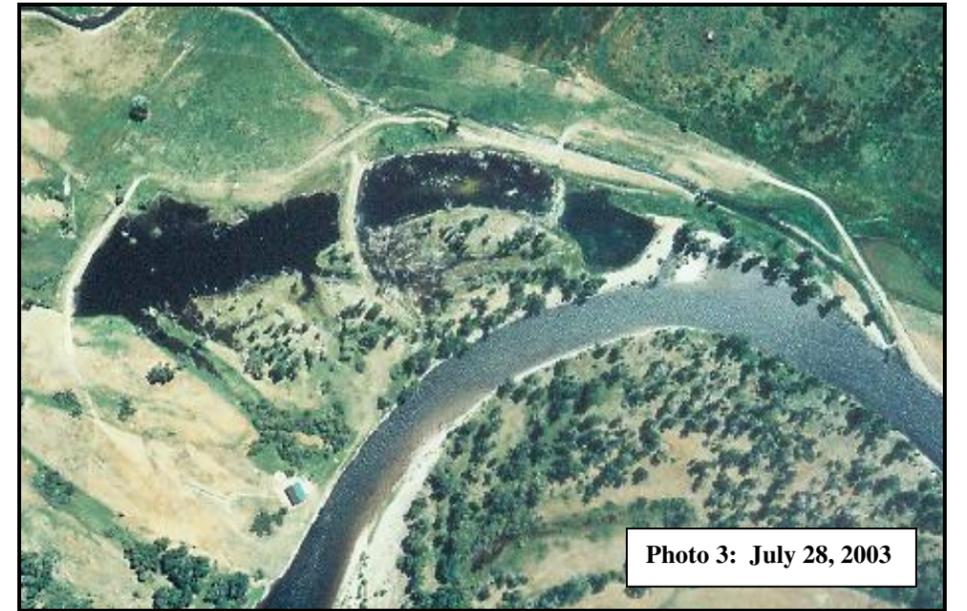


Photo 3: July 28, 2003



Photo 3: July 25, 2004



Photo 3: July 7, 2005

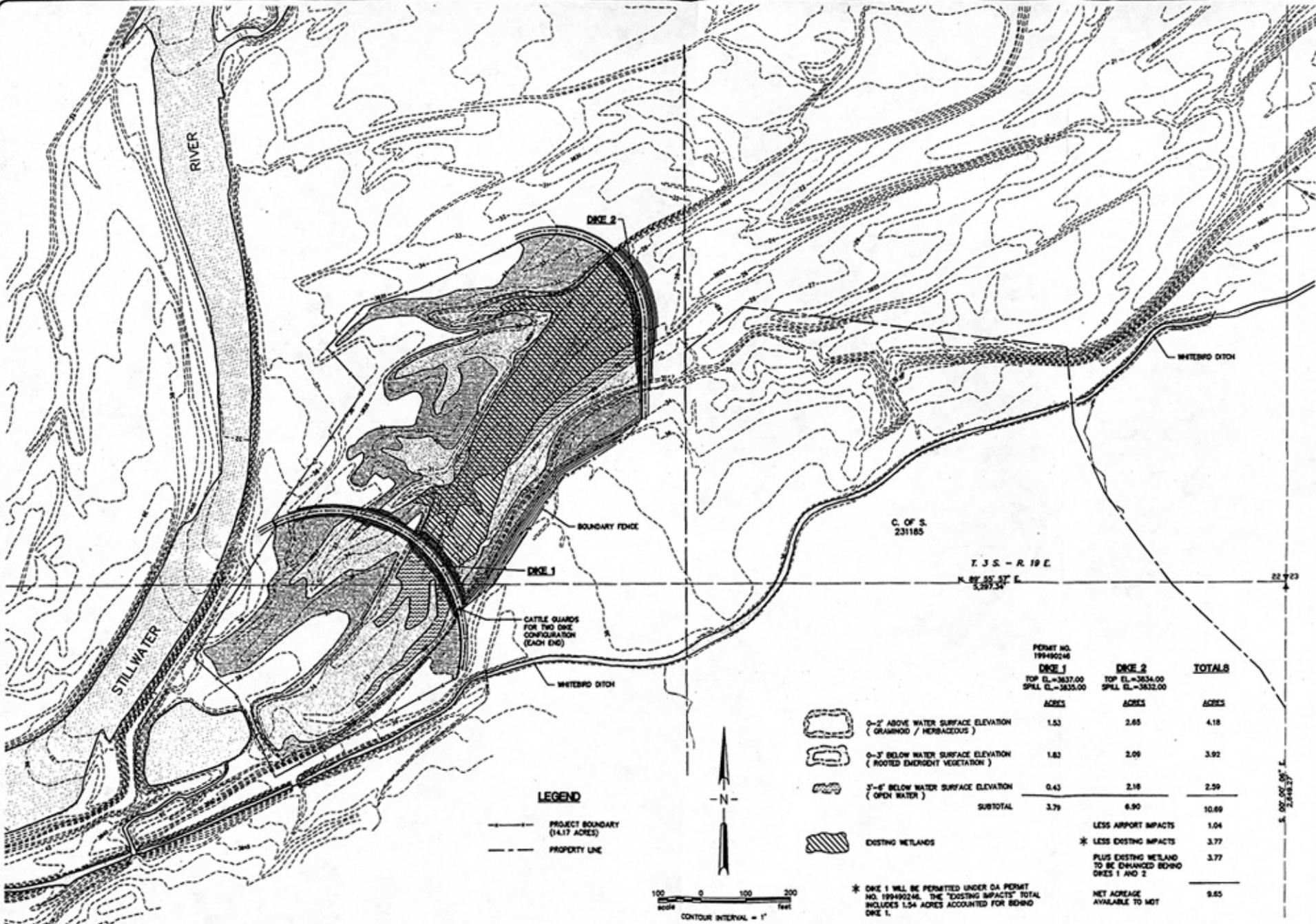
## **Appendix D**

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### **PROPOSED WETLAND MITIGATION SITE MAP**

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*MDT Wetland Mitigation Monitoring  
Stillwater River  
Absarokee, Montana*



**LEGEND**

— PROJECT BOUNDARY (14.17 ACRES)

- - - PROPERTY LINE

- 0-2' ABOVE WATER SURFACE ELEVATION (GRAINLAND / HERBACEOUS)
- 0-3' BELOW WATER SURFACE ELEVATION (ROOTED EMERGENT VEGETATION)
- 3'-6' BELOW WATER SURFACE ELEVATION (OPEN WATER)
- EXISTING WETLANDS

PERMIT NO. 199-90248	DIKE 1	DIKE 2	TOTALS
TOP EL. = 3637.00	TOP EL. = 3637.00	TOP EL. = 3634.00	
SPILL EL. = 3635.00	SPILL EL. = 3635.00	SPILL EL. = 3632.00	
ACRES	ACRES	ACRES	
1.53	2.65	4.18	
1.83	2.09	3.92	
0.43	2.18	2.59	
SUBTOTAL	6.90	10.69	
	LESS AIRPORT IMPACTS	1.04	
	* LESS EXISTING WETLANDS	3.77	
	PLUS EXISTING WETLAND TO BE ENLARGED BEHIND DIKES 1 AND 2	3.77	
	NET ACREAGE AVAILABLE TO MDT	9.65	

\* DIKE 1 WILL BE PERMITTED UNDER DA PERMIT NO. 199-90248. THE "EXISTING IMPACTS" TOTAL INCLUDES 1.54 ACRES ACCOUNTED FOR BEHIND DIKE 1.

Project No. 24056138 • 10-28-06 • Date: JULY 1998 • Designed: B.C. • Drawn: J.M.K. • Checked: B.C. • Approved: B.C.

WARNING: This drawing is the property of MSE-HKM, Inc. and shall not be used for any other project without the written consent of MSE-HKM, Inc.

No. Revision By Date

**STILLWATER RIVER WETLAND MITIGATION PLAN**

**WETLAND MITIGATION SITE**

MSE-HKM, Inc.  
2727 Central Avenue  
P.O. Box 31318  
Billings, MT 59107-1318  
(406) 656-6999  
FAX (406) 656-6998



FIGURE  
**2b**

## **Appendix E**

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### **BIRD SURVEY PROTOCOL GPS PROTOCOL**

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*MDT Wetland Mitigation Monitoring  
Stillwater River  
Absarokee, 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**

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### **2005 MACROINVERTEBRATE SAMPLING PROTOCOL AND DATA**

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*MDT Wetland Mitigation Monitoring  
Stillwater River  
Absarokee, 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 see 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<sup>th</sup> percentile (for those metrics that decrease in value in response to stress) or below the 25<sup>th</sup> 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<sup>th</sup> percentile for decreasing scores (or above the 25<sup>th</sup> 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. 2	Musgrave – Rest. 2			
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, %Orthoclaadiinae 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.

<b>Metric</b>	<b>Metric calculation</b>	<b>Expected response to degradation or impairment</b>
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
Orthoclaadiinae/Chironomidae	Number of individual midges in the sub-family Orthoclaadiinae / 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%
Orthocladinae/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
Orthocladinae/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
<b>Total score</b>	<b>38</b>	<b>32</b>	<b>28</b>	<b>34</b>	<b>48</b>	<b>44</b>	<b>26</b>	<b>30</b>
<b>Percent of maximum score</b>	<b>0.633333</b>	<b>0.533333</b>	<b>0.466667</b>	<b>0.566667</b>	<b>0.8</b>	<b>0.733333</b>	<b>0.433333</b>	<b>0.5</b>
<b>Impairment classification</b>	<b>sub-optimal</b>	<b>poor</b>	<b>poor</b>	<b>sub-optimal</b>	<b>optimal</b>	<b>optimal</b>	<b>poor</b>	<b>poor</b>

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

	<b>RIDGEWAY</b>	<b>MUSGRAVE REST. 1</b>	<b>MUSGRAVE REST. 2</b>	<b>MUSGRAVE ENH. 1</b>	<b>HOSKINS LANDING</b>	<b>PETERSON RANCH 1</b>	<b>PETERSON RANCH 2</b>	<b>PETERSON RANCH 4</b>	<b>PETERSON RANCH 5</b>
<b>Total taxa</b>	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%
Orthoclaadiinae/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%
<b>Total taxa</b>	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
Orthoclaadiinae/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
<b>Total score</b>	<b>38</b>	<b>42</b>	<b>34</b>	<b>42</b>	<b>50</b>	<b>54</b>	<b>34</b>	<b>48</b>	<b>44</b>
<b>Percent of maximum score</b>	<b>0.633333</b>	<b>0.7</b>	<b>0.566667</b>	<b>0.7</b>	<b>0.833333</b>	<b>0.9</b>	<b>0.566667</b>	<b>0.8</b>	<b>0.733333</b>
<b>Impairment classification</b>	<b>sub-optimal</b>	<b>optimal</b>	<b>sub-optimal</b>	<b>optimal</b>	<b>optimal</b>	<b>optimal</b>	<b>sub-optimal</b>	<b>optimal</b>	<b>optimal</b>

**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%
Orthoclaadiinae/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
Orthoclaadiinae/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
<b>Total score</b>	<b>40</b>	<b>38</b>	<b>36</b>	<b>48</b>	<b>42</b>	<b>48</b>	<b>40</b>	<b>26</b>	<b>38</b>
<b>Percent of maximum score</b>	<b>0.666667</b>	<b>0.633333</b>	<b>0.6</b>	<b>0.8</b>	<b>0.7</b>	<b>0.8</b>	<b>0.666667</b>	<b>0.433333</b>	<b>0.633333</b>
<b>Impairment classification</b>	<b>sub-optimal</b>	<b>sub-optimal</b>	<b>sub-optimal</b>	<b>optimal</b>	<b>optimal</b>	<b>optimal</b>	<b>sub-optimal</b>	<b>poor</b>	<b>sub-optimal</b>

**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%
Orthoclaadiinae/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
Orthoclaadiinae/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
<b>Total score</b>	<b>24</b>	<b>40</b>	<b>38</b>
<b>Percent of maximum score</b>	<b>0.4</b>	<b>0.666667</b>	<b>0.633333</b>
<b>Impairment classification</b>	<b>poor</b>	<b>sub-optimal</b>	<b>sub-optimal</b>

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# Taxa Listing

Project ID: MDT05LW  
RAI No.: MDT05LW024

RAI No.: MDT05LW024

Sta. Name: STILLWATER

Client ID:

Date Coll.:

No. Jars: 1

STORET ID:

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
<b>Non-Insect</b>							
Acari	1	0.94%	Yes	Unknown		5	PR
Cladocera	4	3.77%	Yes	Unknown		8	CF
Copepoda	8	7.55%	Yes	Unknown		8	CG
Ostracoda	35	33.02%	Yes	Unknown		8	CG
Planorbidae							
Planorbidae	2	1.89%	Yes	Immature	Immature	6	SC
Talitridae							
<i>Hyalella</i> sp.	8	7.55%	Yes	Unknown		8	CG
<b>Odonata</b>							
Coenagrionidae							
Coenagrionidae	16	15.09%	No	Larva	Early Instar	7	PR
<i>Enallagma</i> sp.	9	8.49%	Yes	Larva		7	PR
<b>Ephemeroptera</b>							
Baetidae							
Baetidae	8	7.55%	Yes	Larva	Early Instar	4	CG
Caenidae							
<i>Caenis</i> sp.	2	1.89%	Yes	Larva		7	CG
<b>Diptera</b>							
Ceratopogonidae							
Ceratopogoninae	1	0.94%	Yes	Larva	Larva	6	PR
Culicidae							
Culicidae	2	1.89%	Yes	Larva	Larva	10	CG
<b>Chironomidae</b>							
Chironomidae							
Chironomidae	1	0.94%	No	Pupa	Pupa	10	CG
<i>Cricotopus (Cricotopus)</i> sp.	4	3.77%	Yes	Larva		7	SH
<i>Cricotopus trifascia</i>	1	0.94%	Yes	Larva		7	SH
<i>Paratanytarsus</i> sp.	3	2.83%	Yes	Larva		6	CG
<i>Pseudochironomus</i> sp.	1	0.94%	Yes	Larva		5	CG
<b>Sample Count</b>	<b>106</b>						

# Metrics Report

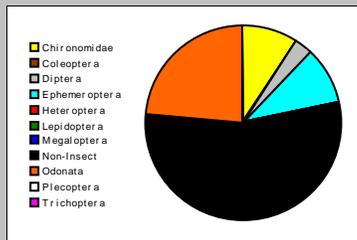
Project ID: MDT05LW  
 RAI No.: MDT05LW024  
 Sta. Name: STILLWATER  
 Client ID:  
 STORET ID  
 Coll. Date:

## Abundance Measures

Sample Count: 106  
 Sample Abundance: 106.00 100.00% of sample used  
 Total Abundance: 142.57  
 Coll. Procedure:  
 Sample Notes:

## Taxonomic Composition

Category	R	A	PRA
Non-Insect	6	58	54.72%
Odonata	1	25	23.58%
Ephemeroptera	2	10	9.43%
Plecoptera			
Heteroptera			
Megaloptera			
Trichoptera			
Lepidoptera			
Coleoptera			
Diptera	2	3	2.83%
Chironomidae	4	10	9.43%

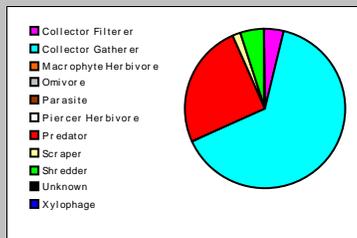


## Dominant Taxa

Category	A	PRA
Ostracoda	35	33.02%
Coenagrionidae	16	15.09%
Enallagma	9	8.49%
Hvalella	8	7.55%
Copepoda	8	7.55%
Baetidae	8	7.55%
Cricotopus (Cricotopus)	4	3.77%
Cladocera	4	3.77%
Paratanytarsus	3	2.83%
Planorbidae	2	1.89%
Culicidae	2	1.89%
Caenis	2	1.89%
Pseudochironomus	1	0.94%
Ceratopogoninae	1	0.94%
Acari	1	0.94%

## Functional Composition

Category	R	A	PRA
Predator	3	27	25.47%
Parasite			
Collector Gatherer	8	68	64.15%
Collector Filterer	1	4	3.77%
Macrophyte Herbivore			
Piercer Herbivore			
Xylophage			
Scraper	1	2	1.89%
Shredder	2	5	4.72%
Omnivore			
Unknown			



## Metric Values and Scores

Metric	Value	BIBI	MTP	MTV	MTM
<i>Composition</i>					
Taxa Richness	15	1	1		0
Non-Insect Percent	54.72%				
E Richness	2	1		1	
P Richness	0	1		0	
T Richness	0	1		0	
EPT Richness	2		0		0
EPT Percent	9.43%		0		0
Oligochaeta+Hirudinea Percent					
Baetidae/Ephemeroptera	0.800				
Hydropsychidae/Trichoptera	0.000				
<i>Dominance</i>					
Dominant Taxon Percent	33.02%		2		2
Dominant Taxa (2) Percent	48.11%				
Dominant Taxa (3) Percent	56.60%	3			
Dominant Taxa (10) Percent	91.51%				
<i>Diversity</i>					
Shannon H (loge)	2.099				
Shannon H (log2)	3.028		3		
Margalef D	3.119				
Simpson D	0.187				
Evenness	0.093				
<i>Function</i>					
Predator Richness	3		1		
Predator Percent	25.47%	5			
Filterer Richness	1				
Filterer Percent	3.77%			3	
Collector Percent	67.92%		2		2
Scraper+Shredder Percent	6.60%		1		0
Scraper/Filterer	0.500				
Scraper/Scraper+Filterer	0.333				
<i>Habit</i>					
Burrower Richness	2				
Burrower Percent	1.89%				
Swimmer Richness	0				
Swimmer Percent	0.00%				
Clinger Richness	2	1			
Clinger Percent	4.72%				
<i>Characteristics</i>					
Cold Stenotherm Richness	0				
Cold Stenotherm Percent	0.00%				
Hemoglobin Bearer Richness	2				
Hemoglobin Bearer Percent	2.83%				
Air Breather Richness	1				
Air Breather Percent	1.89%				
<i>Voltinism</i>					
Univoltine Richness	6				
Semivoltine Richness	0	1			
Multivoltine Percent	62.26%		1		
<i>Tolerance</i>					
Sediment Tolerant Richness	1				
Sediment Tolerant Percent	1.89%				
Sediment Sensitive Richness	0				
Sediment Sensitive Percent	0.00%				
Metals Tolerance Index	3.023				
Pollution Sensitive Richness	0	1		0	
Pollution Tolerant Percent	20.75%	3		1	
Hilsenhoff Biotic Index	7.283		0		0
Intolerant Percent	0.00%				
Supertolerant Percent	54.72%				
CTQa	97.714				

## Bioassessment Indices

BioIndex	Description	Score	Pct	Rating
BIBI	B-IBI (Karr et al.)	18	36.00%	
MTP	Montana DEQ Plains (Bukantis 1998)	11	36.67%	Moderate
MTV	Montana Revised Valleys/Foothills (Bollman 1998)	5	27.78%	Moderate
MTM	Montana DEQ Mountains (Bukantis 1998)	4	19.05%	Severe

