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

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*Cloud Ranch  
Big Timber, Montana*



Prepared for:

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

Prepared by:

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

December 2005

Project No: B43054.00 - 0504



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## 1.0 INTRODUCTION

This report summarizes the methods and results of the second year of monitoring at the Cloud Ranch project site. The Big Timber Creek stream and wetland restoration was constructed in the spring of 2003 to mitigate wetland impacts associated with proposed Montana Department of Transportation (MDT) roadway improvement projects in the Billings District - watershed #13. The site is located in Sweetgrass County approximately twelve miles northwest of Big Timber in Section 36, Township 3 North, Range 13 East (**Figure 1**). Elevations within the assessment area range from approximately 4840 to 4900 feet above sea level. The surrounding land uses include pastures and residential areas.

The project is intended to develop approximately 5.5 acres of wetland credit within a 15.5 acre conservation easement on property owned by John and Kathryn Heminway. The project goals are to restore a degraded reach of Big Timber creek by narrowing the channel and revegetating the over bank areas with riparian trees, shrubs, wetland grasses and forbs. Restoration and creation activities for the off-channel wetland sites include pond and embankment removal, with subsequent grading adjacent to restored or existing wetlands which were formerly inundated with water. All disturbed areas are revegetated with native wetland species. The stream channel and off-channel wetland restoration sites are shown on **Figure 2, Appendix A**.

The 2003 baseline wetland delineation conducted by Aquatic Design and Construction Inc. (ADC) identified 1.00 acre of wetlands within the project area (**Appendix D**). The Corps of Engineers (COE, 2002) approved allocation of 1:1 credit ratio for creation and restoration, as well as 4:1 ratio for the maintenance of a buffer zone around the wetland and riparian areas. More specifically, the wetland credit breakdown approved by the COE is as follows: 0.61 acre for off- channel wetland creation, 1.41 acres for off-channel wetland restoration, 2.0 acres for riparian wetland restoration along Big Timber Creek, 0.58 acre for emergent wetland restoration along Big Timber Creek, and a 0.89 acre upland buffer (4:1 ratio) for a total of 5.5 acres. The summary table of potential wetland credits available for the Cloud Ranch is outlined in the COE letter, 2002 (**Appendix G**).

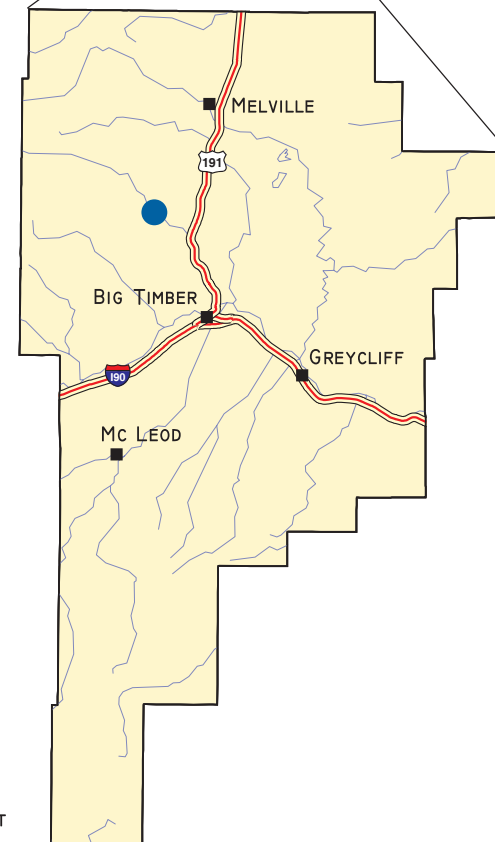
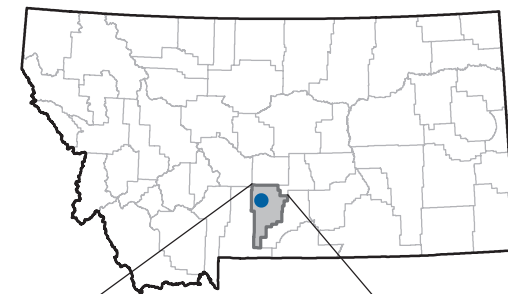
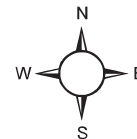
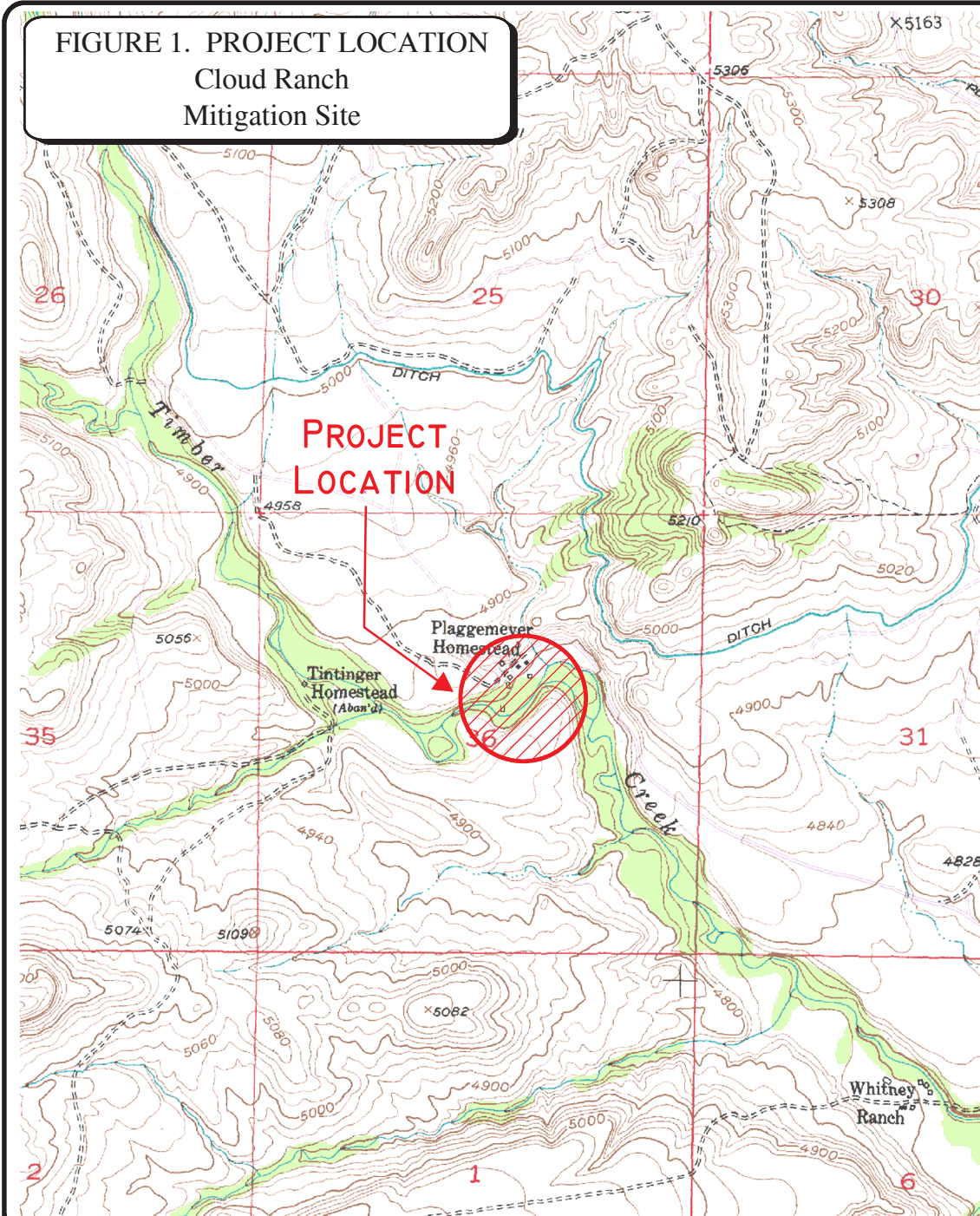
Wetland restoration and creation activities resulted in the temporary disturbance of 0.03 acre of existing wetlands. For the purposes of the report, each area (off-channel wetlands and Big Timber Creek) will be addressed separately, but the acreages will be tallied as one site.

## 2.0 METHODS

### 2.1 Monitoring Dates and Activities

The project site was visited on July 19, 2005 to ascertain breeding bird and other wildlife use. The primary monitoring visit was conducted on August 4, 2005 (**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; functional assessment; and maintenance needs.

**FIGURE 1. PROJECT LOCATION**  
 Cloud Ranch  
 Mitigation Site



0 800 1,600  
 FEET  
 1:24,000

PROJECT #: 330054.504  
 DATE: JAN 2005  
 LOCATION:  
 PROJECT MANAGER:  
 DRAWN BY: B. STEINEBACH

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## 2.2 Hydrology

Wetland hydrology indicators were recorded using procedures outlined in the COE 1987 Wetland Delineation Manual (Environmental Laboratory 1987). Hydrology data were recorded on the COE Routine Wetland Delineation Data Form (**Appendix B**) at each wetland determination point. Precipitation data for the year 2005 were compared to the 1894-2005 average (WRCC 2005).

All additional hydrologic data were recorded on the mitigation site monitoring form (**Appendix B**). The boundary between emergent vegetation and open water was mapped on the aerial photograph (**Figure 3, Appendix A**). 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 will be updated as new species are encountered. Observations from past year will be compared with new data to document vegetation changes over time. The assessment area is fenced and woody species were planted along the creek. Qualitative observations were used to assess the survival of the planted woody species. The visual assessment included written estimates of species survival along the transect length as well as the stream channel and floodplain.

Two transects were established during the 2004 monitoring event to represent the range of current vegetation conditions. These transects were re-evaluated in 2005 to reflect changes in species composition and changing wetland boundaries. These transects locations are shown on **Figure 2, Appendix A**. The percent cover for each species was recorded on the vegetation transect forms (**Appendix B**). Each transect is used to evaluate changes over time, especially the establishment and increase of hydrophytic vegetation. Transect ends are marked with metal fence posts and their locations recorded with the GPS unit. Photos of each transect were taken during the August visit.

## 2.4 Soils

Soils were evaluated during the mid-season visit according to the procedure outlined in the COE 1987 Wetland Delineation Manual. Soil data were recorded for each wetland determination point on 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 areas developing at the Cloud Ranch. A pre-construction wetland map was completed by the Aquatic Design and Construction (2003) and is included in **Appendix D**.

## 2.6 Mammals, Reptiles, and Amphibians

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

## 2.7 Birds

Bird observations were recorded during the July 19<sup>th</sup> 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 the existing wetland pond located in the northeast corner of the project site. The sample was preserved as outlined in the sampling procedure and sent to Rhithron Associates for analysis. The approximate sampling location is 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 ADC but were unavailable for use in this report (T. Coleman January/February 2005).

## 2.10 Photographs

Photographs were taken showing Big Timber Creek riverine wetlands, the off-channel wetland areas, the monitoring area, and the vegetation transects (**Appendix C**). A description and compass direction for each photograph were recorded on the wetland monitoring form.

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

## 2.11 GPS Data

During the 2004 monitoring season survey points were collected using a resource grade Trimble Geoexplorer III hand-held GPS unit (**Appendix E**). Points collected included: the beginning and end locations of the vegetation transects, the jurisdictional wetland boundary, and the sample point (SP) locations. In addition, GPS data were collected for four (4) landmarks recognizable on the air photo for purposes of line fitting to the topography. In 2004, the wetland delineation boundary was recorded on an aerial photo along the creek channel where GPS signals were unattainable. No additional GPS data were collected in 2005.

## 2.12 Maintenance Needs

The condition of water level control structures, weed infestation, or other mitigation related structures was evaluated. Minor maintenance needs and recommendations are provided in **Section 3.9**. This examination did not entail an engineering-level analysis.

## 3.0 RESULTS

The project includes two different and distinct wetland areas; the Big Timber Creek channel restoration and the off-channel creation/restoration wetlands within the upland terraces south of the stream channel. Information pertaining to each type of mitigation is summarized below.

### 3.1 Hydrology

#### Big Timber Creek

The Cloud Ranch reach of Big Timber Creek is located approximately one mile below the confluence of the South Fork of Big Timber and the main stem of Big Timber Creek. The existing braided creek channel was reconstructed to a single channel consistent with an upstream reference reach. The over-bank areas of the new channel are beginning to revegetate with riparian shrubs and trees species and herbaceous wetland plants. Herbaceous wetland plants are initially dominating the topographically low areas within the reconstructed bars. The over-bank substrate is well-drained, very coarse textured alluvial material. In general, the riverine wetlands associated with the creek are low point or side bars as shown on **Figure 3, Appendix A**.

During the 2005 monitoring visit, considerable channel movement was observed within the reconstructed creek and floodplain. High water marks, overbank flows, loss of outside banks and fresh deposition of sediment (clay and silt) were noted on the point bars of inside curves. During the overbank flows two new stream channels were created. Overbank flows also deposited alluvial material immediately adjacent to the creek channel creating a natural levee or backwater areas. The lateral movement of the creek has created a series of terraces at varying levels with changes in vegetation. Primary hydrology indicators observed during the August 4, 2005 monitoring visit included saturation within the upper 12 inches, and/or inundation, water marks, and sediment deposits.



### Off-channel restored/created wetlands

A drained pond within an historic oxbow of Big Timber Creek was graded and revegetated with herbaceous wetland plants. The unnamed spring creek channel was originally ditched through most of the pond system. As part of the restoration activities, a new sinuous channel was developed through the wetland complex where a series of low structures were created to mimic a condition analogous to a series of abandoned beaver ponds. Three (3) water level control structures were installed as well as several small dikes to promote inundation of the created and existing wetlands. An embankment was also removed from the pond to lower water surface levels consistent with the existing wetland area to the south. Several ponds or “over-widened” sections of the existing spring creek channel were filled and revegetated with herbaceous wetland plants. During the August 4, 2005 monitoring visit approximately 75% of the assessment area was inundated with several inches of standing water. Open water, bare soil, or the area without emergent vegetation, is depicted on **Figure 3, Appendix A**.

According to the Western Regional Climate Center (WRCC), the Big Timber weather station has calculated a mean annual precipitation of 15.35 inches from 1894 through May 2005. The mean annual precipitation from January 2004 to May 2005 was 10.6 inches (WRCC 2005). Therefore the precipitation from January 2004 through May 2005 was 70% of the normal long-term average, indicating 2004 and the spring of 2005 were drier compared to historic precipitation.

### **3.2 Vegetation**

Vegetation species identified on the site are presented in **Table 1**, and in the monitoring form (**Appendix B**). The vegetation types along the Big Timber Creek include: Type 1 *Bromus inermis*/*Agropyron repens*, Type 2, *Populus angustifolia*/*Agrostis alba* and, Type 3, *Agrostis alba*. Dominant species within each community are listed on the monitoring form (**Appendix B**). Hydrophytic vegetation communities are changing in size, diversity and cover values over time.

The vegetation types within the off-channel wetlands include: Type 4, *Juncus torreyi*/*Eleocharis palustris*, Type 5, *Glyceria sp.*/*Typha latifolia*, Type 6, *Typha latifolia*/*Carex sp.* and, Type 7, *Bromus sp.*/*Agropyron sp.* Dominant species within each community are also listed on the monitoring form (**Appendix B**). There are approximately 35 known species of wetland plants with a FACW to OBL status within the channel assessment area and within the off-channel wetlands.

The vegetation transect results are detailed in the monitoring form (**Appendix B**) and are summarized below in **Tables 2a** and **2b**. Transect 1 is located in the upper reach of the Big Timber Creek and spans from upland to upland across the channel, wetlands and floodplain (**Table 2a** and **Charts 1** and **2**). Transect 2 is located along the northern quarter of the off-channel restored wetlands (**Table 2b** and **Charts 3** and **4**).

The south and southwestern portions of the upland community type 7 were inundated with several inches of water during the August monitoring visit. As the saturation zones expand into

the upland areas, hydrophytic vegetation is encroaching into the saturated/inundated soils. *Agrostis alba* (FACW) was noted in saturated upland areas. Expansion of the Community type 5 wetland boundaries into Community type 7 were noted during the 2005 monitoring visit. Community type 5 has also become more distinct with increased species diversity and an increase in OBL and FACW species. Community type 6 is expanding into areas of ponded or flowing water. There is a significant reduction in sparsely vegetated or bare soil compared to 2004.

Changes in the vegetation along Big Timber Creek include increased wetland areas, loss of wetland/upland banks due to channel migration, and improved vegetation cover and diversity in both riparian wetland and uplands in addition to the buffer areas.

In 2004, the overall survival of the willow cuttings along Big Timber Creek was estimated between 40 to 45 percent. In 2005, primarily due to overbank flows and bank loss, the overall survival of the willow cuttings was reduced. It is estimated that 25 to 30 percent of the original willow cuttings planted are still in place and alive.

In 2004, the estimated survival of transplanted cottonwood seedlings was approximately 60 to 65 percent. The cottonwoods were planted further inland and were not negatively affected by high water flows. Few dead or declining cottonwood seedlings were noted during the 2005 field survey. Cottonwood seedlings were generally robust, healthy with new growth. Details of the plant survival along the stream channel can be found in **Appendix B** (page 6).

Three Category I, state noxious weed species were present at the site: houndstongue (*Cynoglossum officinale*), Canada thistle (*Cirsium arvense*), and spotted knapweed (*Centaurea maculosa*). One weed species listed on the Sweetgrass County noxious list was also found: black henbane (*Hyoscyamus niger*). These areas were not mapped on the 2005 **Figure 3** as they do not constitute discrete vegetation communities. Canada thistle, hounds tongue and spotted knapweed were observed in bank areas along Big Timber Creek as sporadic infestations. Canada thistle and henbane were observed within the off-channel restored/created wetlands and the disturbed uplands as sporadic infestations. It appeared that Canada thistle, henbane and hounds tongue, in upland or transition areas, had been sprayed prior to the 2005 August site visit. Mechanical weed control measures included mowing in the uplands or off-channel transition areas to control thistle and other annual weeds. Because Canada thistle and hounds tongue are present, there is potential for them to increase in numbers and out-compete native plants desired by wildlife. Canada thistle, in particular, can colonize very moist areas.

**Table 1: 2004 and 2005 Big Timber Creek riverine and off-channel wetland vegetation species list.**

Scientific Name	Region 9 (Northwest) Wetland Indicator Status <sup>1, 2</sup>
<i>Achillea millefolium</i>	<b>FACU</b>
<i>Agropyron repens</i>	FACU
<i>Agropyron riparium</i>	(FACU)
<i>Agropyron smithii</i>	FACU
<i>Agropyron trachycaulum</i>	FAC
<i>Agrostis alba</i>	FACW
<b><i>Alopecurus aequalis</i></b>	<b>FACW</b>
<i>Alopecurus arundinaceus</i>	(FACW)
<i>Alopecurus pratensis</i>	FACW
<i>Ambrosia trifida</i>	FACU+
<i>Beckmannia syzigachne</i>	OBL
<i>Betula occidentalis</i>	FACW
<i>Bromus inermis</i>	(UPL)
<i>Bromus marginatus</i>	(FACU)
<i>Bromus japonicus</i>	UPL
<i>Calamagrostis canadensis</i>	FACW+
<i>Carex aquatilis</i>	OBL
<i>Carex languinosa</i>	OBL
<i>Carex nebrascensis</i>	OBL
<i>Carex utriculata</i>	OBL
<b><i>Carex vulpinoides</i></b>	<b>OBL</b>
<b><i>Centaurea maculosa</i></b>	<b>(FACU)</b>
<i>Chenopodium sp</i>	(UPL)
<i>Cirsium arvense</i>	FACU+
<i>Crepis runinata</i>	FACU
<i>Cynoslossum officinale</i>	(UPL)
<b><i>Dactylis glomerata</i></b>	<b>FACU</b>
<i>Deschampsia cespitosa</i>	FACW
<i>Eleocharis palustris</i>	OBL
<i>Elymus canadensis</i>	FAC
<i>Epilobium ciliatum.</i>	FACW-
<i>Equisetum arvense</i>	FAC
<i>Glyceria elata</i>	FACW+
<i>Glyceria grandis</i>	OBL
<i>Glycyrrhiza lepidota</i>	FAC+
<i>Helianthus annuus</i>	FACU
<i>Hordum jubatum</i>	FAC+
<i>Hyoscyamus niger</i>	(UPL)
<i>Juncus balticus</i>	FACW+
<b><i>Juncus ensifolius</i></b>	<b>FACW</b>
<i>Juncus longistylis</i>	FACW
<b><i>Juncus mertensianus</i></b>	<b>OBL</b>

**Table 1 (Continued) 2004 and 2005 Big Timber Creek riverine and off-channel wetland vegetation species list.**

Scientific Name	Region 9 (Northwest) Wetland Indicator Status <sup>1, 2</sup>
<i>Juncus tenuis</i>	FACW-
<i>Juncus torreyi</i>	FACW
<i>Melilotus officinalis</i>	FACU
<i>Mentha arvensis</i>	FACW-
<i>Mimulus guttatus</i>	OBL
<i>Phalaris arundinacea</i>	FACW
<i>Phleum pretense</i>	FACU
<i>Populus angustifolia</i>	FACW
<i>Poa compressa</i>	FACU+
<i>Poa palustris</i>	FAC
<i>Poa pratensis</i>	FACU+
<i>Prunus virginiana</i>	FACU
<i>Rumex crispus</i>	FAC+
<i>Salix exigua</i>	OBL
<i>Scirpus acutus</i>	OBL
<b><i>Scirpus microcarpus</i></b>	<b>OBL</b>
<i>Scirpus validus</i>	OBL
<b><i>Solidago canadensis</i></b>	<b>FACU</b>
<i>Solidago occidentalis</i>	FACW
<i>Spartina pectinata</i>	OBL
<i>Symphoricarpos albus</i>	FACU
<b><i>Trifolium fragiferum</i></b>	<b>FACU</b>
<i>Typha latifolia</i>	OBL
<i>Veronica americana</i>	OBL
<i>Verbascum thapsus</i>	(UPL)

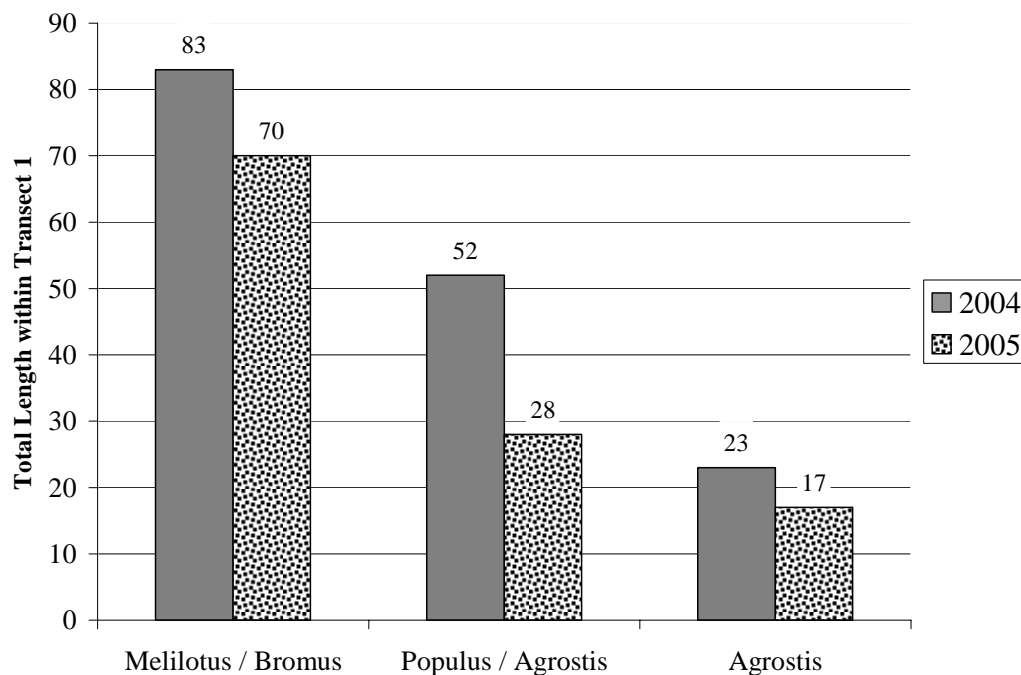
<sup>1</sup> **Bolded** species indicate those documented within the analysis area for the first time in 2005.

<sup>2</sup> Species in parenthesis indicate either not included or classified as “non-indicator” in the *National List of Plant Species that Occur in Wetlands: Northwest (Region 9)* (Reed 1988); status in parentheses are probable and based on biologist's experience.

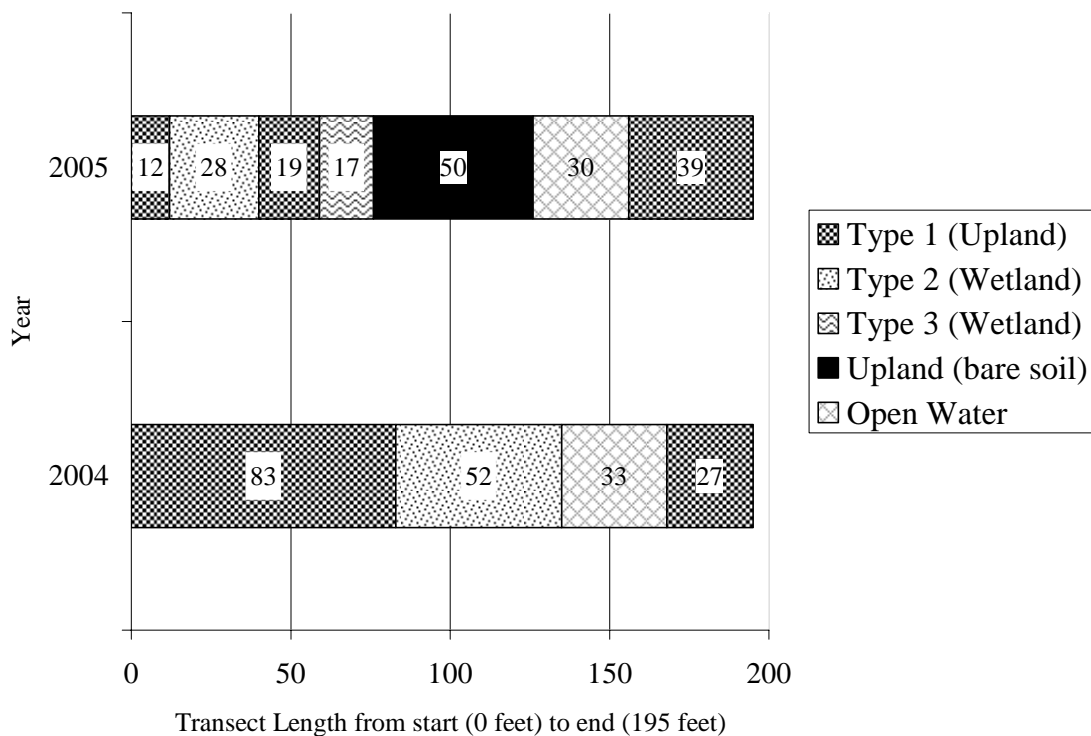
**Table 2a: 2004 and 2005 Transect 1 data summary.**

Monitoring Year	2004	2005
<b>Transect Length (feet)</b>	195	195
<b># Vegetation Community Transitions along Transect</b>	3	3
<b># Vegetation Communities along Transect</b>	3	3
<b># Hydrophytic Vegetation Communities along Transect</b>	1	2
<b>Total Vegetative Species</b>	19	18
<b>Total Hydrophytic Species</b>	11	8
<b>Total Upland Species</b>	9	10
<b>Estimated % Total Vegetative Cover</b>	60	71
<b>% Transect Length Comprised of Hydrophytic Vegetation Communities</b>	25	23
<b>% Transect Length Comprised of Upland Vegetation Communities</b>	40	36
<b>% Transect Length Comprised of Unvegetated Open Water</b>	25	15
<b>% Transect Length Comprised of Bare Substrate</b>	10	26

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



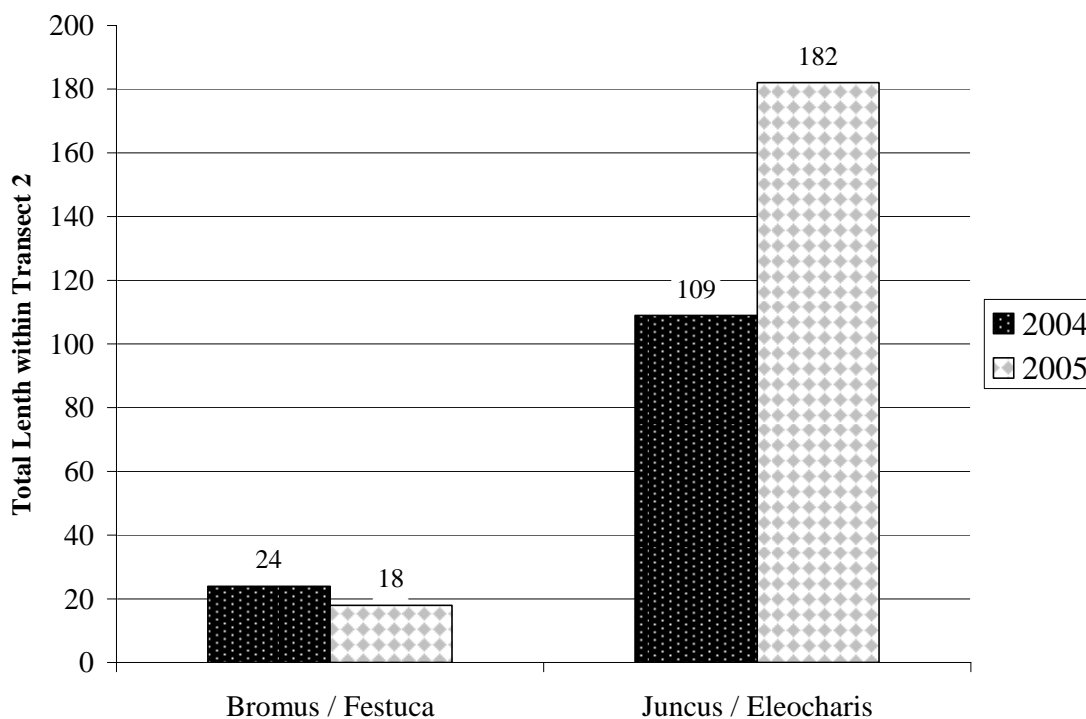
**Chart 2: Transect map showing vegetation types of Transect 1 from start (0 feet) to end (195 feet) from 2004 to 2005.**



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

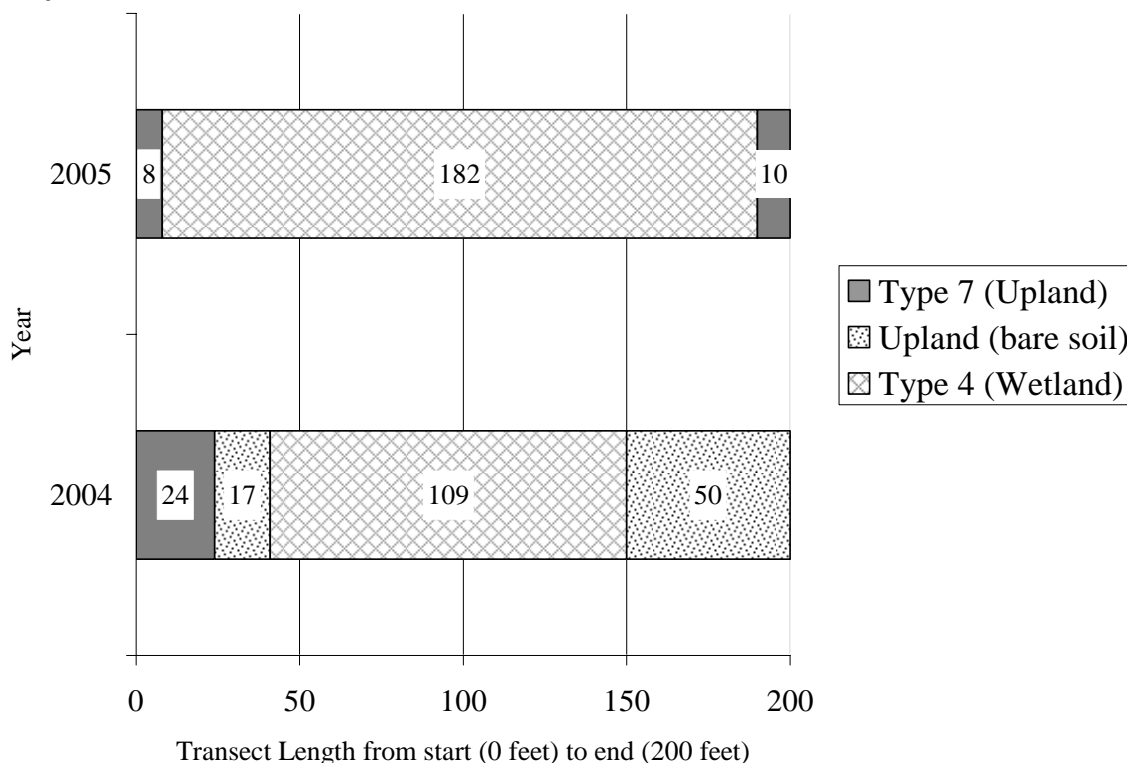
Monitoring Year	2004	2005
<b>Transect Length (feet)</b>	200	200
<b># Vegetation Community Transitions along Transect</b>	2	2
<b># Vegetation Communities along Transect</b>	3	2
<b># Hydrophytic Vegetation Communities along Transect</b>	1	1
<b>Total Vegetative Species</b>	12	15
<b>Total Hydrophytic Species</b>	7	10
<b>Total Upland Species</b>	3	5
<b>Estimated % Total Vegetative Cover</b>	60	70
<b>% Transect Length Comprised of Hydrophytic Vegetation Communities</b>	54	90
<b>% Transect Length Comprised of Upland Vegetation Communities</b>	21	8
<b>% Transect Length Comprised of Unvegetated Open Water</b>	0	2
<b>% Transect Length Comprised of Bare Substrate</b>	25	2

**Chart 3: Length of vegetation communities along Transect 2**





**Chart 4: Transect map showing vegetation types of Transect 2 from start (0 feet) to end (200 feet) from 2004 to 2005.**



### 3.3 Soils

The project site was mapped as part of the Sweetgrass County Soil Survey (USDA 1981). The dominant soil on the site is mapped as Nesda-Mcilwaine loam (107A). These soils are found on low stream terraces and flood plains. The Mesda-Mcilwaine soils are both well drained, non hydric soils with approximately 12 inches of loam over extremely gravelly coarse sand. The soil classification is a Fluventic Haploboroll. There are two small inclusions of Albicalis (5%) and Meadowcreek (5%). Albicalis is a loamy textured, hydric soil that is poorly drained. Meadowcreek is not listed as a hydric soil.

Soils were sampled at four (4) sample points (SP-1, SP-2 Transect 1 and SP-3, SP-4 Transect 2). Soil pits 1 and 4 are within a wetland, soil pits 2 and 3 are an upland soil. Soils at SP-1 (Transect 1) were a very dark gray (10YR 2/1) silty loam to from 0 -6 inches and sandy clay loam, dark gray (10YR 3.1) from 6 to 12 inches with dark yellowish (10YR 4/4) mottles. Saturation was observed to the surface. The soils at SP-4 (Transect 2) were very dark gray (10YR 3/1) clay loam from 0-12 inches with dark yellowish brown (10YR 4/6) mottles. Soils were saturated at the surface and shallow areas of ponded water (2 – 4 inches deep) were observed.

Soil pits sampled within the upland areas (SP-2 and SP-3) revealed soils with similar textures (silty loam to sandy clay loam). Hydric soils were observed in SP-2 (low chroma values and mottles at 6 inches), however vegetation and hydrology do not meet the wetland criteria. Soil at SP-3, with a chroma value of 10YR 4/2 (without mottles), was not considered hydric.

### 3.4 Wetland Delineation

The delineated wetland boundary is depicted on **Figure 3, Appendix A**. The COE data forms are included in **Appendix B**. Riverine wetlands generally include low areas or portions of vegetated point or side bars. The vegetation within the off-channel wetlands consisted primarily of emergent vegetation, generally within topographically low areas where saturation has occurred and is developing into wetland areas. Aquatic vegetation such as cattails and bulrush were more common along the perimeter of the spring creek channel. A total of 2.75 acres of wetlands and open water were delineated in the off-channel wetland development area within the defined monitoring area. This included 0.24 acre of shallow (< 4 feet deep) open water and 0.72 acre of pre-existing wetlands. Approximately 0.76 acre of wetlands were delineated along Big Timber Creek (the Big Timber Creek open water channel is not included in this total).

Subtracting the pre-existing wetlands from the total yields a net gain of 2.79 aquatic habitat acres (1.79 wetland acres off-channel, 0.24 shallow open water acres off-channel, and 0.76 wetland acres along Big Timber Creek) at the monitoring sites.

### 3.5 Wildlife

Wildlife species observed on the site in 2005 are listed in **Table 3**. Activities and densities associated with these observations are included on the monitoring form in **Appendix B**. Several mammal, fish and one amphibian species were noted by Aquatic Design & Construction, Inc. (**Table 3**).

**Table 3: 2004 and 2005 fish and wildlife species observed within the Cloud Ranch Mitigation Site.**

<b>REPTILES</b>
Western terrestrial garter snake ( <i>Thamnophis elegans</i> )
<b>AMPHIBIANS</b>
Western Chorus Frog ( <i>Pseudacris triseriata</i> ) <sup>1</sup>
<b>FISH</b>
Brook trout ( <i>Salvelinus fontinalis</i> ) <sup>1</sup>
Brown trout ( <i>Salmo trutta</i> ) <sup>1</sup>
Rainbow trout ( <i>Oncorhynchus mykiss</i> ) <sup>1</sup>
<b>BIRDS</b>
Bald eagle ( <i>Haliaeetus leucocephalus</i> ) <sup>1</sup>
Unidentified sparrow sp.
House wren ( <i>Troglodytes aedon</i> )
Red-naped sap sucker ( <i>Sphyrapicus nuchalis</i> )
Spotted sandpiper ( <i>Actitis macularia</i> )
Yellow-rumped Warbler ( <i>Dendroica coronata</i> )
Warbling vireo ( <i>Vireo gilvus</i> )
American Goldfinch ( <i>Carduelis psaltria</i> )
Least Flycatcher ( <i>Empidonax minimus</i> )

**Table 3 (Continued): 2004 and 2005 fish and wildlife species observed within the Cloud Ranch Mitigation Site.**

<b>MAMMALS</b>
Black bear ( <i>Ursus americanus</i> ) <sup>1</sup>
White-tailed deer ( <i>Odocoileus virginianus</i> ) <sup>1</sup>
Mule deer ( <i>Odocoileus hemionus</i> ) <sup>1</sup>

<sup>1</sup> Observed by Aquatic Design & Construction, Inc.

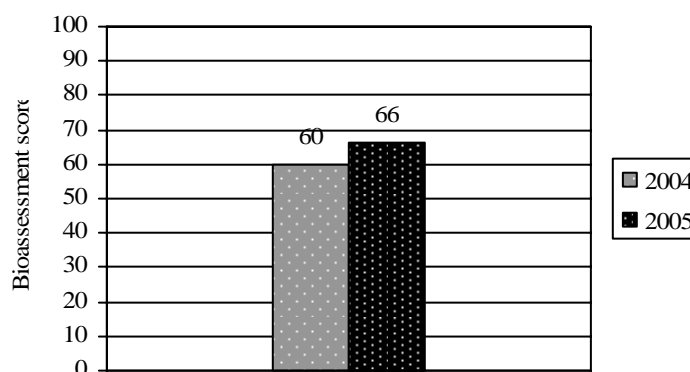
**Bolded** species indicate those documented within the analysis area in 2005.

### 3.6 Macroinvertebrates

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

*Sub-optimal conditions were indicated by the bioassessment scores calculated for this site in both 2004 and 2005. Taxa richness increased between the 2 years; additional chironomid taxa accounted for this increase. Hypoxic substrates are indicated by the hemoglobin-bearers among the midge fauna. Large numbers of the worm *Nais* sp. persisted at the site, suggesting that bacterial films were a dominant energy source here. Biotic index values suggest a more sensitive fauna in 2005 compared to the assemblage collected in 2004. Water quality was probably good.*

**Chart 5: 2004-2005 Cloud Ranch bioassessment scores**



### 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 ADC (2003) but the results were unavailable. The creek corridor wetlands currently rate as a Category II community, as do the off-channel wetlands.

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

Function and Value Parameters From the 1999 MDT Montana Wetland Assessment Method	2004 Post-Construction Off-Channel Wetlands	2004 Post-Construction Big Timber Creek	2005 Off-Channel Wetlands	2005 Big Timber Creek
Listed/Proposed T&E Species Habitat	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)
MNHP Species Habitat	Low (0.1)	Mod (0.6)	Low (0.1)	Mod (0.6)
General Wildlife Habitat	Mod (0.7)	High (0.9)	Mod (0.7)	High (0.9)
General Fish/Aquatic Habitat	NA	Mod (0.7)	NA	Mod (0.7)
Flood Attenuation	Mod (0.5)	Mod (0.4)	Mod (0.5)	Mod (0.4)
Short and Long Term Surface Water Storage	High (0.8)	High (0.8)	High (0.8)	High (0.8)
Sediment, Nutrient, Toxicant Removal	High (1.0)	Mod (0.6)	High (1.0)	Mod (0.6)
Sediment/Shoreline Stabilization	High (1.0)	Mod (0.7)	High (1.0)	Mod (0.7)
Production Export/Food Chain Support	Mod (0.7)	Mod (0.7)	Mod (0.7)	Mod (0.7)
Groundwater Discharge/Recharge	High (1.0)	High (1.0)	High (1.0)	High (1.0)
Uniqueness	Mod (0.4)	Mod (0.4)	Mod (0.4)	Mod (0.4)
Recreation/Education Potential	Mod (0.7)	Mod (0.7)	Mod (0.7)	Mod (0.7)
Actual Points/Possible Points	7.2/11	7.8/12	7.2/11	7.8/12.00
% of Possible Score Achieved	65%	65%	65%	65%
Overall Category	II	II	II	II
<b>Total Acreage of Assessed Wetlands and Open Water within Easement (ac)</b>	<b>2.19</b>	<b>2.65</b>	<b>2.75</b>	<b>2.93</b>
<b>Baseline Acreage of Assessed Wetlands and Open Water within Easement (ac)</b>	<b>0.72</b>	<b>2.17 (ow)</b>	<b>0.72</b>	<b>2.17 (ow)</b>
<b>Functional Units (acreage x actual points) (fu)</b>	<b>15.7</b>	<b>20.67</b>	<b>19.8</b>	<b>22.85</b>
<b>Net Acreage Gain (ac)</b>	<b>1.47 (1.2 wetland, 0.27 ow)</b>	<b>0.48 (wetland)</b>	<b>2.03 (1.79 wetland, 0.24 ow)</b>	<b>0.76 (wetland)</b>
<b>Net Functional Unit Gain<sup>1</sup></b>	<b>Presently unavailable</b>	<b>Presently unavailable</b>	<b>4.1 (since 2004)</b>	<b>2.18 (since 2004)</b>
<b>Total Functional Unit Gain<sup>1</sup></b>	<b>Presently unavailable</b>		<b>6.28 (since 2004)</b>	

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

### 3.8 Photographs

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

### 3.9 Maintenance Needs/Recommendations

The site supports three State of Montana-listed noxious weeds (Canada thistle, houndstongue, and spotted knapweed) and one weed on the Stillwater County list (black henbane). Canada thistle, hounds tongue and black henbane were observed within the off-channel wetland assessment area. Canada thistle and a few spotted knapweed plants were observed along Big Timber Creek. As mentioned earlier, the henbane and Canada thistle appeared to have been sprayed in 2005. Mowing was also observed on the upland buffer areas most likely to control Canada thistle and annual weeds. This is an effective method of controlling annual or non-aggressive weed species but is not an effective control measure for Canada thistle. Chemical or biological control measures are recommended for the Canada thistle, houndstongue, and spotted knapweed and henbane.

The water level control structures within the off-channel wetlands were functioning and in good working order at the time of the August monitoring. Changes in the creek migration resulting in bank loss, gravel bars and new deposition areas will continue to be monitored to track riparian wetland gains or losses, and negative or undesirable changes in vegetation.

### 3.10 Current Credit Summary

MDT anticipated creation and restoration of this site to provide 5.5 acres of credit within a 15.5 acre conservation easement. A summary table from the COE of potential wetland credits is provided in **Appendix G** (COE 2002 letter). The COE allows a 1:1 ratio for creation and restoration for Big Timber Creek and the off-channel wetlands as well as a 4:1 ratio for a buffer zone. **Table 5** outlines the target wetland credits and ratios from the COE (2002) and the net acres delineated during the 2005 wetland monitoring.

In 2005, the new off-channel wetland/open water acreage is 2.03 acres (2.51 acres total wetland + 0.24 acre open water – 0.72 acre of pre-existing wetlands = 2.03 acres). The open water decreased slightly in 2005 due to the increase in cover of cattails (*Typha latifolia*). The Big Timber Creek new wetland acreage is 0.76 acres which includes 0.53 acres of riparian wetland and 0.23 acres of emergent wetlands. The Big Timber Creek channel itself is not included in acreage totals.

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

Wetland Mitigation	Current Net Acres	Ratio	2005 Credit Acres	Target Credit Acres	Comments
<b>Off-channel</b> <sup>1</sup> Creation and restoration wetlands, open water	2.03	1:1	2.03	2.02	
<b>Subtotal</b>	<b>2.03</b>		<b>2.03</b>	<b>2.02</b>	
<b>Big Timber Creek</b> <sup>2</sup> Riparian wetland restoration	0.53	1:1	0.53	2.00	Riparian wetland community represented by Type 2.
Emergent wetland restoration	0.23	1:1	0.23	0.58	Emergent wetland restoration represented by Type 3
<b>Subtotal</b>	<b>0.76</b>		<b>0.76</b>	<b>2.58</b>	
<b>Upland and wetland buffer</b>	3.56	4:1	0.89	0.89	Credited only if livestock grazing is prohibited on wetland sites.
<b>Subtotal</b>	<b>3.56</b>		<b>0.89</b>	<b>0.89</b>	
<b>GRAND TOTAL</b>	<b>6.35</b>		<b>3.68</b>	<b>5.49</b>	<b>67% of goal</b>

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

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

In 2005 the mitigation efforts have so far resulted in a total of 2.55 wetland credit acres, 0.24 shallow open water credit acres, and 0.89 credit acre of wetland/upland buffers. The grand total for the Cloud Ranch to date is 3.68 credit acres or 67 percent of the goal.



#### 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.
- US Army Corps of Engineers (COE). 1987. *Corps of Engineers Wetlands Delineation Manual*. US Army Corps. Washington, DC.
- USDA Natural Resource Conservation Service. 1981. *Soil Survey of Sweetgrass County, Montana*.
- Western Regional Climate Center (WRCC). 2005. Big Timber Station:  
<http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?mtcolu>.

## **Appendix A**

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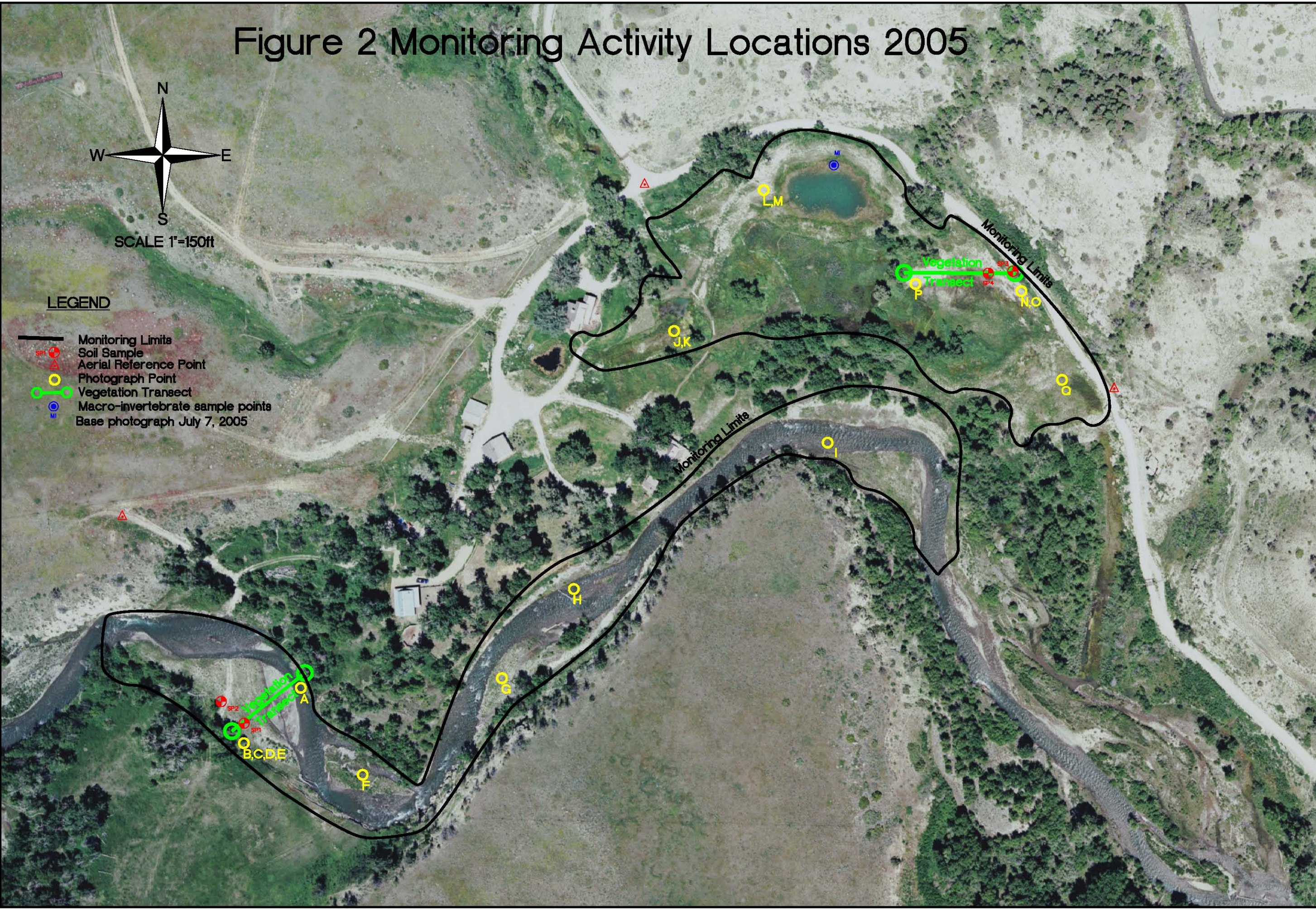
### **FIGURES 2 - 3**

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*MDT Wetland Mitigation Monitoring  
Cloud Ranch  
Big Timber, Montana*



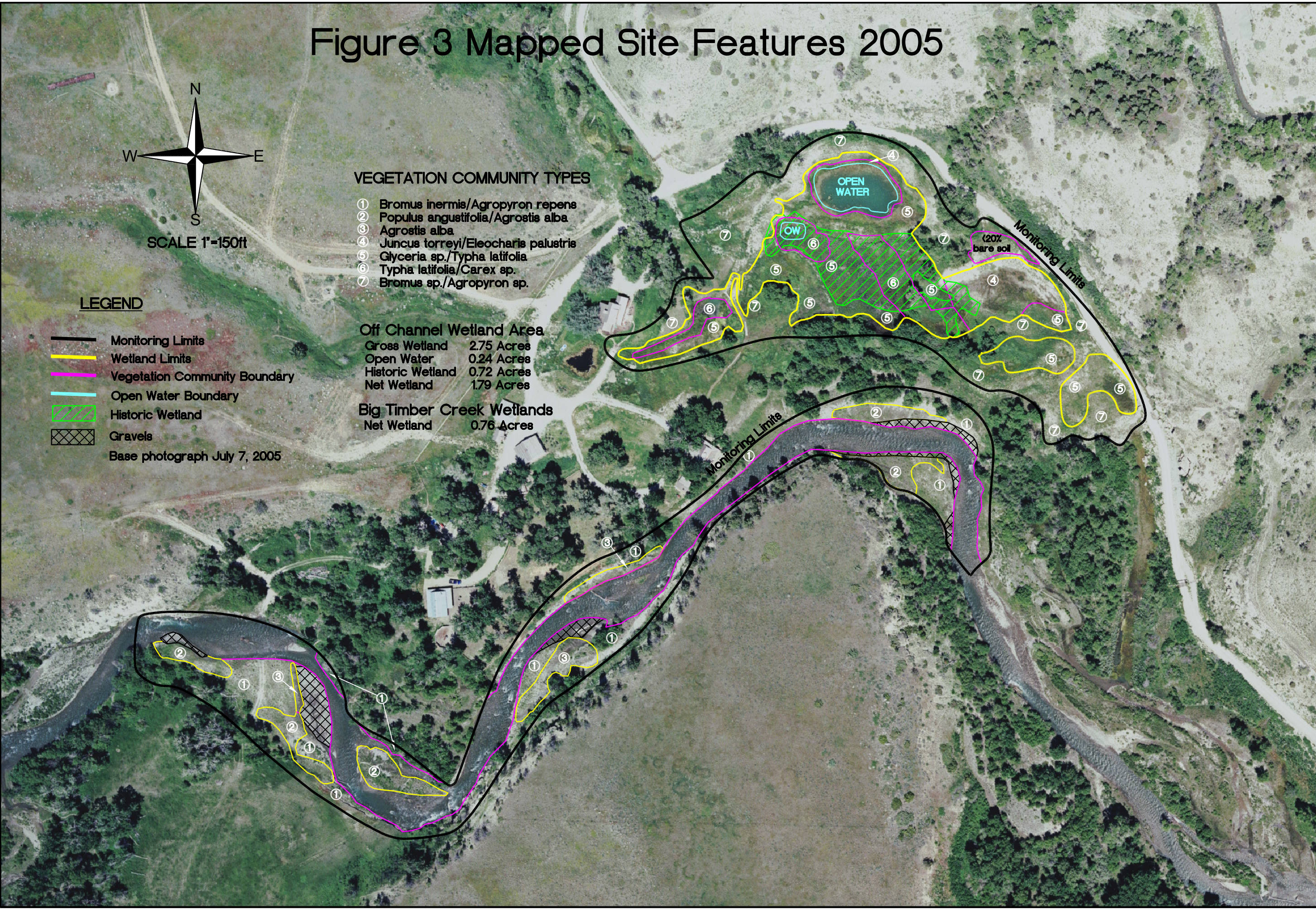
Figure 2 Monitoring Activity Locations 2005



PROJECT NAME		MDT Cloud Ranch Wetland Mitigation	
DRAWING TITLE		Monitoring Activity Locations 2005	
PROJECT NO:	B43054.0504	DRAWN:	SH
LOCATION:	Big Timber, MT	PROJECT MGR:	JB
SCALE:	1"=150'	CHECKED:	CH
FILE NAME:	2005 Base.dwg	APPVD:	JB
LAND & WATER CONSULTING		A division of	
P.O. BOX 1122		Bozeman, MT 59711	
SHEET		2	
REV 01		Nov/12/2005	



Figure 3 Mapped Site Features 2005



PROJECT NAME		MDT Cloud Ranch Wetland Mitigation	
DRAWING TITLE		Mapped Site Features 2005	
PROJ NO:	B43054.0504	DRAWN:	SH
LOCATION:	Big Timber, MT	PROJ MGR:	JB
SCALE:	1"=150'	CHECKED:	CH
FILE NAME:	2005 Base.dwg	APPVD:	JB
LAND & WATER CONSULTING		A Division of <b>RSJ</b>	
P.O. BOX 1122		Bozeman, MT 59711	
SHEET		3 OF	
REV 01		Nov/16/2005	



## **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*

*Cloud Ranch*

*Big Timber, Montana*

## LWC / MDT WETLAND MITIGATION SITE MONITORING FORM

Project Name: Cloud Ranch Project Number: B43054-0504 Assessment  
Date: 8/4/05  
Location: 12 mi north of Big Timber MDT District: Billings District #13 Milepost:  
Legal description: T 3N R13E Section 36 Time of Day: 10 AM  
Weather Conditions: clear/warm/calm Person(s) conducting the assessment: CH/LWC  
Initial Evaluation Date: 8/4/05 Visit #: 1 Monitoring Year: 2005  
Size of evaluation area: 5.5 acres Land use surrounding wetland:  
pasture/residential

### HYDROLOGY

**Surface Water** Source: Big Timber Creek and an unnamed spring creek  
Inundation: Present X Absent        Average depths: 0.5 ft Range of depths: 0 -  
1 ft  
Assessment area under inundation: 75 %  
Depth at emergent vegetation-open water boundary: 0.5 ft  
If assessment area is not inundated are the soils saturated w/in 12" of surface: Yes X No         
Other evidence of hydrology on site (drift lines, erosion, stained vegetation etc.): water marks,  
drift lines

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

### Groundwater

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

Well #	Depth	Well #	Depth	Well #	Depth

### Additional Activities Checklist:

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

**COMMENTS/PROBLEMS:** Heavy rain storms the night before the monitoring is, in part,  
responsible for the excessive surface water and saturated soils. Surface water was observed in  
approximately 75 percent of the off-channel assessment area during the August monitoring trip.

\_\_\_\_\_



## VEGETATION COMMUNITIES

Community No: 1 Community Title (main species): *Bromus inermis*/*Agropyron repens*  
***Big Timber Creek Channel Restoration***

Dominant Species	% Cover	Dominant Species	% Cover
<i>Bromus inermis</i>	20	<i>Achillea millefolium</i>	5
<i>Agropyron repens</i>	15	<i>Solidago canadensis</i>	5
<i>Populus angustifolia</i>	15	<i>Trifolium fragiferum</i>	5
<i>Phleum pratensis</i>	5	<i>Agropyron riparium</i>	5
<i>Melilotus officinalis</i>	5	<i>Bromus marginatus</i>	5
<i>Agrostis alba</i>	5	Cobbles/bare soil	5

**COMMENTS/PROBLEMS:** Big Timber creek has migrated within the project reach during the past year. This was evidenced by large, unvegetated exposed gravel/cobble bars within the transect, as well as up-stream and down-gradient. Several new, small channels were noted across side and point bars. Approximately 10 to 15 ft of vegetated bank was lost within the monitoring transect. Several points bars noted in 2004 were gone or significantly smaller. Several dead willow cuttings that were transplanted along the edge of bars or inside curves were noted in flowing water.

Community No: 2 Community Title (main species): *Populus angustifolia*/*Agrosts alba*  
***Big Timber Creek Channel Restoration***

Dominant Species	% Cover	Dominant Species	% Cover
<i>Populus angustifolia</i> (seedlings)	20	<i>Mentha arvensis</i>	<5
<i>Agrostia alba</i>	20	<i>Elymus canadensis</i>	5
<i>Deschampsia cespitosa</i>	15	<i>Cirsium arvense</i>	<5
<i>Juncus torreyi</i>	10	<i>Alopecurus pratensis</i>	5
<i>Poa palustris</i>	10	<i>Glyceria grandis</i>	5
<i>Juncus ensifolius</i>	5	Cobbles/rock	20
<i>Juncus tenuis</i>	5		

**COMMENTS/PROBLEMS:** Riverine wetland vegetation is dependent upon creek flows and periodic flooding. Weather (precipitation and flow events) influence the percent cover, species diversity and rate of wetland development along the creek. Some of the wetland species noted in 2004 along the waters edge or in backwater areas (such as *Veronica americana*) were not observed in 2005. Most likely plants were washed as a result of high flows and subsequent bank loss. Most of the point or side bars have lost several feet of vegetated bank.

Community No.: 3 Community Title (main species): Agrostis alba  
**Big Timber Creek Channel Restoration**

Dominant Species	% Cover	Dominant Species	% Cover
<i>Agrostis alba</i>	30	<i>Salix exigua (cuttings)</i>	5
<i>Alopecurus pratensis</i>	10	<i>Poa palustris</i>	5
<i>Juncus torreyi</i>	10	<i>Epibolium ciliatum</i>	5
<i>Deschampsia cespitosa</i>	10	<i>Elymus canadensis</i>	5
<i>Glyceria elata</i>	5	<i>Rock/cobbles/gravels</i>	5
<i>Mentha arvensis</i>	5		
<i>Phalaris arundinacea</i>	5		

**COMMENTS/PROBLEMS:** This community type lacks the woody component noted in CT 1 and 2.

**Additional Activities Checklist:**

X Record and map vegetative communities on air photo

**VEGETATION COMMUNITIES**

Community No: 4 Community Title (main species): Juncus torreyi/Eleocharis palustris  
**Off-channel wetlands**

Dominant Species	% Cover	Dominant Species	% Cover
<i>Juncus torreyi</i>	20	<i>Glyceria sp.</i>	5
<i>Eleocharis palustris</i>	15	<i>Juncus longifolia</i>	5
<i>Typha latifolia</i>	10	<i>Carex utriculata</i>	5
<i>Scirpus acutus</i>	10	<i>Carex nebrascensis</i>	5
<i>Agrostis alba</i>	10	<i>Poa palustris</i>	5
<i>Juncus mertensianus</i>	5	<i>Alopecurus aequalis</i>	5

**COMMENTS/PROBLEMS:** Approximately 95% of this CT was inundated.

Community No: 5 Community Title (main species): Glyceria sp./Typha latifolia  
**Off-channel wetlands**

Dominant Species	% Cover	Dominant Species	% Cover
<i>Glyceria grandis</i>	20	<i>Juncus mertensianus</i>	5
<i>Glyceria elata</i>	10	<i>Scirpus microptera</i>	5
<i>Typha latifolia</i>	15	<i>Juncus balticus</i>	5
<i>Juncus torreyi</i>	10	<i>Carex vulpinoides</i>	<5
<i>Agrostia alba</i>	10	<i>Carex nebrascensis</i>	<5
<i>Calamagrostis canadensis</i>	5	<i>Eleocharis palustris</i>	<5
<i>Deschampsia cespitosa</i>	5		

**COMMENTS/PROBLEMS:** This community type was difficult to determine in 2004. In 2005, species which appear to occupy the majority of the aerial cover include *Glyceria species* and *Typha latifolia*. In many places the co-dominance was difficult to discern between *Glyceria species*, *Juncus torreyi* and *Agrostis alba*. This is a diverse community type with a varying range of co-dominant species.

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Community No.: 6 Community Title (main species): *Typha latifolia*/*Carex sp.*  
***Off-channel wetlands***

Dominant Species	% Cover	Dominant Species	% Cover
<i>Typha latifolia</i>	30	<i>Scirpus microcarpus</i>	5
<i>Carex utriculata</i>	10	<i>Mentha arvensis</i>	5
<i>Carex aquatilis</i>	10	<i>Scirpus acutus</i>	5
<i>Glyceria grandis</i>	10	<i>Carex languinosa</i>	5
<i>Beckmannia syzigachne</i>	5	<i>Carex vulpinoidea</i>	5
<i>Scirpus validus</i>	5	<i>Scirpus pallidus</i>	<5

**COMMENTS/PROBLEMS:** This community type was found along the unnamed spring creek channel, or in areas where surface water persisted.

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Community No.: 7 Community Title (main species): *Bromus sp.*/*Agropyron sp.*

Dominant Species	% Cover	Dominant Species	% Cover
<i>Bromus inermis</i>	20	<i>Phleum pratensis</i>	10
<i>Bromus marginatus</i>	10	<i>Dactylis glomerata</i>	10
<i>Agropyron riparium</i>	15	<i>Populus angustifolia</i> (scattered mature)	5
<i>Agropyron repens</i>	10	<i>Agrostis alba</i>	5
<i>Agropyron trachycaulum</i>	10	<i>Cirsium arvensis</i>	5

**COMMENTS/PROBLEMS:** This buffer area was mowed in 2004 and also in 2005.

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**Additional Activities Checklist:**

X Record and map vegetative communities on air photo

## Comprehensive Vegetation List

Species	Vegetation Community Number(s)	Species	Vegetation Community Number(s)
<i>Achillea millefolium</i>	1	<i>Juncus longistylis</i>	4
<i>Agropyron repens</i>	1, 7	<i>Juncus mertensianus</i>	4, 5
<i>Agropyron riparium</i>	1, 7	<i>Juncus tenuis</i>	5
<i>Agropyron smithii</i>	7	<i>Juncus torreyi</i>	2, 3, 4, 5
<i>Agropyron trachycaulum</i>	7	<i>Melilotus officinalis</i>	1
<i>Agrostis alba</i>	1, 2, 3, 4, 5, 7	<i>Mentha arvensis</i>	2, 3, 6
<i>Alopecurus aequalis</i>	4	<i>Mimulus guttatus</i>	2
<i>Alopecurus arundinaceus</i>	3	<i>Phalaris arundinacea</i>	3
<i>Alopecurus pratensis</i>	2, 3	<i>Phleum pratense</i>	1
<i>Ambrosia trifida</i>	1	<i>Populus angustifolia</i>	1, 2, 3, 7
<i>Beckmannia syzigachne</i>	3, 4, 6	<i>Poa palustris</i>	2, 3, 4, 5
<i>Betula occidentalis</i>	1	<i>Poa pratensis</i>	1, 7
<i>Bromus inermis</i>	1, 7	<i>Prunus virginiana</i>	7
<i>Bromus marginatus</i>	7	<i>Puccinellia distans</i>	2
<i>Bromus japonicus</i>	7	<i>Rumex crispus</i>	2
<i>Calamagrostis canadensis</i>	5	<i>Salix exigua</i>	2, 3
<i>Carex aquatilis</i>	6	<i>Scirpus acutus</i>	4, 6
<i>Carex languinosa</i>	6	<i>Scirpus microcarpus</i>	6
<i>Carex nebrascensis</i>	4, 5	<i>Scirpus validus</i>	4, 6
<i>Carex utriculata</i>	4, 6	<b><i>Solidago canadensis</i></b>	1
<b><i>Carex vulpinoides</i></b>	6	<i>Solidago occidentalis</i>	1
<b><i>Centaurea maculosa</i></b>	1	<i>Spartina pectinata</i>	4
<i>Chenopodium sp</i>	1	<i>Symphoricarpos albus</i>	1
<i>Cirsium arvense</i>	1, 5, 7	<b><i>Trifolium fragiferum</i></b>	<b>1</b>
<i>Crepis runinata</i>	1	<i>Typha latifolia</i>	4, 5, 6
<i>Cynoslossum officinale</i>	5, 7	<i>Veronica americana</i>	2
<b><i>Dactylis glomerata</i></b>	7	<i>Verbascum thapsus</i>	1, 7
<i>Deschampsia cespitosa</i>	2, 3, 5		
<i>Eleocharis palustris</i>	3, 4, 5		
<i>Elymus canadensis</i>	2, 3		
<i>Epilobium ciliatum</i>	3		
<i>Festuca pratensis</i>	7		
<i>Glyceria elata</i>	3, 4, 5		
<i>Glyceria grandis</i>	4, 5, 6		
<i>Glycyrrhiza lepidota</i>	1		
<i>Helianthus annuus</i>	1		
<i>Hyoscyamus niger</i>	7		
<i>Juncus balticus</i>	5		
<b><i>Juncus ensifolius</i></b>	5		
		<sup>1</sup> <b>Bolded</b> species indicate those documented within the analysis area for the first time in 2005.	

## COMMENTS/PROBLEMS:

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### PLANTED WOODY VEGETATION SURVIVAL

Species	Number Originally Planted	Number Observed	Mortality Causes
<p><i>Salix exigua</i> cuttings; several hundred were inserted into the point bars and side bars along Big Timber Creek.</p> <p>A general assessment of live cuttings were noted starting at transect 1 and continued up-stream.</p> <p>First bar: ~ 20% survival. Second bar. 40% survival of the willow cuttings. Third bar. No cuttings observed here. Fourth bar. Remaining cuttings were dead. Fifth bar. 30% willow cuttings survival. Sixth bar. 50% willow cuttings survival.</p>	2,500	Estimated overall survival of the willow cuttings along Big Timber creek is approximately 25 to 30%.	It would appear that along the side bars, many of the cuttings were damaged during high flows or were planted too close to the edge of the water. Channel migration after installation affected cutting's survival. Many of the dead cuttings were in standing water (due to channel migration) during the August monitoring. The willows that survived were planted further away from the edge of water or in backwater areas.
<p><i>Populus angustifolia</i> transplanted from 9 inch ^3 pots. In addition to the transplanted seedlings, many root suckers from adjacent cottonwood stands, were also noted.</p> <p>First bar: Numerous seedlings and root suckers (6 inches to 18 inches tall) – only observed a few dead cottonwoods, estimate 90% survival. Second bar. 90% survival Third bar. No cottonwoods noted here Fourth bar. 35% survival. Fifth bar. 50% survival Sixth bar. 50% survival</p>	1,310	Estimated overall survival of the transplanted seedlings along Big Timber creek is approximately 60 to 65%.	Cottonwood seedlings appear to be doing well. Very few dead or declining seedlings were noted along the channel.
<i>Betula occidentalis</i> were also transplanted from 10 cubic inch pots.	392	None were observed in 2005.	Will continue to look for plants in 2006.

### COMMENTS/PROBLEMS:

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# WILDLIFE

## BIRDS

(Attach Bird Survey Field Forms)

Were man made nesting structures installed? Yes\_\_\_\_ No\_\_\_\_Type:\_\_\_ How many?\_\_\_\_\_ Are the nesting structures being utilized? Yes\_\_\_\_ No\_\_\_\_ Do the nesting structures need repairs? Yes\_\_\_\_ No\_\_\_\_

## MAMMALS AND HERPTILES

[illegible]

### Additional Activities Checklist:

  X   Macroinvertebrate sampling (if required)

**COMMENTS/PROBLEMS:** \_\_Weather conditions warm (70 to 80), dry, slight winds.

This image shows a single sheet of white paper with horizontal blue ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

## PHOTOGRAPHS

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

Checklist:

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

Location	Photograph Description	Compass Reading
A	Big Timber Creek – Transect 1, west side	West
B	Big Timber Creek – Transect 1, west side up-stream	South
C	Big Timber Creek – Transect 1, west side bank loss up-stream	North
D	Big Timber Creek – Transect 1, west side	East
E	Big Timber Creek point bar, right side of channel	Southwest
F	Big Timber Creek point bar, left side of channel (riverine wetland)	North
G	Big Timber Creek - point bar, right side of channel (riverine wetland)	West
H	Big Timber Creek, side bar, left side of channel (riverine wetland)	East
I	Big Timber Creek, point bar, right side of channel (cuttings show high water mark/debris)	Southeast
J	Off-channel developing wetlands	West
K	Unnamed tributary – off channel wetlands	West
L	Embankment removal area south of pond	East
M	Off-channel wetlands and buffer around pond	Southeast
N	Transect 2 eastern side– off channel wetlands	North
O	Transect 2 western side – encroaching wetland vegetation into bare soils	Southwest
P	Transect 2 eastern side overview of upland and wetland community	Northwest
Q	Far southeast corner of the project site, communities 5 and 7	West

## COMMENTS/PROBLEMS:

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### 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 for 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)
- ☒ Photo reference points
- ☐ Groundwater monitoring well locations

**COMMENTS/PROBLEMS:** and-drawn WL boundary along one area within the Big Timber channel.

### 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\_\_X\_\_

If yes, do they need to be repaired? YES\_\_\_ NO\_\_\_

If yes, describe problems below and indicate if any actions were taken to remedy the problems.

Were man-made structures build or installed to impound water or control water flow into or out of the wetland? YES\_\_X\_\_ NO\_\_\_

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

If no, describe the problems below.

### COMMENTS/PROBLEMS:

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### MDT WETLAND MONITORING – VEGETATION TRANSECT

Site: Cloud Ranch - Big Timber Creek Date: 8/4/05 Examiner: CH/LWC Transect # 1

Approx. transect length: 195' Compass Direction from Start (Upland): 44 looking east Perpendicular across bar

<b>Vegetation type :</b>	CT 1 (transitional riparian floodplain)	
Length of transect in this type:	0-12' (12')	feet
Species:	Cover:	
BROINE	20	
AGRREP	15	
PHLPRA	10	
POPANG (seedlings/root sprouts)	15	
MELOFF	5	
TRIFRA	<5	
SOLCAN	<5	
POAPRA	<5	
rock/cobbles	5	
Bar soil	10	
Litter	5	
Total Vegetative Cover:		75%

<b>Vegetation type :</b>	CT 2 (riverine wetland)	
Length of transect in this type:	12-40' (28')	feet
Species:	Cover:	
POPANG (seedlings/root sprouts)	15	
AGRALB	20	
DESCAE	10	
POAPAL	10	
EQUHYM	5	
ELYSAN	5	
(gravels, silts/sediment deposition)	30	
SALEXU	5	
AGRREP	<5	
Total Vegetative Cover:		70%

<b>Vegetation type :</b>	CT 1 (transitional riparian floodplain)	
Length of transect in this type:	40-59' (19')	feet
Species:	Cover:	
POPANG (seedlings/root sprouts)	15	
BROINE	20	
AGRREP	15	
PHLPRA	10	
MELOFF	5	
Litter	15	
Bare ground	10	
Gravels/cobbles	10	
Total Vegetative Cover:		65%

<b>Vegetation type :</b>	CT 3 (riverine wetland)	
Length of transect in this type:	59-76' (17')	feet
Species:	Cover:	
AGRALB	30	
DESCES	15	
JUNTOR	10	
POAPAL	10	
Gravels/cobbles	15	
Bare soil	10	
Litter	10	
Total Vegetative Cover:		65%

MDT WETLAND MONITORING – VEGETATION TRANSECT			
Site: <u>Cloud Ranch - Big Timber Creek</u>		Date: <u>8/4/05</u>	
Examiner: <u>CH/LWC</u>		Transect # <u>1</u>	
Approx. transect length: <u>195'</u>		Compass Direction from Start (Upland): <u>44 looking east</u>	
Perpendicular across bar			

<b>Vegetation type :</b>	Exposed gravels		
Length of transect in this type:	76-126' (50')	feet	
Species:	Cover:		
Newly exposed gravels from channel migration			
Total Vegetative Cover:		0%	

<b>Vegetation type :</b>	Open water		
Length of transect in this type:	126-156' (30')	feet	
Species:	Cover:		
Open water – creek channel			
Total Vegetative Cover:		0%	

<b>Vegetation type :</b>	CT 1 (transitional riparian floodplain)		
Length of transect in this type:	156-195' (39')	feet	
Species:	Cover:		
BROINE	30		
AGRREP	20		
AGRRIP	15		
SOLOCC	5		
SYMALB	15		
Total Vegetative Cover:		80%	

<b>Vegetation type :</b>			
Length of transect in this type:		feet	
Species:	Cover:		
Total Vegetative Cover:			

## MDT WETLAND MONITORING – VEGETATION TRANSECT

Site: Cloud Restored Wetlands Date: 8/4/05 Examiner: CH/LWC Transect # 2

Approx. transect length: 200' Compass Direction from Start (Upland): SW 75 degrees

<b>Vegetation type :</b>	CT 7 (upland)	
Length of transect in this type:	0-8'(8')	feet
Species:		Cover:
BROINE		25
AGRREP		15
AGRTRA		10
BROMAR		10
ELYSAN		5
CIRARV		5
Bare soil		30
Total Vegetative Cover:		70%

<b>Vegetation type :</b>	CT 4 (restored wetland)	
Length of transect in this type:	8-190 (182)'	feet
Species:	Cover:	
JUNTOR	15	
JUNMER	5	
TYPLAT	10	
ELEPAL	10	
SCIVAL.	10	
AGRALB	5	
CARUTR	5	
CARNEB	5	
JUNLON	5	
Shallow surface water	30	
Total Vegetative Cover:		70%

<b>Vegetation type :</b>	<b>CT 7 (upland)</b>	
<b>Length of transect in this type:</b>	<b>190-200 (10')</b>	<b>feet</b>
<b>Species:</b>	<b>Cover:</b>	
BROINE	25	
AGRREP	20	
AGRRIP	20	
CIRAVR	5	
POAPAL.	10	
Bare – saturated soil	30	
<b>Total Vegetative Cover:</b>		<b>70%</b>

<b>Vegetation type D:</b>		
Length of transect in this type:		feet
Species:		Cover:
Total Vegetative Cover:		

## MDT WETLAND MONITORING – VEGETATION TRANSECT (back of form)

## Cover Estimate

+= <1%	3 = 11-20%
1 = 1-5%	4 = 21-50%
2 = 6-10%	5 = >50%

**Indicator Class:**

+ = Obligate  
- = Facultative/Wet  
0 = Facultative

**Source:**

P = Planted  
V = Volunteer

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

Transect 1 was established perpendicular to the shoreline (or saturated perimeter). Initially, a 10-foot belt transect was used along this transect to count the number of transplanted woody species along the restored stream channel to determine percent survival/mortality. However, the point where transect crossed was not representative of the willow cuttings survival noted along the remaining portion of the restored stream channel. Because a complete inventory for woody species was not in the scope of work for this monitoring visit, an estimated percent survival or loss was recorded along the restored channel to determine an average survival.

Notes:

[illegible]

**SITE:** Cloud Ranch

Survey Time: varied

<b>Notes:</b>

**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>Cloud Ranch</u> Applicant/Owner: <u>MDT</u> Investigator: <u>CH/LWC</u>	Date: <u>8/4/05</u> County: <u>Sweetgrass</u> State: <u>MT</u>
Do Normal Circumstances exist on the site: <u>X</u> Yes <u>    </u> No Is the site significantly disturbed (Atypical Situation)? <u>    </u> Yes <u>X</u> No Is the area a potential Problem Area?: <u>    </u> Yes <u>X</u> No (If needed, explain on reverse.)	Community ID: <u>Riverine wetland</u> Transect ID: <u>1</u> Plot ID: <u>SP-1</u> At 12 ft mark on tape

**VEGETATION**

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1	DESCES	H	FACW	9			
2	POPANG (seedlings/sprouts)	T	FACW	10			
3	AGRALB	H	FACW	11			
4	EQUARV	H	FAC	12			
5	MELOFF/TRIFOLIUM	H	FACU	13			
6	POAPAL	H	FAC	14			
7	PUCDIS	H	OBL	15			
8				16			

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-). 6/7 = 86% hydrophytic vegetation

**HYDROLOGY**

<u>X</u> Recorded Data (Describe in Remarks): <u>    </u> Stream, Lake, or Tide Gauge <u>X</u> Aerial Photographs <u>    </u> Other <u>    </u> No Recorded Data Available	Wetland Hydrology Indicators: Primary Indicators: <u>    </u> Inundated <u>x</u> Saturated in Upper 12 Inches <u>    </u> Water Marks <u>    </u> Drift Lines <u>X</u> Sediment Deposits <u>    </u> Drainage Patterns in Wetlands Secondary Indicators (2 or more required): <u>    </u> Oxidized Root Channels in Upper 12 Inches <u>    </u> Water-Stained Leaves <u>    </u> Local Soil Survey Data <u>    </u> FAC-Neutral Test <u>    </u> 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: Soils saturated at the surface, noted debris and sediment from high flows.	

## SOILS

Map Unit Name			Drainage Class: <u>Well-drained</u>				
(Series and Phase): <u>Nesda-McIlwaine loams, 0-2% slopes</u>			Field Observations				
Taxonomy (Subgroup): _____			Confirm Mapped Type? <u>      </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.		
0-6	A	10YR 2/1			Loamy sand		
6-12	A	10YR 3/1	10YR 4/4	Small, faint	Sandy clay loam		
<b>Hydric Soil Indicators:</b> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <input type="checkbox"/> Histosol  <input type="checkbox"/> Histic Epipedon  <input type="checkbox"/> Sulfidic Odor  <input type="checkbox"/> Aquic Moisture Regime  <input type="checkbox"/> Reducing Conditions  <input checked="" type="checkbox"/> Gleyed or Low-Chroma Colors         </td> <td style="width: 50%; vertical-align: top;"> <input type="checkbox"/> Concretions  <input type="checkbox"/> High Organic Content in surface Layer in Sandy Soils  <input type="checkbox"/> Organic Streaking in Sandy Soils  <input type="checkbox"/> Listed on Local Hydric Soils List  <input type="checkbox"/> Listed on National Hydric Soils List  <input type="checkbox"/> Other (Explain in Remarks)         </td> </tr> </table>						<input type="checkbox"/> Histosol <input type="checkbox"/> Histic Epipedon <input type="checkbox"/> Sulfidic Odor <input type="checkbox"/> Aquic Moisture Regime <input type="checkbox"/> Reducing Conditions <input checked="" type="checkbox"/> Gleyed or Low-Chroma Colors	<input type="checkbox"/> Concretions <input type="checkbox"/> High Organic Content in surface Layer in Sandy Soils <input type="checkbox"/> Organic Streaking in Sandy Soils <input type="checkbox"/> Listed on Local Hydric Soils List <input type="checkbox"/> Listed on National Hydric Soils List <input type="checkbox"/> Other (Explain in Remarks)
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Hydric soil – mottles noted at 6 inches.							

## WETLAND DETERMINATION

Hydrophytic Vegetation Present? <u>  X  </u> Yes <u>      </u> No Wetland Hydrology Present? <u>  X  </u> Yes <u>      </u> No Hydric Soils Present? <u>  X  </u> Yes <u>      </u> No	Is this Sampling Point Within a Wetland? <u>  X  </u> Yes <u>      </u> No
<b>Remarks:</b>  Wetland boundary is closer to western transect post.	

Approved by HQUSACE 2/92



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

Project/Site: <u>Cloud Ranch</u> Applicant/Owner: <u>MDT</u> Investigator: <u>CH/LB/MDT</u>	Date: <u>8/4/05</u> County: <u>Sweetgrass</u> State: <u>MT</u>
Do Normal Circumstances exist on the site: <u>X</u> Yes <u>    </u> No Is the site significantly disturbed (Atypical Situation)? <u>    </u> Yes <u>X</u> No Is the area a potential Problem Area?: <u>    </u> Yes <u>X</u> No (If needed, explain on reverse.)	Community ID: <u>Riparian floodplain</u> Transect ID: <u>1</u> Plot ID: <u>SP-2</u>

**VEGETATION**

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1	BROINE	H	NL	9			
2	AGRREP	H	FAC-	10			
3	POPANG	T	FACW	11			
4	PHLPRA	H	FACU	12			
5	MELOFF	H	FACU	13			
6				14			
7							

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

Upland vegetation dominant this higher area within the Big Timber Creek terrace. Noticed an increase in *Arctium minus*.

**HYDROLOGY**

<u>X</u> Recorded Data (Describe in Remarks): <u>    </u> Stream, Lake, or Tide Gauge <u>X</u> Aerial Photographs <u>    </u> Other <u>    </u> No Recorded Data Available	Wetland Hydrology Indicators: Primary Indicators: <u>    </u> Inundated <u>x</u> Saturated in Upper 12 Inches <u>    </u> Water Marks <u>    </u> Drift Lines <u>    </u> Sediment Deposits <u>    </u> Drainage Patterns in Wetlands Secondary Indicators (2 or more required): <u>    </u> Oxidized Root Channels in Upper 12 Inches <u>    </u> Water-Stained Leaves <u>    </u> Local Soil Survey Data <u>    </u> FAC-Neutral Test <u>    </u> 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:  Soils were saturated at the surface due to a heavy rain storm prior to monitoring. Below 4 inches, soils were moist but not saturated.	

## SOILS

Map Unit Name (Series and Phase): <u>Nesda-McIlwaine loams, 0-2% slopes</u>			Drainage Class: <u>Well-drained</u>				
Taxonomy (Subgroup): _____			Field Observations 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 – 6	A	10YR 4/1			Silty loam		
6 -12	A	10YR 4/2	7.5 YR 4/6	Small, faint	Sandy clay loam		
<b>Hydric Soil Indicators:</b> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <input type="checkbox"/> Histosol  <input type="checkbox"/> Histic Epipedon  <input type="checkbox"/> Sulfidic Odor  <input type="checkbox"/> Aquic Moisture Regime  <input type="checkbox"/> Reducing Conditions  <input checked="" type="checkbox"/> Gleyed or Low-Chroma Colors         </td> <td style="width: 50%; vertical-align: top;"> <input type="checkbox"/> Concretions  <input type="checkbox"/> High Organic Content in surface Layer in Sandy Soils  <input type="checkbox"/> Organic Streaking in Sandy Soils  <input type="checkbox"/> Listed on Local Hydric Soils List  <input type="checkbox"/> Listed on National Hydric Soils List  <input type="checkbox"/> Other (Explain in Remarks)         </td> </tr> </table>						<input type="checkbox"/> Histosol <input type="checkbox"/> Histic Epipedon <input type="checkbox"/> Sulfidic Odor <input type="checkbox"/> Aquic Moisture Regime <input type="checkbox"/> Reducing Conditions <input checked="" type="checkbox"/> Gleyed or Low-Chroma Colors	<input type="checkbox"/> Concretions <input type="checkbox"/> High Organic Content in surface Layer in Sandy Soils <input type="checkbox"/> Organic Streaking in Sandy Soils <input type="checkbox"/> Listed on Local Hydric Soils List <input type="checkbox"/> Listed on National Hydric Soils List <input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Histosol <input type="checkbox"/> Histic Epipedon <input type="checkbox"/> Sulfidic Odor <input type="checkbox"/> Aquic Moisture Regime <input type="checkbox"/> Reducing Conditions <input checked="" type="checkbox"/> Gleyed or Low-Chroma Colors	<input type="checkbox"/> Concretions <input type="checkbox"/> High Organic Content in surface Layer in Sandy Soils <input type="checkbox"/> Organic Streaking in Sandy Soils <input type="checkbox"/> Listed on Local Hydric Soils List <input type="checkbox"/> Listed on National Hydric Soils List <input type="checkbox"/> Other (Explain in Remarks)						
Low chroma and mottles.							

## WETLAND DETERMINATION

Hydrophytic Vegetation Present? <u>      </u> Yes <u>  x  </u> No Wetland Hydrology Present? <u>      </u> Yes <u>  x  </u> No Hydric Soils Present? <u>  x  </u> Yes <u>      </u> No	Is this Sampling Point Within a Wetland? <u>      </u> Yes <u>  x  </u> No
<b>Remarks:</b>  Upland terrace along Big Timber Creek. Hydric soils but hydrology and vegetation do not meet wetland criteria.	

Approved by HQUSACE 2/92

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

Project/Site: <u>Cloud Ranch</u> Applicant/Owner: <u>MDT</u> Investigator: <u>CH/LWC</u>	Date: <u>8/4/05</u> County: <u>Sweetgrass</u> State: <u>MT</u>
Do Normal Circumstances exist on the site: <u>X</u> Yes <u>    </u> No Is the site significantly disturbed (Atypical Situation)? <u>    </u> Yes <u>X</u> No Is the area a potential Problem Area?: <u>    </u> Yes <u>X</u> No (If needed, explain on reverse.)	Community ID: <u>Restored Wetland</u> Transect ID: <u>2</u> Plot ID: <u>SP-3</u> Located 7 ft west of stake

**VEGETATION**

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1	BROINE	H	NL				
2	AGRREP	H	FACU				
3	AGRRIP	H	NL				
4	AGRTRA	H	FAC				
5	BROMAR	H	NL				
6	ELYCAN	H	FAC				
7							
8							

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-). 2/6 = 33% hydrophytic vegetation

This area will likely remain a buffer area around the wetland perimeter. Improved species diversity and cover compared to 2004. Some *Cirsium arvense* still present within this buffer area.

**HYDROLOGY**

<u>X</u> Recorded Data (Describe in Remarks): <u>    </u> Stream, Lake, or Tide Gauge <u>X</u> Aerial Photographs <u>    </u> Other <u>    </u> No Recorded Data Available	Wetland Hydrology Indicators: Primary Indicators: <u>    </u> Inundated <u>X</u> Saturated in Upper 12 Inches <u>    </u> Water Marks <u>    </u> Drift Lines <u>    </u> Sediment Deposits <u>    </u> Drainage Patterns in Wetlands Secondary Indicators (2 or more required): <u>    </u> Oxidized Root Channels in Upper 12 Inches <u>    </u> Water-Stained Leaves <u>    </u> Local Soil Survey Data <u>    </u> FAC-Neutral Test <u>    </u> 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>    2    </u> (in.)	
Remarks:  Soils saturated at 2 inches due to heavy rain prior to monitoring.	

## SOILS

Map Unit Name		Drainage Class: <u>Well-drained</u>	
(Series and Phase): <u>Nesda-McIlwaine loams, 0-2% slopes</u>		Field Observations	
Taxonomy (Subgroup): _____		Confirm Mapped Type? <u>      </u> Yes <u>      </u> No	
<b>Profile Description:</b>			
Depth inches	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)
0-12	A	10 YR 4/2	
<b>Hydric Soil Indicators:</b> <div style="display: flex; justify-content: space-between;"> <div> <u>      </u> Histosol  <u>      </u> Histic Epipedon  <u>      </u> Sulfidic Odor  <u>      </u> Aquic Moisture Regime  <u>      </u> Reducing Conditions  <u>      </u> Gleyed or Low-Chroma Colors </div> <div> <u>      </u> Concretions  <u>      </u> High Organic Content in surface Layer in Sandy Soils  <u>      </u> Organic Streaking in Sandy Soils  <u>      </u> Listed on Local Hydric Soils List  <u>      </u> Listed on National Hydric Soils List  <u>      </u> Other (Explain in Remarks) </div> </div>			
Hydric soil indicators were not noted.			

## 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>      </u>	Yes	<u>  X  </u>	No	
Hydric Soils Present?	<u>      </u>	Yes	<u>  X  </u>	No	
Remarks:					
The first 10 feet of this 200 ft transect is currently an upland buffer. Species diversity and cover by desirable species has improved compared to 2004.					

Approved by HQUSACE 2/92

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

Project/Site: <u>Cloud Ranch</u> Applicant/Owner: <u>MDT</u> Investigator: <u>CH/LWC</u>	Date: <u>8/4/05</u> County: <u>Sweetgrass</u> State: <u>MT</u>
Do Normal Circumstances exist on the site: <u>X</u> Yes <u>    </u> No Is the site significantly disturbed (Atypical Situation)? <u>    </u> Yes <u>X</u> No Is the area a potential Problem Area?: <u>    </u> Yes <u>X</u> No (If needed, explain on reverse.)	Community ID: <u>Restored wetland</u> Transect ID: <u>2</u> Plot ID: <u>SP-4</u>

**VEGETATION**

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1	JUNTOR	H	FACW	9			
2	JUNMER	H	OBL	10			
3	ELEPAL	H	OBL	11			
4	TYPLAT	H	OBL	12			
5	AGRALB	H	FACW	13			
6	GLYGRA	H	FACW+	14			
7	CARNEB	H	OBL	15			
8	SCI sp.	H	OBL	16			
Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-). <u>8/8 = 100% hydrophytic vegetation</u>							
Diverse wetland vegetation.							

**HYDROLOGY**

<u>X</u> Recorded Data (Describe in Remarks): <u>    </u> Stream, Lake, or Tide Gauge <u>X</u> Aerial Photographs <u>    </u> Other <u>    </u> No Recorded Data Available	Wetland Hydrology Indicators: Primary Indicators: <u>X</u> Inundated <u>X</u> Saturated in Upper 12 Inches <u>X</u> Water Marks <u>    </u> Drift Lines <u>    </u> Sediment Deposits <u>    </u> Drainage Patterns in Wetlands Secondary Indicators (2 or more required): <u>    </u> Oxidized Root Channels in Upper 12 Inches <u>    </u> Water-Stained Leaves <u>    </u> Local Soil Survey Data <u>    </u> FAC-Neutral Test <u>    </u> Other (Explain in Remarks)
Field Observations:  Depth of Surface Water: <u>2-4</u> (in.)  Depth to Free Water in Pit: <u>---</u> (in.)  Depth to Saturated Soil: <u>0</u> (in.)	
Remarks:  Approximately 95% of this wetland was inundated.	

## SOILS

Map Unit Name		Drainage Class: <u>Well-drained</u>	
(Series and Phase): <u>Nesda-McIlwaine loams, 0-2% slopes</u>		Field Observations	
Taxonomy (Subgroup): _____		Confirm Mapped Type? <input type="checkbox"/> Yes <input type="checkbox"/> No	

Profile Description:					
Depth inches	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-12	A	10YR 3/1	10YR 4/6	Faint, small	Clay loam

Hydric Soil Indicators:	
<input type="checkbox"/> Histosol <input type="checkbox"/> Histic Epipedon <input type="checkbox"/> Sulfidic Odor <input type="checkbox"/> Aquic Moisture Regime <input type="checkbox"/> Reducing Conditions <input checked="" type="checkbox"/> Gleyed or Low-Chroma Colors	<input type="checkbox"/> Concretions <input type="checkbox"/> High Organic Content in surface Layer in Sandy Soils <input type="checkbox"/> Organic Streaking in Sandy Soils <input type="checkbox"/> Listed on Local Hydric Soils List <input type="checkbox"/> Listed on National Hydric Soils List <input type="checkbox"/> Other (Explain in Remarks)
Hydric soils based on mottles and low chroma value.	

## WETLAND DETERMINATION

Hydrophytic Vegetation Present? <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	Is this Sampling Point Within a Wetland? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Remarks:  Wetland area has increased in size from 2004.	

Approved by HQUSACE 2/92

1. Project Name: Cloud Ranch 2. Project #: 43054 Control #: \_\_\_\_\_

3. Evaluation Date: 8/4/2005 4. Evaluator(s): CH/LWC 5. Wetland / Site #(s): off-channel wetlands

6. Wetland Location(s) i. T: 3 N R: 13 E S: 36 T: \_\_ N R: \_\_ E S: \_\_\_\_\_

ii. Approx. Stationing / Mileposts: \_\_\_\_\_

iii. Watershed: 13 GPS Reference No. (if applies): \_\_\_\_\_

Other Location Information: \_\_\_\_\_

**8. Wetland Size (total acres):** \_\_\_\_\_ (visually estimated)  
2.03 ac (measured, e.g. GPS)

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

**9. Assessment Area (total acres):** 2.03 ac (visually estimated)  
\_\_\_\_\_ (measured, e.g. GPS)

HGM CLASS <sup>1</sup>	SYSTEM <sup>2</sup>	SUBSYSTEM <sup>2</sup>	CLASS <sup>2</sup>	WATER REGIME <sup>2</sup>	MODIFIER <sup>2</sup>	% OF AA
Depression	Palustrine	None	Emergent Wetland	Seasonally Flooded	Excavated	95
Riverine	Riverine	Upper Perennial	Unconsolidated Bottom	Permanently Flooded	---	5
---	---	---	---	---	---	
---	---	---	---	---	---	

<sup>1</sup> = Smith et al. 1995. <sup>2</sup> = Cowardin et al. 1979.

**Common** **Comments:** Under modifier, as part of the creation/restoration activities, wetlands have been created by excavated and shallow dikes.

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

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

**Comments:** (types of disturbance, intensity, season, etc.)

**ii. Prominent weedy, alien, & introduced species:** Canada thistle, houndstongue, black henbane, mullein.

**iii. Briefly describe AA and surrounding land use / habitat:** this AA is for the off-channel wetlands

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

**Comments:**

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

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

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

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

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

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

#### 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 Greater-sage grouse  
 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 type="checkbox"/> High								<input type="checkbox"/> Moderate								<input checked="" type="checkbox"/> Low			
Class Cover Distribution (all vegetated classes)	<input type="checkbox"/> Even				<input type="checkbox"/> Uneven				<input type="checkbox"/> Even				<input type="checkbox"/> Uneven				<input checked="" 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)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	H	--	--
<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)	Wildlife Habitat Features Rating from 14C(ii)			
	<input type="checkbox"/> Exceptional	<input checked="" type="checkbox"/> High	<input type="checkbox"/> Moderate	<input type="checkbox"/> Low
Substantial	--	--	--	--
Moderate	--	.7 (M)	--	--
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 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.	--	--	--	--	--	--	--	--	--
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 type="checkbox"/> High	<input type="checkbox"/> Moderate	<input checked="" type="checkbox"/> Low
Native game fish	--	--	--	--
Introduced game fish	--	--	--	--
Non-game fish	--	--	--	--
No fish	--	--	--	.1 (L)

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

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

Applies only to wetlands subject to flooding via in-channel or overbank flow.

If wetlands in AA do not flooded from in-channel or overbank flow, check NA above.

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

Estimated wetland area in AA subject to periodic flooding	<input type="checkbox"/> ≥ 10 acres			<input checked="" 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>	--	--	--	--	--	.5 (M)	--	--	--
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 type="checkbox"/> >5 acre feet			<input checked="" 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	--	--	--	.8 (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.			
% cover of wetland vegetation in AA	<input checked="" type="checkbox"/> ≥ 70%		<input type="checkbox"/> < 70%		<input type="checkbox"/> ≥ 70%		<input type="checkbox"/> < 70%	
Evidence of flooding or ponding 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
AA contains <b>no or restricted outlet</b>	1 (H)	--	--	--	--	--	--	--
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 type="checkbox"/> High		<input type="checkbox"/> Moderate		<input checked="" 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 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
P/P	--	--	--	--	--	--	--	--	--	--	.7M	--	--	--	--	--	--	--
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 type="checkbox"/> common	<input type="checkbox"/> abundant	<input type="checkbox"/> rare	<input type="checkbox"/> common	<input type="checkbox"/> abundant	<input type="checkbox"/> rare	<input checked="" type="checkbox"/> common	<input type="checkbox"/> abundant
Low disturbance at AA (#12i)	--	--	--	--	--	--	--	.4M	--
Moderate disturbance at AA (#12i)	--	--	--	--	--	--	--	--	--
High disturbance at AA (#12i)	--	--	--	--	--	--	--	--	--

Comments: cottonwoods, alder and willows are found adjacent to the assessment area.

**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 checked="" type="checkbox"/> Low	<input type="checkbox"/> Moderate <input type="checkbox"/> High
Public ownership	--	--
Private ownership	.7(M)	--

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	L	0.30	1	
B. MT Natural Heritage Program Species Habitat	L	0.10	1	
C. General Wildlife Habitat	M	0.70	1	
D. General Fish/Aquatic Habitat	NA	0.00	--	
E. Flood Attenuation	M	0.50	1	
F. Short and Long Term Surface Water Storage	H	0.80	1	
G. Sediment/Nutrient/Toxicant Removal	H	1.00	1	
H. Sediment/Shoreline Stabilization	H	1.00	1	
I. Production Export/Food Chain Support	M	0.70	1	
J. Groundwater Discharge/Recharge	H	1.00	1	
K. Uniqueness	M	0.40	1	
L. Recreation/Education Potential	M	0.70	1	
<b>Totals:</b>		7.20	11.00	15
<b>Percent of Total Possible Points:</b>			<b>65%</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.)

**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**

1. Project Name: Cloud Ranch 2. Project #: 43054 Control #: \_\_\_\_\_

3. Evaluation Date: 8/4/2005 4. Evaluator(s): CH/LWC 5. Wetland / Site #(s): Big Timber Creek

6. Wetland Location(s) i. T: 3 N R: 13 E S: 36 T: \_\_ N R: \_\_ E S: \_\_\_\_\_

ii. Approx. Stationing / Mileposts: \_\_\_\_\_

iii. Watershed: 13 GPS Reference No. (if applies): \_\_\_\_\_

Other Location Information: \_\_\_\_\_

**8. Wetland Size (total acres):** \_\_\_\_\_ (visually estimated)  
0.76 (measured, e.g. GPS)

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

**9. Assessment Area (total acres):** 2.93 ac (visually estimated)  
\_\_\_\_\_ (measured, e.g. GPS)

HGM CLASS <sup>1</sup>	SYSTEM <sup>2</sup>	SUBSYSTEM <sup>2</sup>	CLASS <sup>2</sup>	WATER REGIME <sup>2</sup>	MODIFIER <sup>2</sup>	% OF AA
Riverine	Riverine	Lower Perennial	Streambed	Permanently Flooded	---	80
Riverine	Palustrine	None	Emergent Wetland	Seasonally Flooded	Excavated	20
---	---	---	---	---	---	
---	---	---	---	---	---	

<sup>1</sup> = Smith et al. 1995. <sup>2</sup> = Cowardin et al. 1979.

Common                      **Comments:**

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

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

**Comments:** (types of disturbance, intensity, season, etc.) \_\_\_\_\_

**ii. Prominent weedy, alien, & introduced species:** Canada thistle, houndstongue, black henbane, mullein, burdock.

**iii. Briefly describe AA and surrounding land use / habitat:** this AA includes Big Timber Creek and adjacent wetlands

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

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

**Comments:** As the cottonwoods and willows develop, the classes will likely change.

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

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

Primary or Critical habitat (**list species**) ☐ D ☐ S  
 Secondary habitat (**list species**) ☐ D ☐ S  
 Incidental habitat (**list species**) ☐ D ☒ S bald eagle  
 No usable habitat ☐ D ☐ S

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

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

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

#### 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 yellowstone cutthroat  
 Incidental habitat (**list species**) ☐ D ☒ S Greater-sage grouse  
 No usable habitat ☐ D ☐ S \_\_\_\_\_

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

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

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

#### 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 type="checkbox"/> High								<input type="checkbox"/> Moderate								<input checked="" type="checkbox"/> Low			
Class Cover Distribution (all vegetated classes)	<input type="checkbox"/> Even				<input type="checkbox"/> Uneven				<input type="checkbox"/> Even				<input type="checkbox"/> Uneven				<input checked="" 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)	Wildlife Habitat Features Rating from 14C(ii)			
	<input checked="" type="checkbox"/> Exceptional	<input type="checkbox"/> High	<input type="checkbox"/> Moderate	<input type="checkbox"/> Low
Substantial	--	--	--	--
Moderate	.9 (H)	--	--	--
Low	--	--	--	--

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

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

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

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

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

Duration of Surface Water in AA	<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.	--	--	--	--	--	--	--	--	--
Shading - < 50% of streambank or shoreline of AA contains riparian or wetland scrub-shrub or forested communities.	--	M	--	--	--	--	--	--	--

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 type="checkbox"/> High	<input checked="" type="checkbox"/> Moderate	<input type="checkbox"/> Low
Native game fish	--	--	.7 (M)	--
Introduced game fish	--	--	--	--
Non-game fish	--	--	--	--
No fish	--	--	--	--

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

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

Applies only to wetlands subject to flooding via in-channel or overbank flow.

If wetlands in AA do not flooded from in-channel or overbank flow, check NA above.

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

Estimated wetland area in AA subject to periodic flooding	<input type="checkbox"/> ≥ 10 acres			<input checked="" 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>	--	--	--	--	--	--	--	--	--
AA contains <b>unrestricted outlet</b>	--	--	--	--	--	.4 (M)	--	--	--

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 type="checkbox"/> >5 acre feet			<input checked="" 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 <b>≥ 5 out of 10 years</b>	--	--	--	.8 (H)	--	--	--	--	--
Wetlands in AA flood or pond <b>&lt; 5 out of 10 years</b>	--	--	--	--	--	--	--	--	--

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

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

Applies to wetlands with potential to receive excess sediments, nutrients, or toxicants through influx of surface or ground water or direct input.

If no wetlands in the AA are subject to such input, check NA above.

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

Sediment, Nutrient, and Toxicant Input Levels Within AA	AA receives or surrounding land use has potential to deliver low to moderate levels of sediments, nutrients, or compounds such that other functions are not substantially impaired. Minor sedimentation, sources of nutrients or toxicants, or signs of eutrophication present.				Waterbody on MDEQ list of waterbodies in need of TMDL development for "probable causes" related to sediment, nutrients, or toxicants or AA receives or surrounding land use has potential to deliver high levels of sediments, nutrients, or compounds such that other functions are substantially impaired. Major sedimentation, sources of nutrients or toxicants, or signs of eutrophication present.			
% cover of wetland vegetation in AA	<input type="checkbox"/> ≥ 70%		<input checked="" type="checkbox"/> < 70%		<input type="checkbox"/> ≥ 70%		<input type="checkbox"/> < 70%	
Evidence of flooding or ponding in AA	<input 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
AA contains <b>no or restricted outlet</b>	--	--	--	--	--	--	--	--
AA contains <b>unrestricted outlet</b>	--	--	.6 (M)	--	--	--	--	--

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 %	--	--	--
35-64 %	.7 (M)	--	--
< 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 type="checkbox"/> High		<input type="checkbox"/> Moderate		<input checked="" 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 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
P/P	--	--	--	--	--	--	--	--	--	--	.7M	--	--	--	--	--	--	--
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 type="checkbox"/> common	<input type="checkbox"/> abundant	<input type="checkbox"/> rare	<input type="checkbox"/> common	<input type="checkbox"/> abundant	<input type="checkbox"/> rare	<input checked="" type="checkbox"/> common	<input type="checkbox"/> abundant
<b>Low</b> disturbance at AA (#12i)	--	--	--	--	--	--	--	.4M	--
<b>Moderate</b> disturbance at AA (#12i)	--	--	--	--	--	--	--	--	--
<b>High</b> 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 checked="" type="checkbox"/> Low	<input type="checkbox"/> Moderate <input type="checkbox"/> High
<b>Public</b> ownership	--	--
<b>Private</b> ownership	.7(M)	--

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	L	0.30	1	
B. MT Natural Heritage Program Species Habitat	M	0.60	1	
C. General Wildlife Habitat	H	0.90	1	
D. General Fish/Aquatic Habitat	M	0.70	1	
E. Flood Attenuation	M	0.40	1	
F. Short and Long Term Surface Water Storage	H	0.80	1	
G. Sediment/Nutrient/Toxicant Removal	H	0.60	1	
H. Sediment/Shoreline Stabilization	M	0.70	1	
I. Production Export/Food Chain Support	M	0.70	1	
J. Groundwater Discharge/Recharge	H	1.00	1	
K. Uniqueness	M	0.40	1	
L. Recreation/Education Potential	M	0.70	1	
<b>Totals:</b>		7.80	12.00	
<b>Percent of Total Possible Points:</b>			<b>65%</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.)

**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**

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*MDT Wetland Mitigation Monitoring*  
*Cloud Ranch*  
*Big Timber, Montana*

## CLOUD RANCH WETLAND MITIGATION SITE 2005



**Photograph A: Description:** Transect #1 – Big Timber Creek. **Compass Reading:** West



**Photograph B: Description:** Transect #1 – Big Timber Creek. **Compass Reading:** South



**Photograph C: Description:** Transect #1 – Big Timber Creek bank loss. **Compass Reading:** Northwest



**Photograph D: Description:** Transect #1 – Big Timber Creek. **Compass Reading:** East



**Photograph E: Description:** Big Timber Creek point bar, right side of channel. **Compass Reading:** SW



**Photograph F: Description:** Big Timber Creek point bar left side of channel. **Compass Reading:** North



## CLOUD RANCH WETLAND MITIGATION SITE 2005



**Photograph G: Description:** Big Timber Creek – riverine wetland **Compass Reading:** West



**Photograph H: Description:** Big Timber Creek – riverine wetland.. **Compass Reading:** East



**Photograph I: Description:** Big Timber Creek – riverine wetland. **Compass Reading:** Southeast



**Photograph J: Description:** Off-channel developing wetlands. **Compass Reading:** West



**Photograph K: Description:** Unnamed tributary – off channel wetlands. **Compass Reading:** West



**Photograph L: Description:** Embankment removal area south of pond. **Compass Reading:** East



## CLOUD RANCH WETLAND MITIGATION SITE 2005



**Photograph M: Description:** Off channel wetlands and buffer around pond. **Compass Reading:** SE



**Photograph N: Description:** Transect #2 – off channel wetlands. **Compass Reading:** North



**Photograph O: Description:** Transect #2 wetlands. **Compass Reading:** Southeast



**Photograph P: Description:** Transect #2 - wetlands. **Compass Reading:** Northwest



**Photograph Q: Description:** Far SE corner of the project side, CT 5 and 7. **Compass Reading:** West

## **Appendix D**

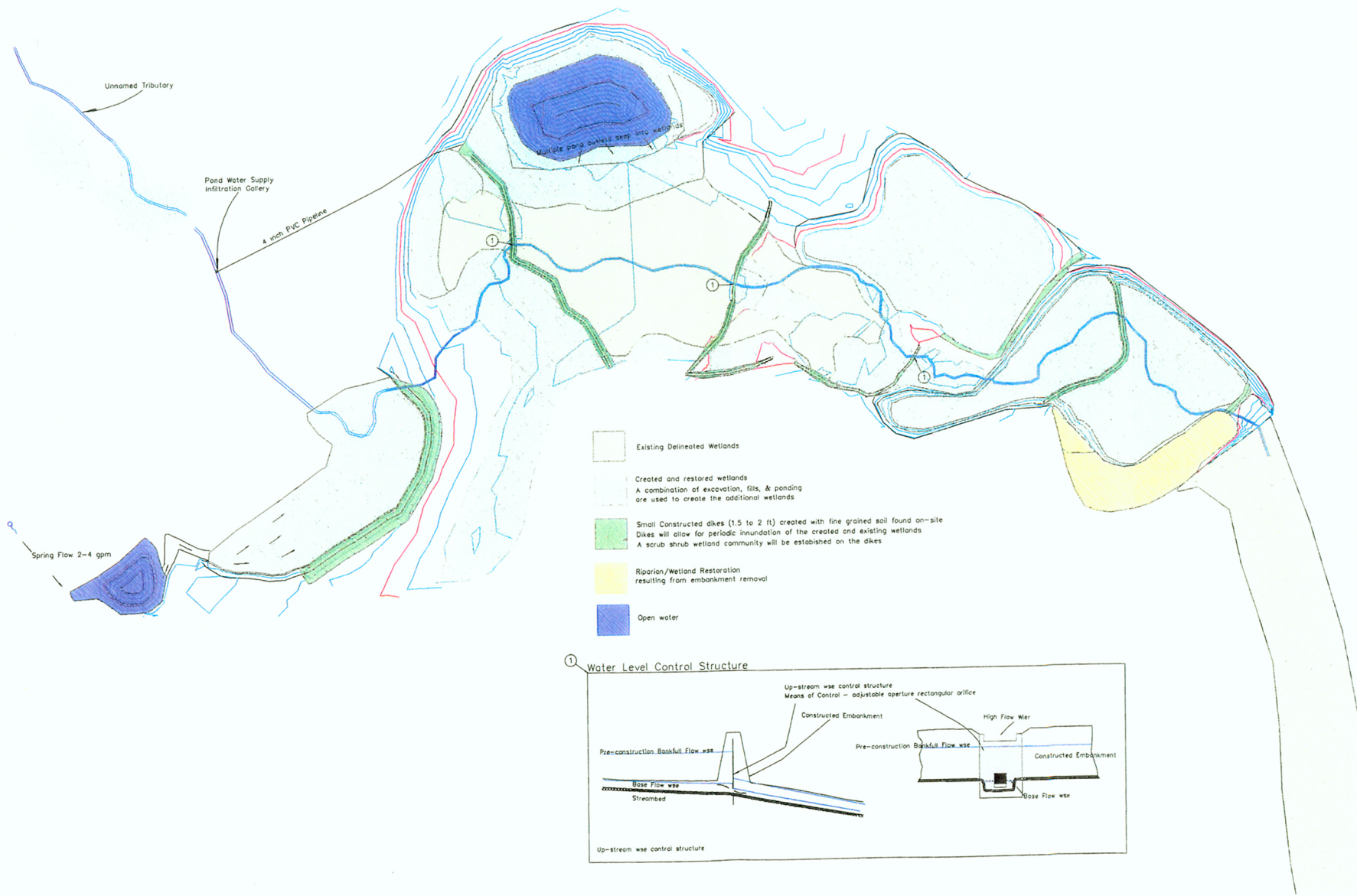
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### **WETLAND MITIGATION SITE MAP**

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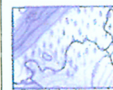
*MDT Wetland Mitigation Monitoring  
Cloud Ranch  
Big Timber, Montana*





PROJECT Cloud Ranch		REV	3/03
PROJECT NO	NEW 140	Proposed Wetland Creation Site Plan	
SCALE	1" = 80'	SHEET	1 of 1

**ADC**  
**SERVICES INC.**  
water resource consulting



## **Appendix E**

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

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*MDT Wetland Mitigation Monitoring  
Cloud Ranch  
Big Timber, Montana*

## **BIRD SURVEY PROTOCOL**

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

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

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

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

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

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

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

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





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

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

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

#### ***1. Bird Species List***

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

#### ***2. Bird Density***

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

#### ***3. Bird Behavior***

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

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

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



## **GPS Mapping and Aerial Photo Referencing Procedure**

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

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

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

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



## **Appendix F**

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

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*MDT Wetland Mitigation Monitoring  
Cloud Ranch  
Big Timber, Montana*

# **AQUATIC INVERTEBRATE SAMPLING PROTOCOL**

## **Equipment List**

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

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

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

## **Site Selection**

Select the sampling site with these considerations in mind:

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

## **Sampling**

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

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

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

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

This step is optional, but it gives you a chance to 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. 1	Musgrave – Rest. 1	Musgrave – Rest. 1
Musgrave – Rest. 2	Musgrave – Rest. 2	Musgrave – Rest. 2	Musgrave – Rest. 2	Musgrave – Rest. 2
Musgrave – Enh. 1	Musgrave – Enh. 1	Musgrave – Enh. 1	Musgrave – Enh. 1	Musgrave – Enh. 1
Musgrave – Enh. 2				
	Hoskins Landing	Hoskins Landing	Hoskins Landing	Hoskins Landing
	Peterson - 1	Peterson – 1	Peterson – 1	Peterson – 1
	Peterson – 2		Peterson – 2	Peterson – 2
	Peterson – 4	Peterson – 4	Peterson – 4	Peterson – 4
	Peterson – 5	Peterson – 5	Peterson – 5	Peterson – 5
	Jack Johnson - main	Jack Johnson - main		
	Jack Johnson - SW	Jack Johnson - SW		
	Creston	Creston	Creston	Creston
	Lawrence Park			
	Perry Ranch			Perry Ranch
	SF Smith River	SF Smith River	SF Smith River	SF Smith River
	Camp Creek	Camp Creek	Camp Creek	Camp Creek
	Kleinschmidt	Kleinschmidt – pond	Kleinschmidt – pond	Kleinschmidt – pond
		Kleinschmidt – stream	Kleinschmidt – stream	Kleinschmidt – stream
		Ringling - Galt		
			Circle	
			Cloud Ranch Pond	Cloud Ranch Pond
			Cloud Ranch Stream	
			Colloid	Colloid
			Jack Creek	Jack Creek
			Norem	Norem
				Rock Creek Ranch
				Wagner Marsh

## **Sample Processing**

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

At Rhithron's laboratory, Caton subsamplers and stereomicroscopes with 10X magnification were used to randomly select a minimum of 100 organisms, when possible, from each sample. In some cases, the entire sample contained fewer than 100 organisms; in these cases, all organisms from the sample were taken. Taxa were identified in general accordance with the taxonomic resolution standards set out in the MT DEQ Standard Operating Procedures for Sampling and Sample Analysis (Bukantis 1998). All samples were re-identified by a second taxonomist for quality assurance purposes. The identified samples have been archived at Rhithron's laboratory. Taxonomic data and organism counts were entered into an Excel 2000 spreadsheet, and metrics were calculated and scored using spreadsheet formulae.

## **Bioassessment Metrics**

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

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

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

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

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

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



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

<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
Orthocladiinae/Chironomidae	Number of individual midges in the sub-family Orthocladiinae / total number of midges in the subsample.	Decrease
% Amphipoda	Percent abundance of amphipods in the subsample	Increase
% Crustacea + % Mollusca	Percent abundance of crustaceans in the subsample plus percent abundance of molluscs in the subsample	Increase
HBI	Relative abundance of each taxon multiplied times that taxon's modified Hilsenhoff Biotic Index value. These numbers are summed over all taxa in the subsample.	Increase
% Dominant taxon	Percent abundance of the most abundant taxon in the subsample	Increase
% Collector-Gatherers	Percent abundance of organisms in the collector-gatherer functional group	Decrease
% Filterers	Percent abundance of organisms in the filterer functional group	Increase

## RESULTS

*(Note: Individual site discussions were removed from this report by Land & Water Consulting / PBS&J and are included in the Macro-Invertebrate sections of individual reports. Summary tables are provided on the following pages.)*

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

	BEAVERHEAD #1	BEAVERHEAD #3	BEAVERHEAD #5	BEAVERHEAD #6	BIG SPRING CREEK	STILLWATER	ROUNDUP	WIDGEON
Total taxa	22	9	14	18	28	17	7	19
POET	2	0	0	2	4	4	0	0
Chironomidae taxa	7	4	4	4	9	5	3	11
Crustacea + Mollusca	4	3	1	4	7	5	2	4
% Chironomidae	59.80%	7.55%	50.00%	16.67%	33.65%	9.43%	22.22%	76.47%
Orthoclaadiinae/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
Orthoclaadiinae/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.

	RIDGEWAY	MUSGRAVE REST. 1	MUSGRAVE REST. 2	MUSGRAVE ENH. 1	HOSKINS LANDING	PETERSON RANCH 1	PETERSON RANCH 2	PETERSON RANCH 4	PETERSON RANCH 5
<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%
Orthocladiinae/Chir	0.000	0.318	0.167
% Amphipoda	0.00%	3.00%	7.00%
% Crustacea + % Mollusca	62.50%	40.00%	19.00%
HBI	7.50	7.61	8.58
% Dominant taxon	56.25%	18.00%	38.00%
% Collector-Gatherers	6.25%	57.00%	40.00%
% Filterers	0.00%	0.00%	3.00%
Total taxa	1	5	5
POET	1	1	5
Chironomidae taxa	1	5	5
Crustacea + Mollusca	1	3	3
% Chironomidae	3	3	3
Orthocladiinae/Chir	1	3	1
% Amphipoda	5	5	3
% Crustacea + % Mollusca	3	3	5
HBI	3	1	1
% Dominant taxon	1	5	3
% Collector-Gatherers	1	3	1
% Filterers	3	3	3
<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>

### **Literature Cited**

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

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

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

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

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

# Taxa Listing

Project ID: MDT05LW  
RAI No.: MDT05LW021

RAI No.: MDT05LW021

Sta. Name: CLOUD

Client ID:

Date Coll.:

No. Jars: 1

STORET ID:

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
<b>Non-Insect</b>							
Lymnaeidae							
<i>Stagnicola</i> sp.	4	3.85%	Yes	Unknown		6	SC
Naididae							
Naididae	43	41.35%	Yes	Unknown		8	CG
Physidae							
Physidae	3	2.88%	Yes	Unknown		8	SC
Planorbidae							
<i>Gyraulus</i> sp.	1	0.96%	Yes	Unknown		8	SC
<b>Odonata</b>							
Coenagrionidae							
Coenagrionidae	3	2.88%	Yes	Larva	Early Instar	7	PR
<b>Ephemeroptera</b>							
Baetidae							
Baetidae	1	0.96%	Yes	Larva	Damaged	4	CG
<b>Coleoptera</b>							
Dytiscidae							
Dytiscidae	1	0.96%	Yes	Larva	Larva	5	PR
Hydrophilidae							
<i>Helophorus</i> sp.	1	0.96%	Yes	Adult		11	SH
Hydrophilidae	1	0.96%	Yes	Larva	Larva	5	PR
<b>Diptera</b>							
Ceratopogonidae							
Ceratopogoninae	6	5.77%	Yes	Larva	Larva	6	PR
Dixidae							
<i>Dixella</i> sp.	1	0.96%	Yes	Larva		4	CG
<b>Chironomidae</b>							
Chironomidae							
<i>Acricotopus</i> sp.	3	2.88%	Yes	Larva		10	CG
<i>Dicrotendipes</i> sp.	5	4.81%	Yes	Larva		8	CG
<i>Glyptotendipes</i> sp.	1	0.96%	Yes	Larva		10	SH
<i>Nanocladius</i> sp.	1	0.96%	Yes	Larva		3	CG
<i>Orthocladius</i> sp.	1	0.96%	Yes	Larva		6	CG
<i>Parakiefferiella</i> sp.	1	0.96%	Yes	Larva		6	CG
<i>Paratanytarsus</i> sp.	8	7.69%	Yes	Larva		6	CG
<i>Procladius</i> sp.	1	0.96%	Yes	Larva		9	PR
<i>Psectrocladius</i> sp.	4	3.85%	Yes	Larva		8	CG
<i>Pseudochironomus</i> sp.	11	10.58%	Yes	Larva		5	CG
<i>Tanytarsus</i> sp.	3	2.88%	Yes	Larva		6	CF
Sample Count	104						



# Metrics Report

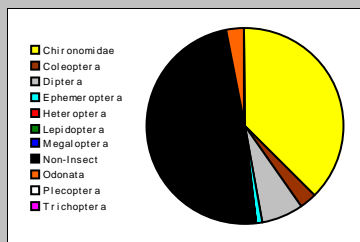
Project ID: MDT05LW  
RAI No.: MDT05LW021  
Sta. Name: CLOUD  
Client ID:  
STORET ID  
Coll. Date:

## Abundance Measures

Sample Count: 104  
Sample Abundance: 168.65 61.67% of sample used  
Total Abundance: 226.83  
Coll. Procedure:  
Sample Notes:

## Taxonomic Composition

Category	R	A	PRA
Non-Insect	4	51	49.04%
Odonata	1	3	2.88%
Ephemeroptera	1	1	0.96%
Plecoptera			
Heteroptera			
Megaloptera			
Trichoptera			
Lepidoptera			
Coleoptera	3	3	2.88%
Diptera	2	7	6.73%
Chironomidae	11	39	37.50%

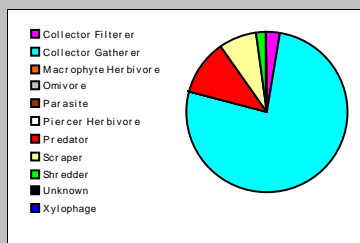


## Dominant Taxa

Category	A	PRA
Naididae	43	41.35%
Pseudochironomus	11	10.58%
Paratanytarsus	8	7.69%
Ceratopogoninae	6	5.77%
Dicrotendipes	5	4.81%
Stanicola	4	3.85%
Psectrocladius	4	3.85%
Tanytarsus	3	2.88%
Physidae	3	2.88%
Coenagrionidae	3	2.88%
Acricotopus	3	2.88%
Procladius	1	0.96%
Parakiefferiella	1	0.96%
Orthocladius	1	0.96%
Nanocladius	1	0.96%

## Functional Composition

Category	R	A	PRA
Predator	5	12	11.54%
Parasite			
Collector Gatherer	11	79	75.96%
Collector Filterer	1	3	2.88%
Macrophyte Herbivore			
Piercer Herbivore			
Xylophage			
Scraper	3	8	7.69%
Shredder	2	2	1.92%
Omnivore			
Unknown			

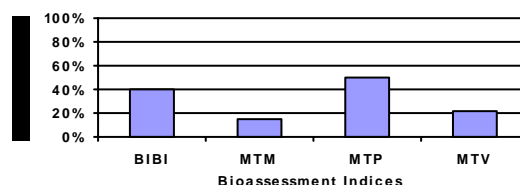


## Metric Values and Scores

Metric	Value	BIBI	MTP	MTV	MTM
<i>Composition</i>					
Taxa Richness	22	3	2		1
Non-Insect Percent	49.04%				
E Richness	1	1		0	
P Richness	0	1		0	
T Richness	0	1		0	
EPT Richness	1		0		0
EPT Percent	0.96%		0		0
Oligochaeta+Hirudinea Percent	41.35%				
Baetidae/Ephemeroptera	1.000				
Hydropsychidae/Trichoptera	0.000				
<i>Dominance</i>					
Dominant Taxon Percent	41.35%		2		1
Dominant Taxa (2) Percent	51.92%				
Dominant Taxa (3) Percent	59.62%	3			
Dominant Taxa (10) Percent	86.54%				
<i>Diversity</i>					
Shannon H (loge)	2.262				
Shannon H (log2)	3.263		3		
Margalef D	4.522				
Simpson D	0.193				
Evenness	0.076				
<i>Function</i>					
Predator Richness	5		2		
Predator Percent	11.54%	3			
Filterer Richness	1				
Filterer Percent	2.88%			3	
Collector Percent	78.85%		2		1
Scraper+Shredder Percent	9.62%		1		0
Scraper/Filterer	2.667				
Scraper/Scraper+Filterer	0.727				
<i>Habit</i>					
Burrower Richness	4				
Burrower Percent	22.12%				
Swimmer Richness	1				
Swimmer Percent	0.96%				
Clinger Richness	1	1			
Clinger Percent	2.88%				
<i>Characteristics</i>					
Cold Stenotherm Richness	0				
Cold Stenotherm Percent	0.00%				
Hemoglobin Bearer Richness	5				
Hemoglobin Bearer Percent	18.27%				
Air Breather Richness	2				
Air Breather Percent	1.92%				
<i>Voltinism</i>					
Univoltine Richness	7				
Semivoltine Richness	3	3			
Multivoltine Percent	38.46%		3		
<i>Tolerance</i>					
Sediment Tolerant Richness	2				
Sediment Tolerant Percent	4.81%				
Sediment Sensitive Richness	0				
Sediment Sensitive Percent	0.00%				
Metals Tolerance Index	4.283				
Pollution Sensitive Richness	0				
Pollution Tolerant Percent	21.15%	1			0
Hilsenhoff Biotic Index	7.107	3			1
Intolerant Percent	0.00%		0		0
Supertolerant Percent	58.65%				
CTQa	102.667				

## Bioassessment Indices

BioIndex	Description	Score	Pct	Rating
BIBI	B-IBI (Karr et al.)	20	40.00%	
MTP	Montana DEQ Plains (Bukantis 1998)	15	50.00%	Moderate
MTV	Montana Revised Valleys/Foothills (Bollman 1998)	4	22.22%	Moderate
MTM	Montana DEQ Mountains (Bukantis 1998)	3	14.29%	Severe



## **Appendix G**

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### **U.S. ARMY CORP OF ENGINEERS PRELIMINARY WETLAND CREDIT ASSESSMENT**

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*MDT Wetland Mitigation Monitoring  
Cloud Ranch  
Big Timber, Montana*

**RECEIVED U.S. ARMY CORPS OF ENGINEERS**

OCT 31 2002

HELENA REGULATORY OFFICE  
10 WEST 15TH STREET, SUITE 2200  
HELENA, MONTANA 59626**ENVIRONMENTAL**REPLY TO  
ATTENTION OF:

October 7, 2002

Helena Regulatory Office  
Phone (406) 441-1375  
Fax (406) 441-1380Subject: Corps File Number 2002-90-578  
Heminway Property Wetland Project  
Preliminary Wetland Credit AssessmentMr. Tom Coleman  
Aquatic Design & Construction, Inc.  
PO Box 582  
Livingston, Montana 59047

Dear Mr. Coleman:

This letter is a response to your request that the US Army Corps of Engineers (Corps) concur with the crediting methods used to estimate the amount of wetland mitigation credit that may be generated by a proposed wetland project. The proposed work will occur on the Heminway property adjacent to the Big Timber Creek. The project is located near the community of Big Timber in Section 36, Township 3 North, Range 13 East, Sweetgrass County, Montana.

It is your intention to develop or restore, and then protect, wetlands at the site to provide compensatory wetland mitigation credit to the Montana Department of Transportation. It is required that all creditable areas be protected by a perpetual conservation easement or other encumbrance that ensures the continued existence of the aquatic lands and suitable buffers developed at the site. The following table summarizes the general amounts and types of wetland credit that the Corps will commit to, assuming that the site is constructed and develops as presented in your August 29, 2002 letter to this office.

Type of Mitigation Effort	Total Acres	Acres of Credit
Enhancement of Existing Wetland, 3:1 ratio	none	none
Creation of wetlands resulting from grading adjacent to restored or existing wetlands, 1:1 ratio	0.61 acres created	0.61 acres credit
Wetland restoration at sites of pond removal and pond embankment removals, 1:1 ratio	1.41 acres restored	1.41 acres credit
Riparian wetland restoration along Big Timber Creek channel project, 1:1 ratio	2.0 acres restored	2.0 acres credit
Emergent wetland restoration along Big Timber Creek channel project, 1:1 ratio	0.58 acres restored	0.58 acres credit
Allowable Buffer Zone, 4:1 ratio	3.58 acres upland buffer	0.89 acres credit
<b>Summary of Potential Wetland Credit Available:</b>	--	<b>5.49 acres</b>



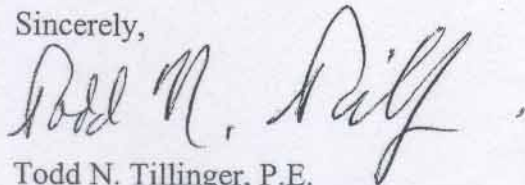
You will note that the amount of credit agreed to at this time was determined using ratios of compensation to impact rather than functional assessment. If necessary, the Corps will adjust the amount of mitigation credit acreage after the conclusion of the monitoring period.

Credit for wetland and upland buffer areas will only be awarded if livestock grazing is prohibited in those areas as a condition of the protective easement.

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

If you have any questions please contact me by phone at (406) 441-1375 or by e-mail at [todd.n.tillinger@usace.army.mil](mailto:todd.n.tillinger@usace.army.mil), and reference Corps File Number 2002-90-578.

Sincerely,

A handwritten signature in black ink, appearing to read "Todd N. Tillinger". The signature is fluid and cursive, with a large, stylized "T" and "N".

Todd N. Tillinger, P.E.  
Project Manager

CC: Larry Urban, Montana Department of Transportation - Environmental Services