# MONTANA DEPARTMENT OF TRANSPORTATION
# WETLAND MITIGATION MONITORING REPORT: YEAR 2004

*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

June 2005

Project No: B43054.00 - 0504

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LAND & WATER

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**Cover Photo:** Big Timber Creek; view is to the northwest.

# 1.0 INTRODUCTION

This report summarizes the methods and results of the first 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**).

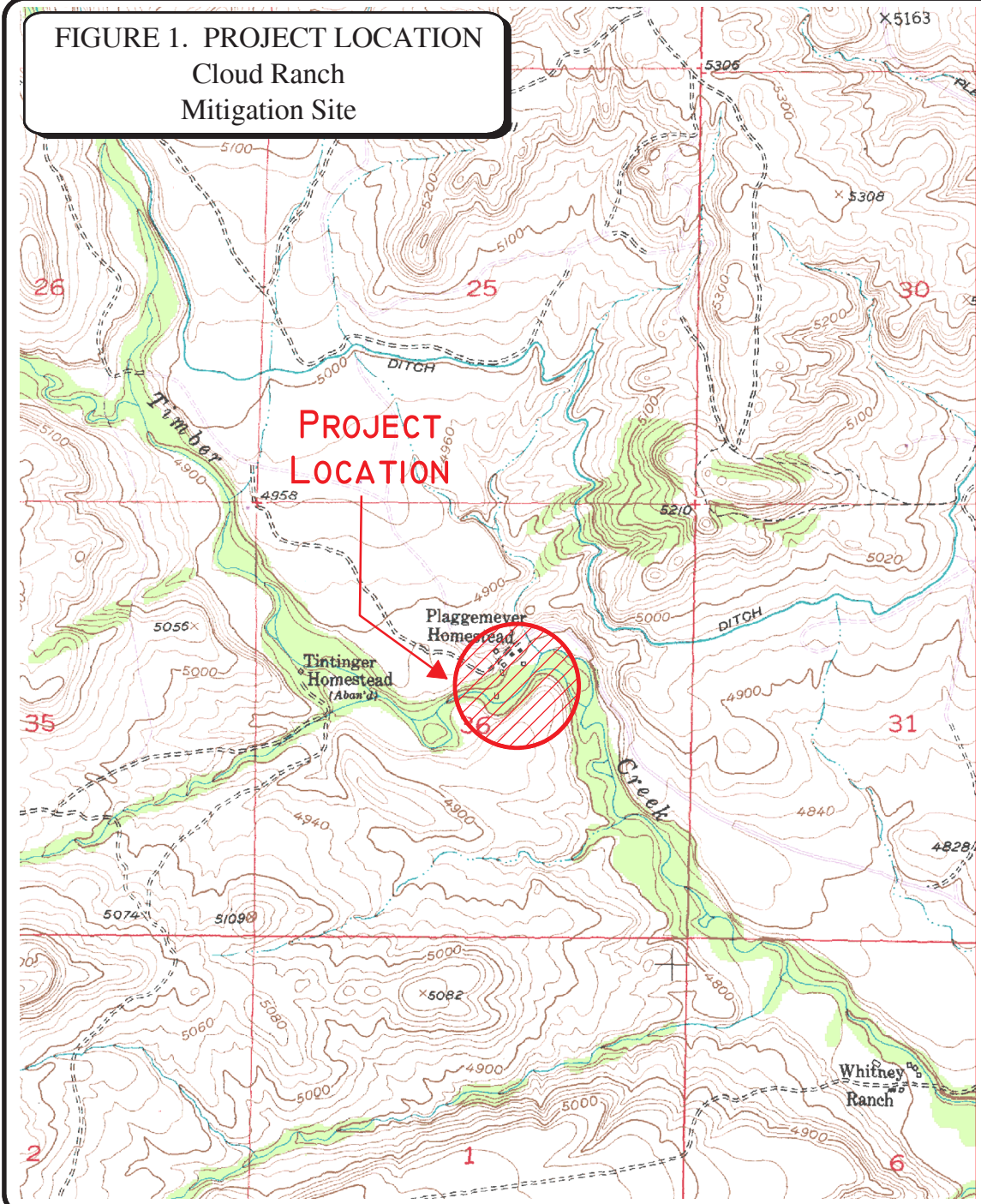
Wetland restoration and creation activities resulted in the temporary disturbance of 0.03 acre of existing wetlands. For the purposes of the report, each area (off-channel wetlands and Big Timber Creek) will be addressed separately, but the acreages will be tallied as one site.

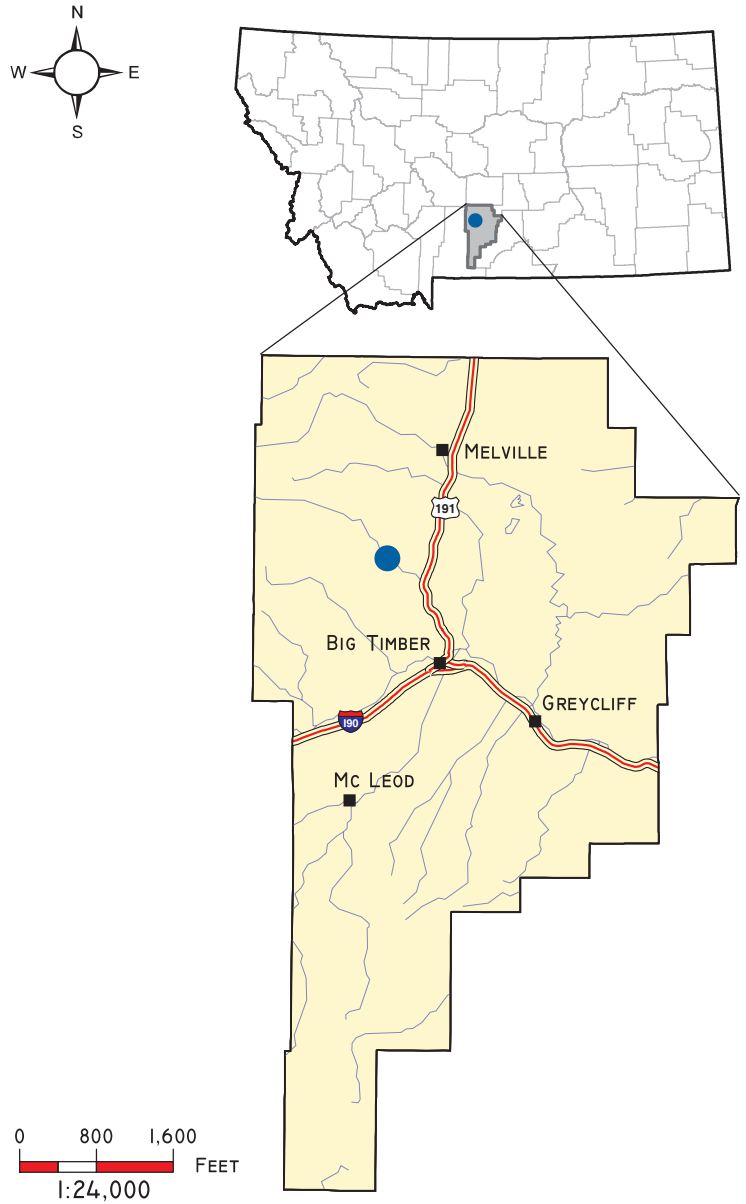
# 2.0 METHODS

## 2.1 Monitoring Dates and Activities

The project site was visited during 2004 on August 23 to collect the wetland monitoring form data **(Appendix B)**. Activities and information conducted/collected during the monitoring event included: wetland delineation; wetland/open water boundary mapping; vegetation community mapping; vegetation transects; soils data; hydrology data; bird and general wildlife use; photograph points; macroinvertebrate sampling; GPS data points; functional assessment; and maintenance needs.

# FIGURE 1. PROJECT LOCATION
Cloud Ranch
Mitigation Site




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 2004 were compared to the 1994-2003 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 2004 will be compared with future data to document vegetation changes over time. The assessment area is fenced and woody species were planted along the creek.

Two transects were established during the 2004 monitoring event to represent the range of current vegetation conditions. 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 will be 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, 1993). 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.

### 2.8 Macroinvertebrates

Two macroinvertebrate composite samples were collected during the site visit following the protocol **(Appendix F)**; one sample was collected from Big Timber Creek and one from the existing wetland pond. Samples were preserved as outlined in the sampling procedure and sent to Rhithron Associates for analysis. The approximate sampling locations are indicated on **Figure 2, Appendix A**. Results are included in **Appendix F**.

### 2.9 Functional Assessment

A functional assessment form was completed for the site using the 1999 MDT Montana Wetland Assessment Method. Field data necessary for this assessment were collected on a condensed data sheet. The remainder of the assessment was completed in the office. Pre-construction functional assessments were completed by 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.

## 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.** It is anticipated that these wetland areas will increase in size with vegetation establishment. Primary indicators observed during the August 23, 2004 monitoring visit included saturation within the upper 12 inches, water marks, and/or inundation.

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 chnnel 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" section of the existing spring creek channel were filled and revegetated with herbaceous wetland plants. During the August 23, 2004 monitoring visit approximately 70% 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 2004 (2005). The

mean annual precipitation from January to August for the period from 1894 through 2004 was 11.17 inches (WRCC 2005). While the mean annual precipitation from January to August for the year of 2004 was 8.59 inches (WRCC 2005). Therefore, the mean annual precipitation from January through August in 2004 was 77% of the normal long-term average, indicating 2004 was a drier year.

### 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 *Melilotus officinalis/Bromus inermis,* 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 will likely increase 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./Agrostia alba*, Type 6, *Typha latifolia/Carex* sp. and, Type 7, *Bromus sp./Festuca pratensis*. Dominant species within each community are also listed on the monitoring form **(Appendix B).** There are approximately 27 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 southern portions of 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 expected to encroach into the saturated/inundated soils. It is anticipated that community type 5 may also become more distinct with OBL and FACW species. Cover from species such as *Agrostis alba* (FAC*) are likely to decrease.

The overall survival of the willow cuttings along Big Timber Creek was estimated between 40 to 45 percent. The survival of transplanted cottonwood seedlings was approximately 60 to 65 percent. Details of the plant survival along the stream channel can be found in **Appendix B (**page 6).

Two Category I, state noxious weed species were present at the site: houndstongue (*Cynoglossum officinale*) and Canada thistle (*Cirsium arvense*). One weed species listed on the Sweetgrass County noxious list was also found: black henbane (*Hyoscyamus niger*). These areas were not mapped on the 2004 **Figure 3** as they do not constitute discreet vegetation communities. Canada thistle and hounds tongue were observed in the newly constructed over-

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

| Scientific Name | Region 9 (Northwest) Wetland Indicator Status [1] |
|---|---|
| *Agropyron repens* | FAC- |
| *Agropyron riparium* | **(FACU)** |
| *Agropyron trachycaulum* | FAC |
| *Agrostis alba* | FAC* |
| *Alopecurus arundinaceus* | FAC* |
| *Ambrosia trifida* | FACU+ |
| *Beckmannia syzigachne* | OBL |
| *Betula occidentalis* | FACW |
| *Bromus inermis* | **(UPL)** |
| *Bromus marginatus* | **(FACU)** |
| *Bromus japonicus* | UPL |
| *Calamagrosits canadensis* | FACW+ |
| *Carex aquatilis* | OBL |
| *Carex languinosa* | OBL |
| *Carex nebrascensis* | OBL |
| *Carex utriculata* | OBL |
| *Chenopodium sp* | **(UPL)** |
| *Cirsium arvense* | FACU+ |
| *Crepis runinata* | FACU |
| *Cynoslossum officinale* | **(UPL)** |
| *Deschampsia cespitosa* | FACW |
| *Eleocharis palustris* | OBL |
| *Elymus Canadensis* | FAC |
| *Epilobium ciliatum.* | FACW- |
| *Equisetum arvense* | FAC |
| *Glyceria elata* | FACW+ |
| *Glyceria grandis* | OBL |
| *Glycyrrhiza lepidota* | FAC+ |
| *Helianthus annuus* | FACU |
| *Hordum jubatum* | FAC+ |
| *Hyoscyamus niger* | (UPL) |
| *Juncus balticus* | FACW+ |
| *Juncus longistylis* | FACW |
| *Juncus tenuis* | FACW- |
| *Juncus torreyi* | FACW |
| *Melilotus officinalis* | FACU |
| *Mentha arvensis* | FACW- |
| *Mimulus guttatus* | OBL |
| *Phalaris arundinacea* | FACW |
| *Phleum pretense* | FACU |
| *Populus angustifolia* | FACW |
| *Poa compressa* | FACU+ |
| *Poa palustris* | FAC |
| *Poa pratensis* | FACU+ |
| *Prunus virginiana* | FACU |
| *Rumex crispus* | FAC+ |
| *Salix exigua* | OBL |
| *Scirpus acutus* | OBL |
| *Scirpus microcarpus* | OBL |
| *Scirpus validus* | OBL |
| *Solidago occidentalis* | FACW |
| *Spartina pectinata* | OBL |
| *Symphoricarpos albus* | FACU |
| *Typha latifolia* | OBL |
| *Veronica americana* | OBL |
| *Verbascum thapsus* | **(UPL)** |

[1] **Bolded** species are 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 Transect 1 data summary.***

| Monitoring Year | 2004 |
|---|---|
| Transect Length (feet) | 195 |
| # Vegetation Community Transitions along Transect | 3 |
| # Vegetation Communities along Transect | 3 |
| # Hydrophytic Vegetation Communities along Transect | 1 |
| Total Vegetative Species | 19 |
| Total Hydrophytic Species | 11 |
| Total Upland Species | 9 |
| Estimated % Total Vegetative Cover | 60 |
| % Transect Length Comprised of Hydrophytic Vegetation Communities | 25 |
| % Transect Length Comprised of Upland Vegetation Communities | 40 |
| % Transect Length Comprised of Unvegetated Open Water | 25 |
| % Transect Length Comprised of Bare Substrate | 10 |

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

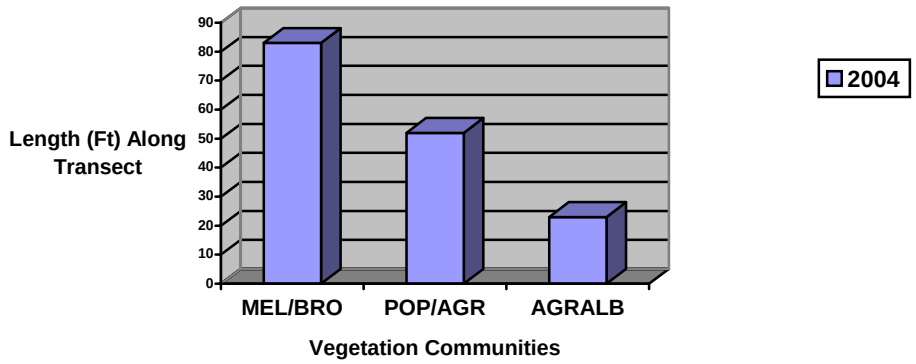
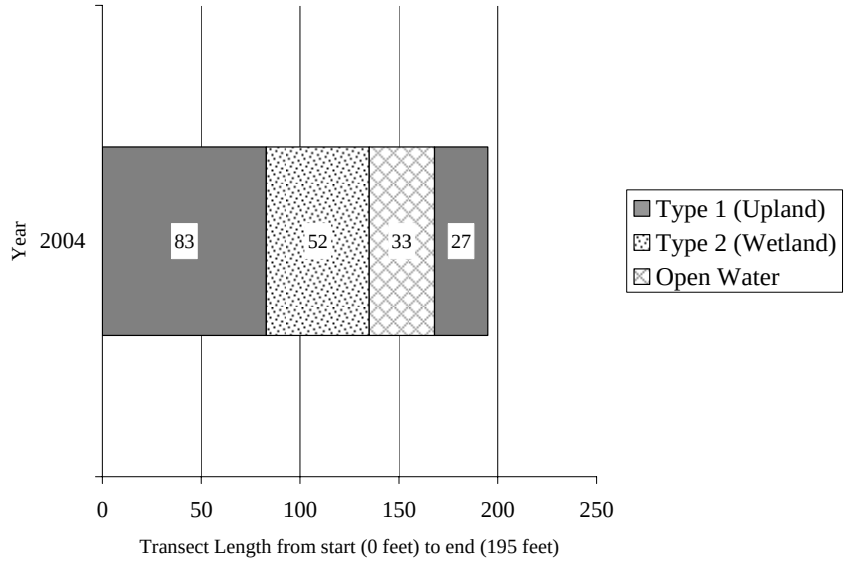



**Chart 2:** ***Transect map showing vegetation types of Transect 1 from start (0 feet) to end (195 feet) for 2004.****




*Open water is the creek channel.

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

| Monitoring Year | 2004 |
|---|---|
| Transect Length (feet) | 200 |
| # Vegetation Community Transitions along Transect | 2 |
| # Vegetation Communities along Transect | 3 |
| # Hydrophytic Vegetation Communities along Transect | 1 |
| Total Vegetative Species | 12 |
| Total Hydrophytic Species | 7 |
| Total Upland Species | 3 |
| Estimated % Total Vegetative Cover | 60 |
| % Transect Length Comprised of Hydrophytic Vegetation Communities | 54. |
| % Transect Length Comprised of Upland Vegetation Communities | 21 |
| % Transect Length Comprised of Unvegetated Open Water | 0 |
| % Transect Length Comprised of Bare Substrate | 25 |

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

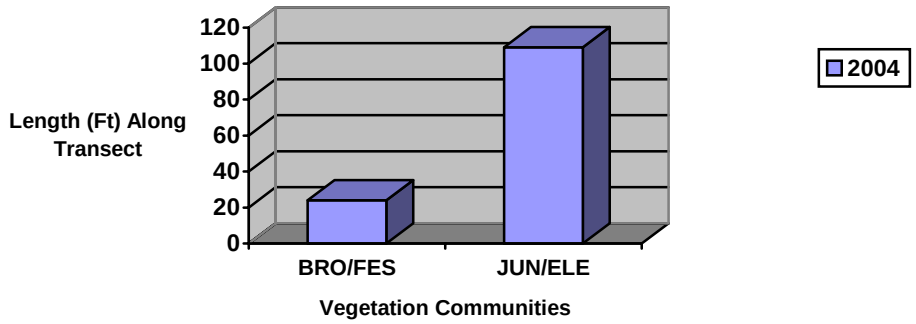
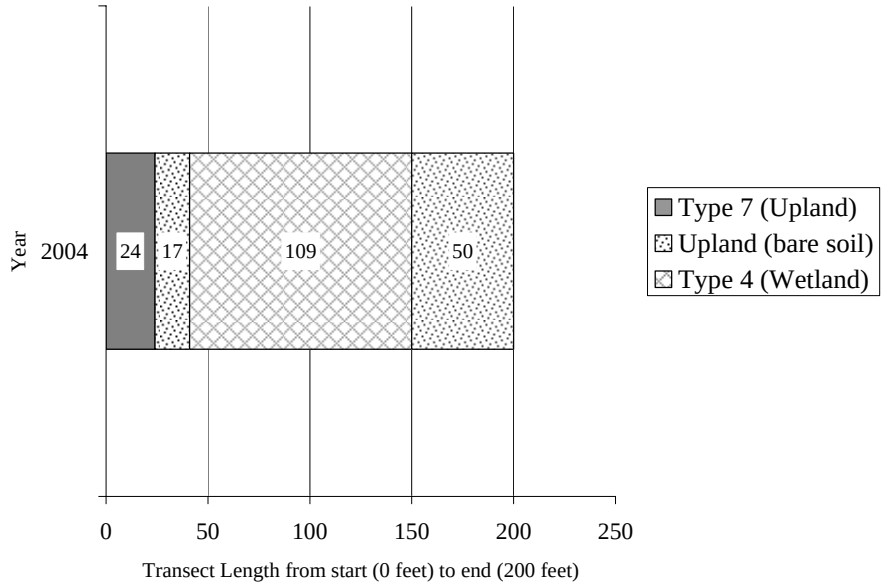



**Chart 4:** ***Transect map showing vegetation types of Transect 2 from start (0 feet) to end (200 feet) for 2004.***



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 henbane had been sprayed prior to the August site visit. The majority of the plants were dead, but other weed species did not appear to have been sprayed. 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.

### 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 the Nesda-Mcilwaine loams (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 dark gray to very dark gray (10YR 4/1, 10YR 3/1) sandy loam from 0 -10 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 – 3 inches deep) were observed.

The upland soil pits (SP-2 and SP-3) revealed soils with similar textures (silty loam to clay loam) but soils were without mottles. Chroma values ranged from 10YR 5/2 to 10YR 3/2.

### 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 as noted by inundation. Aquatic vegetation such as cattails and bulrush were more common along the perimeter of the spring creek channel. A total of 2.67 acres of wetlands were delineated in the off-channel wetland development area and along Big Timber Creek within the defined monitoring areas. This included 0.27 acre of shallow (< 4 feet deep) open water and 0.72 acre of pre-existing wetlands in the off-channel wetland development area. The Big Timber Creek open water channel is not included in these totals. Subtracting the pre-existing wetlands from the total yields a net gain of 1.95 aquatic habitat acres (1.68 wetlands acres and 0.27 shallow open water acre) at the monitoring sites.

## 3.5 Wildlife

Wildlife species observed on the site in 2004 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 fish and wildlife species observed within the Cloud Ranch Mitigation Site.***

| |
|---|
| **REPTILES** |
| None |
| **AMPHIBIANS** |
| Western Chorus Frog (*Pseudacris triseriata*)[2] |
| **FISH** |
| Brook trout (*Salvelinus fontinalis*)[2] |
| Brown trout (*Salmo trutta* )[2] |
| Rainbow trout (*Oncorhynchus mykiss*)[2] |
| **BIRDS**[1] |
| Bald eagle (*Haliaeetus leucocephalus*)[2]<br>Unidentified sparrow sp.[1] |
| **MAMMALS** |
| Black bear (U*rsus americanus*)[2]<br>White-tailed deer *(Odocoileus virginianus)*[2]<br>Mule deer (*Odocoileus hemionus*)[2] |

[1] Weather conditions were very poor on day of monitoring with 30-40 mph winds, light rain, and 40-50 degrees.
[2] Observed by Aquatic Design & Construction, Inc.

## 3.6 Macroinvertebrates

**Off-Channel Wetlands**. Sub-optimal conditions were indicated by the bioassessment score calculated for this site (**Bollman, 2004, Appendix F**). The invertebrate fauna was dominated by snails and midges, many of which were hemoglobin-bearers, suggesting hypoxic benthic substrates. Naiad worms were also abundant; these creatures typically feed on bacterial films. Macrophytes were likely primary habitat sources. The taxonomic composition of the sample suggests a good degree of habitat complexity, and the biotic index value was below the median value for sites in this study. Water quality was probably good.

**Stream.** Midges in 11 taxa overwhelmed this site. Many of these taxa are rheophilic, suggesting that some flow existed at the site. The bioassessment score indicated sub-optimal conditions, which may be due to monotonous habitats. The biotic index value was the lowest observed in the study; the water quality here was more appropriate for a lotic system than of a lentic wetland. The macroinvertebrate sampling results are included in **Appendix F**.

## 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.

## 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 two State of Montana-listed noxious weeds (Canada thistle and houndstongue) and one weed on the Stillwater County list (black henbane). All three species were observed within the off-channel wetland assessment area. Only Canada thistle was observed along Big Timber Creek. As mentioned earlier, the henbane did appear to have been sprayed in 2004. The plants were dead at the time of the August monitoring. 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 or Canada thistle. Chemical or biological control measures are recommended for the Canada thistle, houndstongue 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. No problems such as loss of constructed point or side bars were observed, nor were poorly vegetated or barren areas along the creek.

**Table 4:** ***Summary of 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 |
|---|---|---|
| Listed/Proposed T&E Species Habitat | Low (0.3) | Low (0.3) |
| MNHP Species Habitat | Low (0.1) | Mod (0.6) |
| General Wildlife Habitat | Mod (0.7) | High (0.9) |
| General Fish/Aquatic Habitat | NA | Mod (0.7) |
| Flood Attenuation | Mod (0.5) | Mod (0.4) |
| Short and Long Term Surface Water Storage | High (0.8) | High (0.8) |
| Sediment, Nutrient, Toxicant Removal | High (1.0) | Mod (0.6) |
| Sediment/Shoreline Stabilization | High (1.0) | Mod (0.7) |
| Production Export/Food Chain Support | Mod (0.7) | Mod (0.7) |
| Groundwater Discharge/Recharge | High (1.0) | High (1.0) |
| Uniqueness | Mod (0.4) | Mod (0.4) |
| Recreation/Education Potential | Mod (0.7) | Mod (0.7) |
| Actual Points/Possible Points | 7.2/11 | 7.8/12 |
| % of Possible Score Achieved | 65% | 65% |
| Overall Category | II | II |
| **Total Acreage of Assessed Wetlands within Easement (ac)** | **2.02** | **2.65** |
| **Functional Units (acreage x actual points) (fu)** | **14.5** | **20.67** |
| **Net Acreage Gain (ac)** | **1.47** | **0.48** |
| **Net Functional Unit Gain[1]** | **Presently unavailable** | **Presently unavailable** |
| **Total Functional Unit Gain[1]** | **Presently unavailable** | **Presently unavailable** |

[1] Baseline functional assessment information was unavailable as of the writing of this report.

## 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 current net acres delineated during the 2004 wetland monitoring. The net off-channel wetland / open water acreage is 1.47 acres (1.92 acres wetland + 0.27 acre open water – 0.72 acre pre-existing wetlands = 1.47 acres). The Big Timber Creek net wetland acreage is 0.48 acres which includes 0.28 acres of riparian wetland and 0.20 acres of emergent wetlands. The Big Timber Creek channel itself is not included in acreage totals.

**Table 5.** ***2004 wetland mitigation monitoring results.***

| Wetland Mitigation | Current Net Acres | Ratio | Current Credit Acres | Target Credit Acres | Comments |
|---|---|---|---|---|---|
| **Off-channel** [1] | | | | | |
| Creation and restoration wetlands, open water | 1.47 | 1:1 | 1.47 | 2.02 | 72% of the proposed wetland creation and restoration area has been converted to wetlands / open water. |
| **Subtotal** | **1.47** | | **1.47** | **2.02** | |
| **Big Timber Creek** [2] | | | | | |
| Riparian wetland restoration | 0.28 | 1:1 | 0.28 | 2.00 | Riparian wetland community represented by Type 2. |
| Emergent wetland restoration | 0.20 | 1:1 | 0.20 | 0.58 | Emergent wetland restoration represented by Type 3. |
| **Subtotal** | **0.48** | | **0.48** | **2.58** | |
| Upland and wetland buffer | 3.56 | 4:1 | 0.89 | 0.89 | Credited only if livestock grazing is prohibited on wetland sites. |
| **Subtotal** | **3.56** | | **0.89** | **0.89** | |
| **GRAND TOTAL** | **5.51** | | **2.84** | **5.49** | **52% of goal** |

[1.] This acreage correlates to lines 2 and 3 in the October 2, 2002 COE table Appendix G.
[2.] This acreage correlates to lines 4, 5 and 6 respectively in the Oct 7, 2002 COE table Appendix G.

The mitigation efforts have so far resulted in a total of 1.68 wetland credit acres, 0.27 shallow open water credit acres, and 0.89 credit acre of wetland/upland buffers. The grand total for the Cloud Ranch to date is 2.84 credit acres or 52 percent of the goal.

## 4.0 REFERENCES

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# Appendix A

## FIGURES 2 - 3

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

# Figure 2 Monitoring Activity Locations 2004

N
W E
S

SCALE 1"=150ft

LEGEND

- Monitoring Limits
- SP1 Soil Sample
- Aerial Reference Point
- Photograph Point
- Vegetation Transect
- MI Macro-invertebrate sample points

Base photograph July 28, 2003

Monitoring Limits

Vegetation Transect

SP3

SP4

P

N,O

L,M

MI

J,K

Monitoring Limits

I

H

G

MI

Vegetation Transect

SP2

SP1

A

B,C,D,E

F

PROJECT NAME
MDT Cloud Ranch Wetland Mitigation

DRAWING TITLE
Monitoring Activity Locations 2004

| | | | |
|---|---|---|---|
| PROJ NO: 330054.504 | DRAWN: RAA | | |
| LOCATION: | PROJ MGR: J.Bergland | | |
| SCALE: 1"=150ft | CHECKED: | APPVD: | |
| FILE NAME: Task504Base.dwg | | | |

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Missoula, MT 59807

FIGURE
2 OF .

REV 02
Jun/23/2005

# Figure 3 Mapped Site Features 2004

N
W E
S

SCALE 1"=150ft

## VEGETATION COMMUNITY TYPES

1. Bromus inermis/Melilotus officinalis
2. Populus angustifolia/Agrostis alba
3. Agrostis alba
4. Juncus torreyi/Eleocharis palustris
5. Glyceria sp./Agrostis alba
6. Typha latifolia/Carex sp.
7. Bromus inermis/Festuca pratensis

## LEGEND

- Monitoring Limits
- Wetland Limits
- Vegetation Community Boundary
- Open Water Boundary
- Historic Wetland

Base photograph July 28, 2003

### Off Channel Wetland Area

| | |
|---|---|
| Gross Wetland | 1.92 Acres |
| Open Water | 0.27 Acres |
| Historic Wetland | 0.72 Acres |
| Net Wetland | 1.47 Acres |

### Big Timber Creek Wetlands

| | |
|---|---|
| Net Wetland | 0.48 Acres |

OPEN WATER
OW
Bare Soil >50%
Monitoring Limits
Monitoring Limits

PROJECT NAME: MDT Cloud Ranch Wetland Mitigation
DRAWING TITLE: Mapped Site Features 2004

| | | | |
|---|---|---|---|
| PROJ NO: 330054.504 | DRAWN: RAA | | |
| LOCATION: Big Timber, Mt | PROJ MGR: J.Bergland | | |
| SCALE: 1"=150ft | CHECKED: CH | APPVD: JB | |
| FILE NAME: Task504Base.dwg | | | |

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FIGURE 3 OF

REV 02
Jun/23/2005

# Appendix B

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## 2004 WETLAND MITIGATION SITE MONITORING FORM
## 2004 BIRD SURVEY FORMS
## 2004 WETLAND DELINEATION FORMS
## 2004 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: 330054-504 Assessment Date: 8/23/04
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: overcast/rainy/windy Person(s) conducting the assessment: CH/LB/LWC
Initial Evaluation Date: 8/23/04 Visit #: 1 Monitoring Year: 2004
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: 70 %
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:** It is likely that additional water had been recently released onto the restored/created project wetland sites. Large areas of flowing, surface water was observed during the August monitoring trip. Soils within these inundated areas were not saturated (i.e. soils were still firm).

## VEGETATION COMMUNITIES

Community No: 1 Community Title (main species): *Melilotus officinalis/Bromeris inermis*

***Big Timber Creek Channel Restoration***

| Dominant Species | % Cover | Dominant Species | % Cover |
|---|---|---|---|
| *Melilotus officinalis* | 25 | *Ambrosia trifida* | 5 |
| *Bromus inermis* | 15 | *Chenopodium sp.* | <5 |
| *Populus angustifolia* | 10 | *Agropyron riparium* | 5 |
| *Agropyron repens* | 5 | *Crepis runinata* | 5 |
| *Cirsum arvense* | <5 | *Verbascum thapsus* | *<5* |
| *Glycyrrhiza lepidota* | <5 | Cobbles/rock | 10 |
| *Salix exigua cuttings* | 5 | | |

**COMMENTS/PROBLEMS:** This is the first growing season following seeding and planting. Common annual forbs, non-native grasses will typically occupy the disturbed site until the seeded species are established. *Solidago occidentalis* and *Helianthus annuus* were also noted but represented <5 percent of the cover**.**

Community No: 2 Community Title (main species): *Populus angustifolia/Agrosts alba*

***Big Timber Creek Channel Restoration***

| Dominant Species | % Cover | Dominant Species | % Cover |
|---|---|---|---|
| *Populus angustifolia (seedlings)* | 20 | *Mentha arvensis* | <5 |
| *Agrostia alba* | 25 | *Cobbles/rock* | 20% |
| *Deschampsia caespitosa* | 20 | *Poa palustris* | 5 |
| *Juncus torreyi* | 10 | | |
| *Rumex crispus* | <5 | | |
| *Mimulus guttulus* | <5 | | |
| *Veronica americana* | <5 | | |

**COMMENTS/PROBLEMS:** Riverine wetland vegetation is dependent upon creek flows and periodic flooding. Weather (precipitation and flow events) will influence the percent cover, species diversity and rate of wetland development along the creek.

Community No.: 3 Community Title (main species): *Agrostis alba*

***Big Timber Creek Channel Restoration***

| Dominant Species | % Cover | Dominant Species | % Cover |
|---|---|---|---|
| *Agrostis alba* | 20 | *Juncus torreyi** | 10 |
| *Mentha arvensis** | 10 | *Phalaris arundinacea* | 5 |
| *Alopecurus pratensis** | 10 | *Poa palustris* | <5 |
| *Salix exigua (cuttings)* | 5 | *Populus angustifolia* | 5 |
| *Glyceria elata* | 5 | *Deschampsia caespitosa** | 10 |
| *Eleocharis palustris* | 5 | *Epibolium ciliatum* | <5 |
| *Beckmannia syzigachne* | 5 | *Elymus canadensis* | <5 |

**COMMENTS/PROBLEMS:** ***These species co-dominate different point and side bars, depending upon location along the stream.

**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 |
|---|---|---|---|
| *Juncus torreyi* | 30 | *Glyceria elata* | 5 |
| *Eleocharis palustris* | 25 | *Juncus longifolia* | 5 |
| *Agrostia alba* | 10 | *Glyceria grandis* | <5 |
| *Typha latifolia* | 10 | *Scirpus acutus* | 5 |
| *Beckmannia syzigachne* | 5 | *Poa palustris* | <5 |

**COMMENTS/PROBLEMS:** Soils were saturated to the surface or inundated with 1 to 2 inches of water.

Community No: 5 Community Title (main species): *Glyceria sp./Agrostia alba*

***Off-channel wetlands***

| Dominant Species | % Cover | Dominant Species | % Cover |
|---|---|---|---|
| *Glyceria elata* | 20 | *Cirsum arvensis* | 5 |
| *Glyceria grandis* | 15 | *Festuca pratensis* | 5 |
| *Agrostia alba* | 10 | *Mentha arvensis* | 5 |
| *Juncus torreyi* | 10 | *Juncus mertensianus* | 5 |
| *Carex nebrascensis* | 5 | *Calamagrostis canadensis* | <5 |
| *Poa palustris* | 10 | *Deschampsia cespitosa* | <5 |
| *Juncus balticus* | 5 | | |

**COMMENTS/PROBLEMS:** This was a difficult community type to determine. In many places *Juncus torreyi* and *Poa palustris* was co-dominant with *Glyceria sp.and Agrostia alba*

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

***Off-channel wetlands***

| Dominant Species | % Cover | Dominant Species | % Cover |
|---|---|---|---|
| *Typha latifolia* | 35 | *Scirpus microcarpus* | 10 |
| *Carex utriculuta* | 15 | *Mentha arvensis* | 5 |
| *Carex aquatilis* | 10 | *Scirpus acutus* | 5 |
| *Glyceria grandis* | 10 | *Carex languinosa* | 5 |
| *Beckmannia syzigachne* | 5 | | |

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

Community No.: 7 Community Title (main species): *Bromus inermis/Festuca pratensis*

| Dominant Species | % Cover | Dominant Species | % Cover |
|---|---|---|---|
| *Bromus inermis* | 25 | *Cirsium arvensis* | 5 |
| *Festuca pratensis* | 20 | *Hyoscyamus niger* | 5 |
| *Populus angustifolia (scattered mature)* | 5 | *Phleum pratensis* | 5 |
| *Agropyron repens* | 10 | *Verbascum thapsus* | <5 |
| *Agropyron smithii* | 10 | *Bromus marginatus* | 5 |
| *Agropyron trachycaulum* | 5 | | |
| *Hordum jubatum* | 6 | | |

**COMMENTS/PROBLEMS:** Some of the areas within this community type had been recently mowed for weed control, based on this mechanical weed control measure it was difficult to identify all species within this community type. The henbane plants did appear to have been sprayed at some time in 2004, all that remained at during the August field visit were dead plants.

**Additional Activities Checklist:**

X **Record and map vegetative communities on air photo**

**Comprehensive Vegetation List**

| Species | Vegetation Community Number(s) | Species | Vegetation Community Number(s) |
|---|---|---|---|
| *Agropyron smithii* | 7 | *Typha latifolia* | 4, 6 |
| *Agropyron trachycaulum* | 7 | *Veronica americana* | 2 |
| *Agrostis alba* | 2, 3, 4, 5 | *Verbascum thapsus* | 1, 7 |
| *Alopecurus pratensis* | 3 | *Veronica americana* | 2 |
| *Ambrosia trifida* | 1 | | |
| *Beckmannia syzigachne* | 3, 4, 6 | | |
| *Bromus inermis* | 1, 7 | | |
| *Bromus marginatus* | 7 | | |
| *Calamagrosits canadensis* | 5 | | |
| *Carex aquatilis* | 6 | | |
| *Carex languinosa* | 6 | | |
| *Carex nebrascensis* | 5 | | |
| *Carex utriculata* | 6 | | |
| *Chenopodium sp* | 1 | | |
| *Cirsium arvense* | 1, 5, 7 | | |
| *Crepis runinata* | 1 | | |
| *Cynoslossum officinale* | 5, 7 | | |
| *Deschampsia cespitosa* | 2, 3, 5 | | |
| *Eleocharis palustris* | 3, 4 | | |
| *Elymus canadensis* | 3 | | |
| *Epilobium ciliatum.* | 3 | | |
| *Festuca pratensis* | 5, 7 | | |
| *Glyceria elata* | 3, 4, 5 | | |
| *Glyceria grandis* | 4, 5, 6 | | |
| *Glycyrrhiza lepidota* | 1 | | |
| *Helianthus annuus* | 1 | | |
| *Hyoscyamus niger* | 7 | | |
| *Juncus balticus* | 5 | | |
| *Juncus longistylis* | 4 | | |
| *Juncus mertensianus* | 5 | | |
| *Juncus torreyi* | 2, 3, 4, 5 | | |
| *Melilotus officinalis* | 1 | | |
| *Mentha arvensis* | 2, 3, 6 | | |
| *Mimulus guttatus* | 2 | | |
| *Phalaris arundinacea* | 3 | | |
| *Populus angustifolia* | 1, 2, 3, 7 | | |
| *Poa palustris* | 2, 3, 4, 5 | | |
| *Poa pratensis* | 7 | | |
| *Prunus virginiana* | 7 | | |
| *Rumex crispus* | 2 | | |
| *Salix exigua* | 3 | | |
| *Scirpus acutus* | 4, 6 | | |
| *Scirpus microcarpus* | 6 | | |
| *Solidago occidentalis* | 1 | | |

**COMMENTS/PROBLEMS:** _____

_____

_____

_____

_____

## PLANTED WOODY VEGETATION SURVIVAL

| Species | Number Originally Planted | Number Observed | Mortality Causes |
|---|---|---|---|
| *Salix exigua* cuttings; several hundred were inserted into the point bars and side bars along Big Timber Creek.<br><br>A general assessment of live cuttings were noted starting at transect 1 and continued up-stream.<br><br>First bar: ~ 25% survival.<br>Second bar. 50% survival of the willow cuttings.<br>Third bar. No cuttings observed here.<br>Fourth bar. All remaining cuttings were dead.<br>Fifth bar. Greater than 50% willow cuttings survival.<br>Sixth bar. Greater than 50% willow cuttings survival. | 2,500 | Estimated overall survival of the willow cuttings along Big Timber creek is approximately 40 to 45 percent. | 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. Lots of volunteer woody plants germinated as well. 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. The length of the cuttings (most 24 inches) also may have been a factor. Most technical specification state "that two-thirds of the cuttings will be inserted into the soil with at least one or three buds or approximately one-third of the stem remaining exposed or above ground". |
| *Populus angustifolia* transplanted from 9 inch ^3 pots. In addition to the transplanted seedlings, many root suckers from adjacent cottonwood stands, were also noted.<br><br>First bar: Numerous seedlings and root suckers (3 inches to 12 inches tall) – estimate, only a few dead cottonwoods were noted 90% survival.<br>Second bar. 90% survival<br>Third bar. 50% survival.<br>Fourth bar. 35% survival.<br>Fifth bar. 50% survival<br>Sixth bar. No cottonwoods noted here. | 1,310 | Estimated overall survival of the transplanted seedlings along Big Timber creek is approximately 60 to 65 %. | |
| *Betula occidentalis* were also transplanted from 10 cubic inch pots. | 392 | None were observed in 2004. | Will continue to look for plants in 2005. |

**COMMENTS/PROBLEMS:** _____

## 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

| Species | Number Observed | Indirect indication of use | | | |
|---|---|---|---|---|---|
| | | Tracks | Scat | Burrows | Other |
| none | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

**Additional Activities Checklist:**
__X___Macroinvertebrate sampling (if required)

**COMMENTS/PROBLEMS:** __Weather conditions very poor; 30-40 mph winds, light rain, 40-50 degrees.

## 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, east side | West |
| B | Big Timber Creek – Transect 1, west side | South |
| C | Big Timber Creek – Transect 1, west side | 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 | North |
| G | Big Timber Creek point bar, right side of channel | Northeast |
| H | Big Timber Creek, side bar, left side of channel | East |
| I | Big Timber Creek, point bar, right side of channel | Northeast |
| J | Off-channel developing wetlands (inundated uplands) | Southwest |
| K | Unnamed tributary – off channel wetlands | West |
| L | Embankment removal area south of pond | South |
| M | Off-channel wetlands south of pond | South |
| N | Transect 2 eastern side– off channel wetlands | North |
| O | Transect 2 eastern side - community type 4 in foreground) | Southwest |
| P | Transect 2 eastern side | South |
| Q | Transect 2 western side | Southeast |
| R | Far southeast corner of the project site, communities 5 and 7 | South |

**COMMENTS/PROBLEMS:** _____
_____
_____

## GPS SURVEYING

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

Checklist:

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

**COMMENTS/PROBLEMS:** ____hand-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:
__X__Delineate wetlands according to the 1987 Army Corps manual.
__X__Delineate wetland-upland boundary on the air photo
__X__Survey wetland-upland boundary with a resource grade GPS survey

**COMMENTS/PROBLEMS:**

## FUNCTIONAL ASSESSMENT

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

**COMMENTS/PROBLEMS:**

## MAINTENANCE

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

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

**COMMENTS/PROBLEMS:**

## MDT WETLAND MONITORING – VEGETATION TRANSECT

Site: Cloud Ranch - Big Timber Creek Date: 8/23/04 Examiner: CH/LB/LWC Transect # 1

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

| **Vegetation type :** | CT 1 (transitional riparian floodplain) |
|---|---|
| Length of transect in this type: 0-83 feet | |
| Species: | Cover: |
| POPANG (~12 inches tall) | 20 |
| MELOFF | 30 |
| DESCAE | 5 |
| BROINE | 10 |
| AGRREP | 5 |
| GLYLEP | <1 |
| CIRARV | <5 |
| CRERUN. | <1 |
| AMBFRI | <1 |
| SALEXU (cuttings survival) | 10 |
| BARE GROUND | 20 |
| Total Vegetative Cover: | 80% |

| **Vegetation type :** | Open water |
|---|---|
| Length of transect in this type: 135-168 feet | |
| Species: | Cover: |
| Open water – creek channel | 100 |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| Total Vegetative Cover: | 0 |

| **Vegetation type :** | CT 2 (riverine wetland) |
|---|---|
| Length of transect in this type: 83-135 feet | |
| Species: | Cover: |
| AGRALB | 25 |
| DESCAE | 20 |
| POPANG (~ 6 inch seedlings) | 20 |
| POACOM | 5 |
| RUMCRI | <1 |
| VERAME | <5 |
| MINGUT | <1 |
| JUNTOR | 5 |
| MENARV | <5 |
| Cobbles/rock | 40 |
| Total Vegetative Cover: | 60 |

| **Vegetation type :** | CT 1 (transitional riparian floodplain) |
|---|---|
| Length of transect in this type: 168-195 feet | |
| Species: | Cover: |
| AGRALB | 45 |
| BROINE | 40 |
| SOLOCC | 5 |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| Total Vegetative Cover: | 100 |

## MDT WETLAND MONITORING – VEGETATION TRANSECT

Site: Cloud Restored Wetlands Date: 8/23/04 Examiner: CH/LB/LWC Transect # 2

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

| **Vegetation type :** | CT 7 | |
|---|---|---|
| Length of transect in this type: | 0-24 (24’) | feet |
| Species: | | Cover: |
| BROINE | | 50 |
| AGRREP | | 40 |
| PRUVIR | | 10 |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | Total Vegetative Cover: | 100% |

| **Vegetation type :** | CT 4 | |
|---|---|---|
| Length of transect in this type: | 41-150 (109’) | feet |
| Species: | | Cover: |
| JUNTOR | | 25 |
| TYPANG | | 15 |
| ELEPAL | | 15 |
| SCI sp. | | 15 |
| AGRALB | | 10 |
| BECSYG | | 5 |
| JUNLON | | 5 |
| | | |
| | | |
| | | |
| | | |
| | Total Vegetative Cover: | 100% |

| **Vegetation type :** | Bare soil | |
|---|---|---|
| Length of transect in this type: | 24-41 (17’) | feet |
| Species: | | Cover: |
| CIRARV | | 15 |
| BROJAP | | 15 |
| Bare – saturated soil | | 70 |
| | | |
| | | |
| | | |
| | | |
| | | |
| | Total Vegetative Cover: | 30% |

| **Vegetation type D:** | Bare soil | |
|---|---|---|
| Length of transect in this type: | 150-200 (50’) | feet |
| Species: | | Cover: |
| Bare soil | | 90 |
| BROINE | | 5 |
| AGRREP | | 5 |
| | | |
| | | |
| | | |
| | | |
| | | |
| | Total Vegetative Cover: | 10% |

MDT WETLAND MONITORING – VEGETATION TRANSECT (back of form)

**Cover Estimate**

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

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[3]**BIRD SURVEY – FIELD DATA SHEET**

Page_1__of_1___
Date: 8/23/04
Survey Time: varied

**SITE:** Cloud Ranch

| Bird Species | # | Behavior | Habitat | Bird Species | # | Behavior | Habitat |
|---|---|---|---|---|---|---|---|
| Sparrow species | 1 | F | Trees adj to pond | | | | |
| | | | | | | | |
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| **Notes:** |
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**Behavior**: BP – one of a breeding pair; BD – breeding display; F – foraging; FO – flyover; L – loafing; N – nesting

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

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

| | |
|---|---|
| Project/Site: Cloud Ranch | Date: 8/23/04 |
| Applicant/Owner: MDT | County: Sweetgrass |
| Investigator: CH/LB/LWC | State: MT |

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

## VEGETATION

| | Dominant Plant Species | Stratum | Indicator | | Dominant Plant Species | Stratum | Indicator |
|---|---|---|---|---|---|---|---|
| 1 | DESCAE | H | FACW | 9 | | | |
| 2 | POPANG | T | FACW | 10 | | | |
| 3 | PUCDIS | H | FACW+ | 11 | | | |
| 4 | AGRALB | H | FAC* | 12 | | | |
| 5 | | | | 13 | | | |
| 6 | | | | 14 | | | |
| 7 | | | | 15 | | | |
| 8 | | | | 16 | | | |

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-). 4/4 = 100% hydrophytic vegetation

Other species noted but not dominant were *Rumex crispus, Mentha arvensis, Juncus torreyi, and Melilotus officinalis*

## HYDROLOGY

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

No Recorded Data Available

Field Observations:

Depth of Surface Water: - (in.)

Depth to Free Water in Pit: - (in.)

Depth to Saturated Soil: 0 (in.)

Wetland Hydrology Indicators:

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

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

Remarks:
Soils saturated at the surface

**SOILS**

Map Unit Name (Series and Phase): Nesda-McIlwaine loams, 0-2% slopes
Taxonomy (Subgroup):
Drainage Class: Well-drained
Field Observations
Confirm Mapped Type? ____ Yes ____ No

Profile Description:

| Depth inches | Horizon | Matrix Color (Munsell Moist) | Mottle Colors (Munsell Moist) | Mottle Abundance/Contrast | Texture, Concretions, Structure, etc. |
|---|---|---|---|---|---|
| 0-12 | A | 10YR 2/1 | 10YR 4/4 | Small, prom | Loamy sand |
| | | Inclusions of 10YR 3/1 | | | |
| | | | | | |
| | | | | | |

Hydric Soil Indicators:

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

Hydric soil – soil pit located approximately 125 ft west of waters edge.

## WETLAND DETERMINATION

| | | | | | |
|---|---|---|---|---|---|
| Hydrophytic Vegetation Present? | X | Yes | ____ | No | Is this Sampling Point Within a Wetland? X Yes ____ No |
| Wetland Hydrology Present? | X | Yes | ____ | No | |
| Hydric Soils Present? | X | Yes | ____ | No | |

Remarks:

Wetland boundary included a small point bar along the waters edge.

Approved by HQUSACE 2/92

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

| | |
|---|---|
| Project/Site: Cloud Ranch | Date: 8/23/04 |
| Applicant/Owner: MDT | County: Sweetgrass |
| Investigator: CH/LB/MDT | State: MT |

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

## VEGETATION

| | Dominant Plant Species | Stratum | Indicator | | Dominant Plant Species | Stratum | Indicator |
|---|---|---|---|---|---|---|---|
| 1 | MELOFFs | H | FACU | 9 | | | |
| 2 | BROIEN | H | NL | 10 | | | |
| 3 | POPANG | T | FACW | 11 | | | |
| 4 | AGRREP | H | FAC- | 12 | | | |
| 5 | CIRARV | H | FACU+ | 13 | | | |
| 6 | | | | 14 | | | |
| 7 | | | | 15 | | | |
| 8 | | | | 16 | | | |

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

Upland vegetation dominant this higher area within the Big Timber Creek terrace.

## HYDROLOGY

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

No Recorded Data Available

Field Observations:

Depth of Surface Water: - (in.)

Depth to Free Water in Pit: - (in.)

Depth to Saturated Soil: >12 (in.)

Wetland Hydrology Indicators:

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

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

Remarks:

Area very hard to dig a pit, rocky and dry.

**SOILS**

Map Unit Name (Series and Phase): Nesda-McIlwaine loams, 0-2% slopes
Taxonomy (Subgroup):
Drainage Class: Well-drained
Field Observations
Confirm Mapped Type? ____ Yes ____ No

Profile Description:

| Depth inches | Horizon | Matrix Color (Munsell Moist) | Mottle Colors (Munsell Moist) | Mottle Abundance/Contrast | Texture, Concretions, Structure, etc. |
|---|---|---|---|---|---|
| 0-12 | A | 10YR 5/2 | | | Silty loam |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Hydric Soil Indicators:

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

No hydric soil indicators

## WETLAND DETERMINATION

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

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

Remarks:

Upland terrace along Big Timber Creek.

Approved by HQUSACE 2/92

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

| | |
|---|---|
| Project/Site: Cloud Ranch | Date: 8/23/04 |
| Applicant/Owner: MDT | County: Sweetgrass |
| Investigator: CH/LB/LWC | State: MT |

| | | | | | |
|---|---|---|---|---|---|
| Do Normal Circumstances exist on the site: | X | Yes | | No | Community ID: Restored Wetland |
| Is the site significantly disturbed (Atypical Situation)? | | Yes | X | No | Transect ID: 2 |
| Is the area a potential Problem Area?: | | Yes | X | No | Plot ID: SP-3 |
| (If needed, explain on reverse.) | | | | | Located 5 ft west of stake |

## VEGETATION

| | Dominant Plant Species | Stratum | Indicator | Dominant Plant Species | Stratum | Indicator |
|---|---|---|---|---|---|---|
| 1 | BROINE | H | NL | | | |
| 2 | AGRREP | H | FAC- | | | |
| 3 | CRIARV | H | FACU | | | |
| 4 | BROJAP | H | FACU | | | |
| 5 | | | | | | |
| 6 | | | | | | |
| 7 | | | | | | |
| 8 | | | | | | |

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-). No hydrophytic vegetation

Wetland features have not developed at this time. Wetland species will likely with time.

## HYDROLOGY

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

No Recorded Data Available

Field Observations:

Depth of Surface Water: - (in.)

Depth to Free Water in Pit: - (in.)

Depth to Saturated Soil: >12 (in.)

Wetland Hydrology Indicators:

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

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

Remarks:

Soils dry at 12 inches.

**SOILS**

Map Unit Name (Series and Phase): Nesda-McIlwaine loams, 0-2% slopes
Taxonomy (Subgroup):
Drainage Class: Well-drained
Field Observations
Confirm Mapped Type? ____ Yes ____ No

Profile Description:

| Depth inches | Horizon | Matrix Color (Munsell Moist) | Mottle Colors (Munsell Moist) | Mottle Abundance/Contrast | Texture, Concretions, Structure, etc. |
|---|---|---|---|---|---|
| 0-12 | A | 10 YR 4/2 | | | Clay loam |
| | | Inclusion of 10YR 3/2 | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Hydric Soil Indicators:

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

Hydric soil indicators were not noted.

## WETLAND DETERMINATION

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

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

Remarks:

The first 24 feet of this 200 ft transect is upland. Continue to monitor for changes in species and soils.

Approved by HQUSACE 2/92

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

| | |
|---|---|
| Project/Site: Cloud Ranch | Date: 8/23/04 |
| Applicant/Owner: MDT | County: Sweetgrass |
| Investigator: CH/LB/LWC | State: MT |

| | | | | | |
|---|---|---|---|---|---|
| Do Normal Circumstances exist on the site: | X | Yes | | No | Community ID: Restored wetland |
| Is the site significantly disturbed (Atypical Situation)? | | Yes | X | No | Transect ID: 2 |
| Is the area a potential Problem Area?: | | Yes | X | No | Plot ID: SP-4 |
| (If needed, explain on reverse.) | | | | | |

## VEGETATION

| | Dominant Plant Species | Stratum | Indicator | | Dominant Plant Species | Stratum | Indicator |
|---|---|---|---|---|---|---|---|
| 1 | JUNTOR | H | FACW | 9 | | | |
| 2 | ELEPAL | H | OBL | 10 | | | |
| 3 | TYPLAT | H | OBL | 11 | | | |
| 4 | AGRALB | H | FAC* | 12 | | | |
| 5 | GLYSTR | H | FACW+ | 13 | | | |
| 6 | BECSYZ | H | OBL | 14 | | | |
| 7 | SCI sp. | H | OBL | 15 | | | |
| 8 | | | | 16 | | | |

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-). 7/7 = 100% hydrophytic vegetation

Diverse wetland vegetation in areas where soils are saturated. Also noted several *Carex nebrascensis* plants.

## HYDROLOGY

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

No Recorded Data Available

Field Observations:

Depth of Surface Water: 2-3 (in.)

Depth to Free Water in Pit: --- (in.)

Depth to Saturated Soil: 0 (in.)

Wetland Hydrology Indicators:

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

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

Remarks:

Low areas were noted with surface water.

**SOILS**

Map Unit Name (Series and Phase): Nesda-McIlwaine loams, 0-2% slopes
Taxonomy (Subgroup):
Drainage Class: Well-drained
Field Observations
Confirm Mapped Type? ____ Yes ____ No

Profile Description:

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

Hydric Soil Indicators:

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

Hydric soils based on mottles and low chroma value.

## WETLAND DETERMINATION

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

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

Remarks:

Wetland area that will likely expand with time.

Approved by HQUSACE 2/92

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

**1. Project Name:** Cloud Ranch **2. Project #:** 330054.504 **Control #:** _____

**3. Evaluation Date:** 8/23/2004 **4. Evaluator(s):** CH/LB/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:** _____

**7. A. Evaluating Agency** LWC

**8. Wetland Size (total acres):** ____ (visually estimated)
0.48 ac (measured, e.g. GPS)

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

**9. Assessment Area (total acres):** 2.65 ac (visually estimated)
_____ (measured, e.g. GPS)

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

| HGM CLASS [1] | SYSTEM [2] | SUBSYSTEM [2] | CLASS [2] | WATER REGIME [2] | MODIFIER [2] | % OF AA |
|---|---|---|---|---|---|---|
| Riverine | Riverine | Lower Perennial | Streambed | Permanently Flooded | --- | 80 |
| Riverine | Palustrine | --- | Emergent Wetland | Seasonally Flooded | Excavated | 20 |
| --- | --- | --- | --- | --- | --- | |
| --- | --- | --- | --- | --- | --- | |

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

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

**12. GENERAL CONDITION OF AA**

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

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

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

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

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

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

| Evidence of Wildlife Use from 14C(i) | **Wildlife Habitat Features Rating** from 14C(ii) | | | |
|---|---|---|---|---|
| | ☒ Exceptional | ☐ High | ☐ Moderate | ☐ Low |
| Substantial | -- | -- | -- | -- |
| Moderate | .9 (H) | -- | -- | -- |
| Low | -- | -- | -- | -- |

**Comments:** _____

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

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

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

| Duration of Surface Water in AA | ☒Permanent/Perennial | | | ☐Seasonal / Intermittent | | | ☐Temporary / Ephemeral | | |
|---|---|---|---|---|---|---|---|---|---|
| Cover - % of waterbody in AA containing cover objects (*e.g.* submerged logs, large rocks & boulders, overhanging banks, floating-leaved vegetation) | >25% | 10-25% | <10% | >25% | 10-25% | <10% | >25% | 10-25% | <10% |
| Shading - >75% of streambank or shoreline of AA contains riparian or wetland scrub-shrub or forested communities | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Shading – 50 to 75% of streambank or shoreline of AA contains riparian or wetland scrub-shrub or forested communities. | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Shading - < 50% of streambank or shoreline of AA contains riparian or wetland scrub-shrub or forested communities. | -- | 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) | | | |
|---|---|---|---|---|
| | ☐ Exceptional | ☐ High | ☒ Moderate | ☐ 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 | ☐ ≥ 10 acres | | | ☒ <10, >2 acres | | | ☐ ≤2 acres | | |
|---|---|---|---|---|---|---|---|---|---|
| % of flooded wetland classified as forested, scrub/shrub, or both | 75% | 25-75% | <25% | 75% | 25-75% | <25% | 75% | 25-75% | <25% |
| AA contains **no outlet or restricted outlet** | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| AA contains **unrestricted outlet** | -- | -- | -- | -- | -- | .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. | ☐ >5 acre feet | | | ☒ <5, >1 acre feet | | | ☐ ≤1 acre foot | | |
|---|---|---|---|---|---|---|---|---|---|
| Duration of surface water at wetlands within the AA | P/P | S/I | T/E | P/P | S/I | T/E | P/P | S/I | T/E |
| Wetlands in AA flood or pond **≥ 5 out of 10 years** | -- | -- | -- | .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 | ☐ ≥ 70% | | ☒ < 70% | | ☐ ≥ 70% | | ☐ < 70% | |
| Evidence of flooding or ponding in AA | ☐ Yes | ☐ No | ☒ Yes | ☐ No | ☐ Yes | ☐ No | ☐ Yes | ☐ No |
| AA contains **no or restricted outlet** | -- | -- | -- | -- | -- | -- | -- | -- |
| AA contains **unrestricted outlet** | -- | -- | .6 (M) | -- | -- | -- | -- | -- |

**Comments**: _____

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

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

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

| % Cover of wetland streambank or shoreline by species with deep, binding rootmasses. | Duration of Surface Water Adjacent to Rooted Vegetation | | |
|---|---|---|---|
| | ☒Permanent / Perennial | ☐Seasonal / Intermittent | ☐Temporary / Ephemeral |
| **≥ 65 %** | -- | -- | -- |
| **35-64 %** | .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*** | ☐ Vegetated component >5 acres | | | | | | ☒ Vegetated component 1-5 acres | | | | | | ☐ Vegetated component <1 acre | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *B* | ☐ High | | ☐ Moderate | | ☐ Low | | ☐ High | | ☐ Moderate | | ☒ Low | | ☐ High | | ☐ Moderate | | ☐ Low | |
| ***C*** | ☐Y | ☐N | ☐Y | ☐N | ☐Y | ☐N | ☐Y | ☐N | ☐Y | ☐N | ☒Y | ☐N | ☐Y | ☐N | ☐Y | ☐N | ☐Y | ☐N |
| **P/P** | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | .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 | ☐rare | ☐common | ☐abundant | ☐rare | ☐common | ☐abundant | ☐rare | ☒common | ☐abundant |
| **Low** disturbance at AA (#12i) | -- | -- | -- | -- | -- | -- | -- | .4M | -- |
| **Moderate** disturbance at AA (#12i) | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| **High** disturbance at AA (#12i) | -- | -- | -- | -- | -- | -- | -- | -- | -- |

**Comments:** 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) | | |
|---|---|---|---|
| | ☒ Low | ☐ Moderate | ☐ 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 | 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 | M | 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 | |
| | **Totals:** | 7.80 | 12.00 | |
| | | ***Percent of Total Possible Points:*** | **65%** (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**

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

**1. Project Name:** Cloud Ranch **2. Project #:** 330054.504 **Control #:** _____

**3. Evaluation Date:** 8/23/2004 **4. Evaluator(s):** CH/LB/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:** _____

**7. A. Evaluating Agency** LWC

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

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

**9. Assessment Area (total acres):** 2.02 ac (visually estimated)
_____ (measured, e.g. GPS)

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

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

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

**11. ESTIMATED RELATIVE ABUNDANCE** (of similarly classified sites within the same Major Montana Watershed Basin)
Common **Comments:** Under modifier, as part of the creation/restoration activities, wetlands have been created by excavated and shallow dikes.

**12. GENERAL CONDITION OF AA**

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

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

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

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

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

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

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

| Evidence of Wildlife Use from 14C(i) | **Wildlife Habitat Features Rating** from 14C(ii) | | | |
|---|---|---|---|---|
| | ☐ Exceptional | ☒ High | ☐ Moderate | ☐ Low |
| Substantial | -- | -- | -- | -- |
| Moderate | -- | .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 | ☐ Permanent/Perennial | | | ☐ Seasonal / Intermittent | | | ☐ Temporary / Ephemeral | | |
|---|---|---|---|---|---|---|---|---|---|
| Cover - % of waterbody in AA containing cover objects (*e.g.* submerged logs, large rocks & boulders, overhanging banks, floating-leaved vegetation) | >25% | 10-25% | <10% | >25% | 10-25% | <10% | >25% | 10-25% | <10% |
| Shading - >75% of streambank or shoreline of AA contains riparian or wetland scrub-shrub or forested communities | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Shading – 50 to 75% of streambank or shoreline of AA contains riparian or wetland scrub-shrub or forested communities. | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Shading - < 50% of streambank or shoreline of AA contains riparian or wetland scrub-shrub or forested communities. | -- | -- | -- | -- | -- | -- | -- | -- | -- |

ii. **Modified Habitat Quality:** Is fish use of the AA precluded or significantly reduced by a culvert, dike, other man-made structure or activity **or** is the waterbody included on the 'MDEQ list of waterbodies in need of TMDL development' with 'Probable Impaired Uses' listed as cold or warm water fishery or aquatic life support**?**
☒ **Y** ☐ **N** If yes, reduce the rating from 14D(i) by one level and check the modified habitat quality rating: ☐ E ☐ H ☐ M ☒ L

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

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

**Comments:** _____

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

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

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

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

ii. **Are residences, businesses, or other features which may be significantly damaged by floods located within 0.5 miles downstream of the AA?** (check)
☒**Y** ☐**N** **Comments:** homes, ranches

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

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

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

| Estimated maximum acre feet of water contained in wetlands within the AA that are subject to periodic flooding or ponding. | ☐ >5 acre feet | | | ☒ <5, >1 acre feet | | | ☐ ≤1 acre foot | | |
|---|---|---|---|---|---|---|---|---|---|
| Duration of surface water at wetlands within the AA | P/P | S/I | T/E | P/P | S/I | T/E | P/P | S/I | T/E |
| Wetlands in AA flood or pond **≥ 5 out of 10 years** | -- | -- | -- | .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 | ☒ ≥ 70% | | ☐ < 70% | | ☐ ≥ 70% | | ☐ < 70% | |
| Evidence of flooding or ponding in AA | ☒ Yes | ☐ No | ☐ Yes | ☐ No | ☐ Yes | ☐ No | ☐ Yes | ☐ No |
| AA contains **no or restricted outlet** | 1 (H) | -- | -- | -- | -- | -- | -- | -- |
| AA contains **unrestricted outlet** | -- | -- | -- | -- | -- | -- | -- | -- |

**Comments**: _____

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

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

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

| % Cover of wetland streambank or shoreline by species with deep, binding rootmasses. | Duration of Surface Water Adjacent to Rooted Vegetation | | |
|---|---|---|---|
| | ☒Permanent / Perennial | ☐Seasonal / Intermittent | ☐Temporary / Ephemeral |
| **≥ 65 %** | 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*** | ☐ Vegetated component >5 acres | | | | | | ☒ Vegetated component 1-5 acres | | | | | | ☐ Vegetated component <1 acre | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *B* | ☐ High | | ☐ Moderate | | ☐ Low | | ☐ High | | ☐ Moderate | | ☒ Low | | ☐ High | | ☐ Moderate | | ☐ Low | |
| ***C*** | ☐Y | ☐N | ☐Y | ☐N | ☐Y | ☐N | ☐Y | ☐N | ☐Y | ☐N | ☒Y | ☐N | ☐Y | ☐N | ☐Y | ☐N | ☐Y | ☐N |
| **P/P** | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | .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 | ☐rare | ☐common | ☐abundant | ☐rare | ☐common | ☐abundant | ☐rare | ☒common | ☐abundant |
| **Low** disturbance at AA (#12i) | -- | -- | -- | -- | -- | -- | -- | .4M | -- |
| **Moderate** disturbance at AA (#12i) | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| **High** disturbance at AA (#12i) | -- | -- | -- | -- | -- | -- | -- | -- | -- |

**Comments:** 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) | | |
|---|---|---|---|
| | ☒ Low | ☐ Moderate | ☐ 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 | |
| | **Totals:** | 7.20 | 11.00 | 15 |
| | ***Percent of Total Possible Points:*** | | **65%** (Actual / Possible) x 100 [rd to nearest whole #] | |

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

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

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

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

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

☐ **I** ☒ **II** ☐ **III** ☐ **IV**

# Appendix C

## REPRESENTATIVE PHOTOGRAPHS
## 2004 AERIAL PHOTOGRAPH

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

# 2004 CLOUD RANCH

**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. **Compass Reading:** north

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

**Photograph E: Description:** Transect #1 – Big Timber Creek. **Compass Reading:** southwest

**Photograph F**: **Description**: Big Timber Creek, point bar. **Compass Reading**: north

# 2004 CLOUD RANCH

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

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

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

**Photograph J: Description:** Off-channel developing wetland. **Compass Reading:** southwest

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

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

# 2004 CLOUD RANCH

**Photograph M: Description:** Off channel wetlands south of pond embankment. **Compass Reading**: south

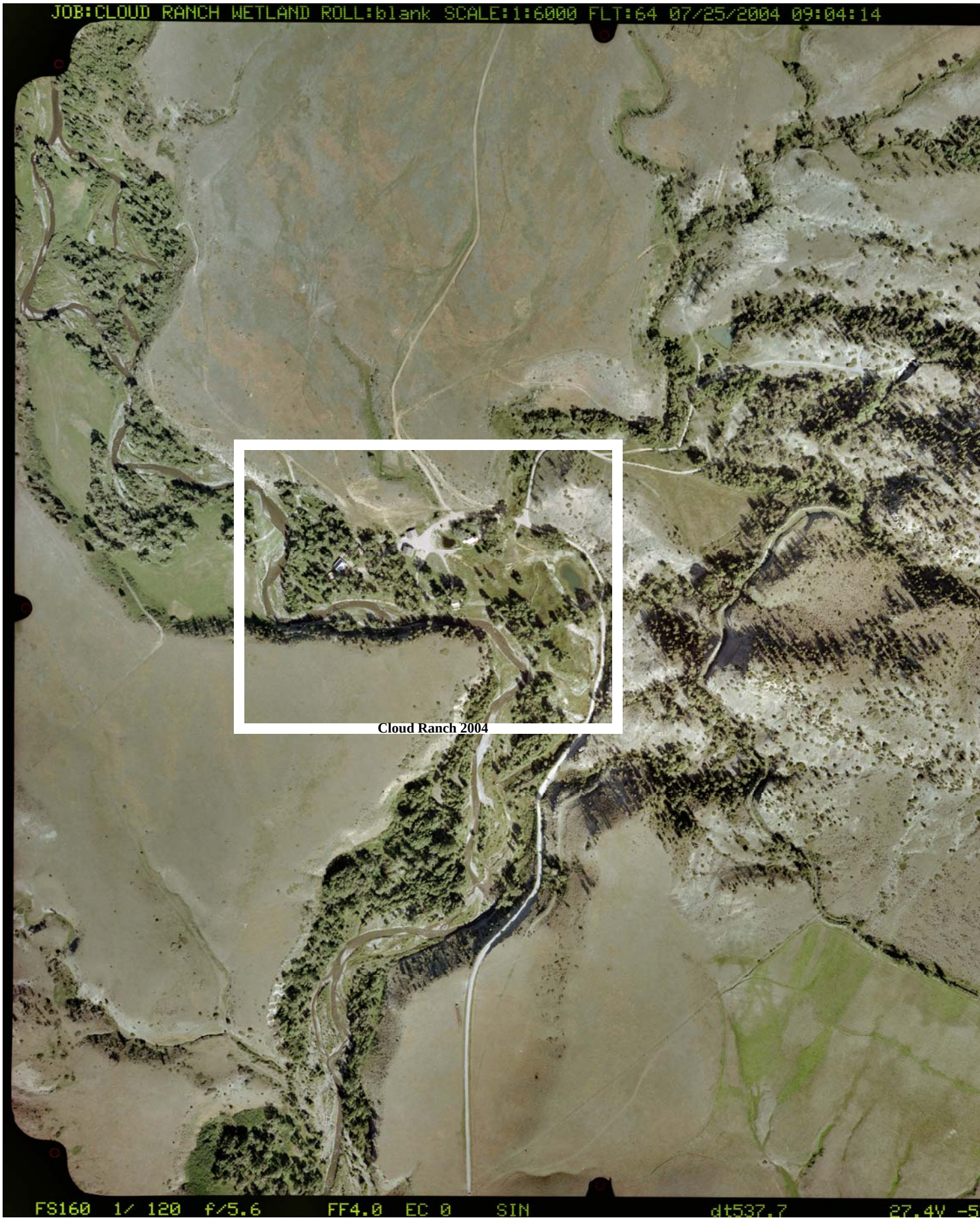
**Photograph N: Description:** Transect #2 – off channel wetlands. **Compass Reading**: north

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

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

**Photograph Q: Description:** Transect #2. **Compass Reading**: southeast

**Photograph R: Description:** Off-channel wetlands. **Compass Reading**: south

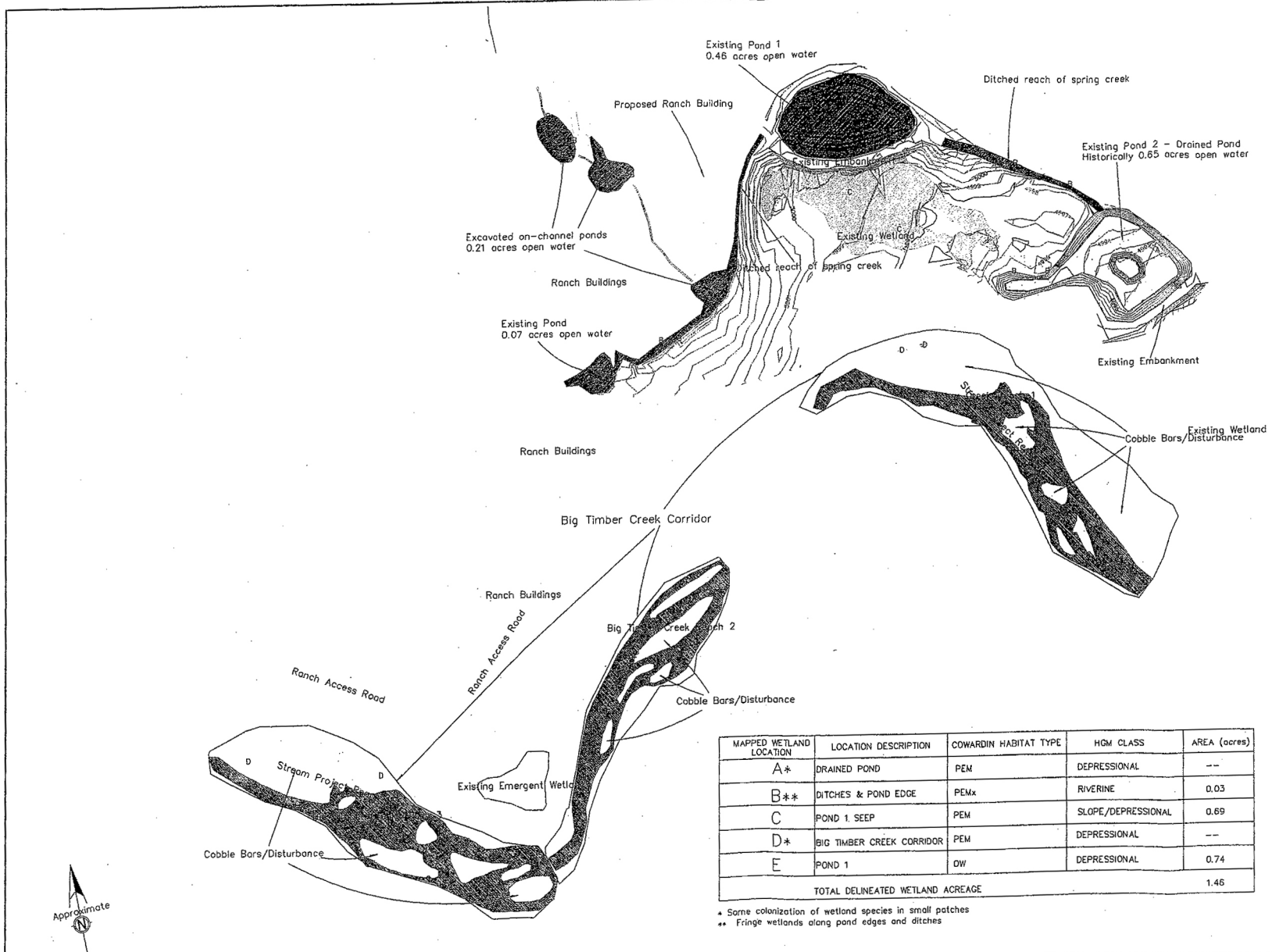



**Cloud Ranch 2004**

# Appendix D

## WETLAND MITIGATION SITE MAP

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

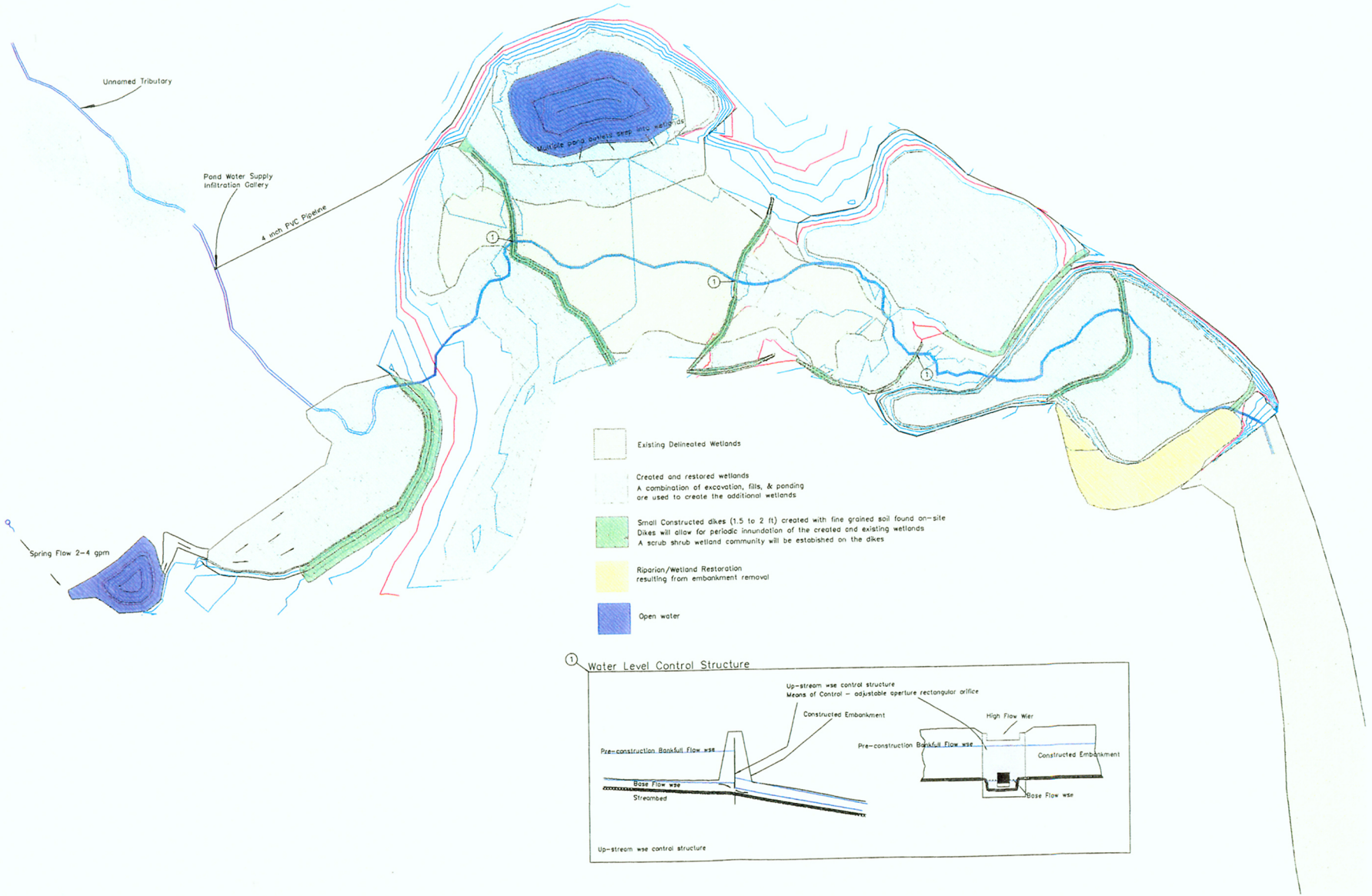



| MAPPED WETLAND LOCATION | LOCATION DESCRIPTION | COWARDIN HABITAT TYPE | HGM CLASS | AREA (acres) |
|---|---|---|---|---|
| A* | DRAINED POND | PEM | DEPRESSIONAL | -- |
| B** | DITCHES & POND EDGE | PEMx | RIVERINE | 0.03 |
| C | POND 1 SEEP | PEM | SLOPE/DEPRESSIONAL | 0.69 |
| D* | BIG TIMBER CREEK CORRIDOR | PEM | DEPRESSIONAL | -- |
| E | POND 1 | OW | DEPRESSIONAL | 0.74 |
| TOTAL DELINEATED WETLAND ACREAGE | | | | 1.46 |

* Some colonization of wetland species in small patches
** Fringe wetlands along pond edges and ditches

PROJECT: Cloud Ranch
PROJECT NO: 140
MEW
Wetland Delineation
REV. 12/01
SCALE 1" = 150'
SHEET 1 of 1

ADC SERVICES INC.
water resource consulting




PROJECT Cloud Ranch

PROJECT NO. 140 | VIEW Proposed Wetland Creation Site Plan | REV 3/03

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

## 2004 MACROINVERTEBRATE SAMPLING PROTOCOL AND DATA

***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 Wetland Mitigation Monitoring Project**
**Aquatic Invertebrate Monitoring**
**Summary 2001 - 2004**

## METHODS

Among other monitoring activities, aquatic invertebrate assemblages were collected at a number of mitigation wetlands throughout Montana. This report summarizes data generated from four years of collection.

The method employed to assess these wetlands is based on constructing an index using a battery of 12 bioassessment metrics or attributes (Table1) 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, 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, and 2004, was assessed using the tested metric battery developed for montane streams of Western Montana (Bollman 1998).The fauna at the Camp Creek site was different from that of the other sites, and suggested montane stream conditions rather than wetland conditions. For the wetlands, “optimal” scores were generally those that fell above the 75th percentile (for those metrics that decrease in value in response to stress) or below the 25th 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 75th percentile for decreasing scores (or above the 25th 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.

## Sample processing

Aquatic invertebrate samples were collected at mitigation wetland sites in the summer months of 2001, 2002, 2003, and 2004 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 1 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.

## RESULTS

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. Thus, the 2004 database contains data for 122 sampling events at 50 unique sites. Table 2 summarizes sites and sampling years.

Metric scoring criteria were re-developed each year as new data was added. For 2004, all 122 records were utilized. Ranges of individual metrics, as well as median metric values remained remarkably consistent in each of the 4 years; minimal changes resulted from the addition of new data in 2004. The summary metric values and scores for the 2004 samples are given in Tables 3a-3d.

## 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.

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.

**Table 1.** Aquatic invertebrate metrics employed in the MTDT mitigation wetland monitoring study, 2001- 2004.

| Metric | Metric Calculation | Expected Response to Degradation or Impairment |
|---|---|---|
| Total taxa | Count of unique taxa identified to lowest recommended taxonomic level | Decrease |
| POET | Count unique Plecoptera, Trichoptera, Ephemeroptera, and Odonata taxa identified to lowest recommended taxonomic level | Decrease |
| Chironomidae taxa | Count unique midge taxa identified to lowest recommended taxonomic level | Decrease |
| Crustacea taxa + Mollusca taxa | Count 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 |

**Table 2.** Montana Department of Transportation Mitigated Wetlands Monitoring Project sites. 2001 – 2004.

| 2001 | 2002 | 2003 | 2004 |
|---|---|---|---|
| Beaverhead 1 | Beaverhead 1 | Beaverhead 1 | Beaverhead 1 |
| Beaverhead 2 | Beaverhead 2 | | |
| Beaverhead 3 | Beaverhead 3 | | Beaverhead 3 |
| Beaverhead 4 | Beaverhead 4 | Beaverhead 4 | |
| Beaverhead 5 | Beaverhead 5 | Beaverhead 5 | Beaverhead 5 |
| 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 |
| Vince Ames | | | |
| Ryegate | | | |
| Lavinia | | | |
| Stillwater | Stillwater | Stillwater | Stillwater |
| Roundup | Roundup | Roundup | Roundup |
| Wigeon | Wigeon | Wigeon | Wigeon |
| Ridgeway | Ridgeway | Ridgeway | Ridgeway |
| 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 – Enh. 1 | Musgrave – Enh. 1 | Musgrave – Enh. 1 | Musgrave – Enh. 1 |
| Musgrave – Enh. 2 | | | |
| | Hoskins Landing | Hoskins Landing | Hoskins Landing |
| | Peterson - 1 | Peterson – 1 | Peterson – 1 |
| | Peterson – 2 | | Peterson – 2 |
| | Peterson – 4 | Peterson – 4 | Peterson – 4 |
| | Peterson – 5 | Peterson – 5 | Peterson – 5 |
| | Jack Johnson - main | Jack Johnson - main | |
| | Jack Johnson - SW | Jack Johnson - SW | |
| | Creston | Creston | Creston |
| | Lawrence Park | | |
| | Perry Ranch | | |
| | SF Smith River | SF Smith River | SF Smith River |
| | Camp Creek | Camp Creek | Camp Creek |
| | Kleinschmidt | Kleinschmidt – pond | Kleinschmidt – pond |
| | | Kleinschmidt – stream | Kleinschmidt – stream |
| | | Ringling - Galt | |
| | | | Circle |
| | | | Cloud Ranch Pond |
| | | | Cloud Ranch Stream |
| | | | Colloid |
| | | | Jack Creek |
| | | | Norem |

Table 3a.

| | BEAVER HEAD #1 | BEAVER HEAD #3 | BEAVER HEAD #5 | BEAVER HEAD #6 | BIG SPRING CREEK | CIRCLE | CLOUD RANCH POND | CLOUD RANCH STREAM | COLLOID | CRESTON |
|---|---|---|---|---|---|---|---|---|---|---|
| **Total taxa** | 27 | 12 | 21 | 18 | 25 | 16 | 16 | 20 | 8 | 18 |
| POET | 3 | 0 | 2 | 3 | 4 | 2 | 2 | 4 | 2 | 3 |
| Chironomidae taxa | 7 | 5 | 5 | 5 | 8 | 5 | 6 | 11 | 1 | 2 |
| Crustacea + Mollusca | 7 | 3 | 4 | 6 | 7 | 1 | 6 | 1 | 1 | 7 |
| % Chironomidae | 0.33636 | 0.18888 | 0.39285 | 0.57547 | 0.44329 | 0.55855 | 0.41666 | 0.84 | 0.09090 | 0.06087 |
| Orthocladiinae/Chir | 0.05405 | 0.35294 | 0.06818 | 0.36065 | 0.27907 | 0.69354 | 0.4 | 0.16666 | 0 | 0 |
| %Amphipoda | 0.03636 | 0 | 0.01785 | 0.05660 | 0.05154 | 0 | 0.00925 | 0 | 0 | 0 |
| %Crustacea + %Mollusca | 0.31818 | 0.73333 | 0.05357 | 0.12264 | 0.18556 | 0.03603 | 0.36111 | 0.01 | 0.09090 | 0.73913 |
| HBI | 7.97169 | 7.88888 | 8.36363 | 8.15789 | 7.61855 | 7.19090 | 7.32291 | 4.84 | 6 | 6.92173 |
| %Dominant taxon | 0.2 | 0.57777 | 0.23214 | 0.25471 | 0.23711 | 0.38738 | 0.13888 | 0.38 | 0.27272 | 0.37391 |
| %Collector-Gatherers | 0.40909 | 0.75555 | 0.51785 | 0.62264 | 0.78350 | 0.05405 | 0.67592 | 0.74 | 0.18181 | 0.29565 |
| %Filterers | 0.12727 | 0 | 0 | 0 | 0.01030 | 0.15315 | 0.09259 | 0.17 | 0 | 0.06087 |
| | | | | | | | | | | |
| **Total taxa** | 5 | 1 | 5 | 3 | 5 | 3 | 3 | 3 | 1 | 3 |
| POET | 3 | 1 | 1 | 3 | 5 | 1 | 1 | 5 | 1 | 3 |
| Chironomidae taxa | 5 | 3 | 3 | 3 | 5 | 3 | 3 | 5 | 1 | 1 |
| Crustacea + Mollusca | 5 | 1 | 3 | 5 | 5 | 1 | 5 | 1 | 1 | 5 |
| % Chironomidae | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 5 | 5 |
| Orthocladiinae/Chir | 1 | 3 | 1 | 3 | 3 | 5 | 3 | 1 | 1 | 1 |
| %Amphipoda | 5 | 5 | 5 | 3 | 3 | 5 | 5 | 5 | 5 | 5 |
| %Crustacea + %Mollusca | 5 | 1 | 5 | 5 | 5 | 5 | 3 | 5 | 5 | 1 |
| HBI | 1 | 1 | 1 | 1 | 1 | 3 | 3 | 5 | 5 | 3 |
| %Dominant taxon | 5 | 1 | 5 | 5 | 5 | 3 | 5 | 3 | 5 | 3 |
| %Collector-Gatherers | 1 | 3 | 3 | 3 | 3 | 1 | 3 | 3 | 1 | 1 |
| %Filterers | 1 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 3 | 1 |
| | | | | | | | | | | |
| | 40 | 26 | 38 | 38 | 44 | 32 | 36 | 38 | 34 | 32 |
| | 0.666667 | 0.433333 | 0.633333 | 0.633333 | 0.733333 | 0.533333 | 0.6 | 0.633333 | 0.566667 | 0.533333 |
| | sub-optimal | poor | sub-optimal | sub-optimal | optimal | sub-optimal | sub-optimal | sub-optimal | sub-optimal | sub-optimal |

Table 3b.

| | FOURCHETTE CREEK ALBATROSS RESERVOIR | FOURCHETTE CREEK FLASHLIGHT RESERVOIR | FOURCHETTE CREEK PENGUIN RESERVOIR | FOURCHETTE CREEK PUFFIN RESERVOIR | JACK CREEK | MDT CAMP CREEK | MDT HOSKINS LANDING | MDT KLEINSCHMIDT CREEK | MDT KLEINSCHMIDT POND |
|---|---|---|---|---|---|---|---|---|---|
| **Total taxa** | 18 | 23 | 19 | 22 | 23 | 35 | 25 | 19 | 19 |
| POET | 3 | 5 | 4 | 3 | 5 | 12 | 4 | 4 | 6 |
| Chironomidae taxa | 6 | 9 | 6 | 4 | 8 | 14 | 4 | 6 | 4 |
| Crustacea + Mollusca | 3 | 4 | 5 | 8 | 7 | 1 | 6 | 2 | 4 |
| % Chironomidae | 0.135135 | 0.265306 | 0.066116 | 0.247934 | 0.352113 | 0.37963 | 0.036697 | 0.438776 | 0.047619 |
| Orthocladiinae/Chir | 0.2 | 0.346154 | 0.625 | 0.3 | 0.52 | 0.585366 | 0.5 | 0.627907 | 0.8 |
| %Amphipoda | 0.126126 | 0.336735 | 0.578512 | 0.041322 | 0.028169 | 0 | 0.018349 | 0.010204 | 0.009524 |
| %Crustacea + %Mollusca | 0.684685 | 0.387755 | 0.77686 | 0.371901 | 0.380282 | 0.111111 | 0.541284 | 0.061224 | 0.190476 |
| HBI | 7.972973 | 7.216495 | 7.7 | 6.950413 | 7.647059 | 4.570093 | 6.59633 | 6.561224 | 6.67619 |
| %Dominant taxon | 0.495495 | 0.336735 | 0.561983 | 0.140496 | 0.15493 | 0.111111 | 0.366972 | 0.316327 | 0.552381 |
| %Collector-Gatherers | 0.873874 | 0.816327 | 0.702479 | 0.38843 | 0.394366 | 0.416667 | 0.091743 | 0.683673 | 0.114286 |
| %Filterers | 0 | 0.010204 | 0.132231 | 0.008264 | 0.042254 | 0.12037 | 0.018349 | 0.153061 | 0.047619 |
| | | | | | | | | | |
| **Total taxa** | | | | | | | | | |
| POET | 3 | 5 | 3 | 5 | 5 | 5 | 5 | 3 | 3 |
| Chironomidae taxa | 3 | 5 | 5 | 3 | 5 | 5 | 5 | 5 | 5 |
| Crustacea + Mollusca | 3 | 5 | 3 | 3 | 5 | 5 | 3 | 3 | 3 |
| % Chironomidae | 1 | 3 | 3 | 5 | 5 | 1 | 5 | 1 | 3 |
| Orthocladiinae/Chir | 5 | 3 | 5 | 3 | 3 | 3 | 5 | 1 | 5 |
| %Amphipoda | 3 | 3 | 5 | 3 | 5 | 5 | 5 | 5 | 5 |
| %Crustacea + %Mollusca | 3 | 1 | 1 | 3 | 5 | 5 | 5 | 5 | 5 |
| HBI | 1 | 3 | 1 | 3 | 3 | 5 | 3 | 5 | 5 |
| %Dominant taxon | 1 | 3 | 1 | 3 | 1 | 5 | 5 | 5 | 5 |
| %Collector-Gatherers | 1 | 5 | 1 | 5 | 5 | 5 | 3 | 5 | 1 |
| %Filterers | 5 | 5 | 3 | 1 | 1 | 1 | 1 | 3 | 1 |
| | 3 | 3 | 1 | 3 | 3 | 1 | 3 | 1 | 3 |
| | | | | | | | | | |
| | 32 | 44 | 32 | 40 | 46 | 46 | 48 | 42 | 44 |
| | 0.533333 | 0.733333 | 0.533333 | 0.666667 | 0.766667 | 0.766667 | 0.8 | 0.7 | 0.733333 |
| | sub-optimal | optimal | sub-optimal | optimal | optimal | optimal | optimal | optimal | optimal |

**Table 3d.**

| | ROUNDUP | SOUTH FORK SMITH RIVER | STILLWATER | WIGEON |
|---|---|---|---|---|
| **Total taxa** | 9 | 20 | 23 | 16 |
| POET | 0 | 5 | 4 | 3 |
| Chironomidae taxa | 4 | 7 | 9 | 5 |
| Crustacea + Mollusca | 3 | 3 | 4 | 3 |
| % Chironomidae | 0.55 | 0.482143 | 0.466667 | 0.314815 |
| Orthocladiinae/Chir | 0.072727 | 0.055556 | 0.244898 | 0.647059 |
| %Amphipoda | 0 | 0.071429 | 0.12381 | 0.481481 |
| %Crustacea + %Mollusca | 0.42 | 0.116071 | 0.180952 | 0.574074 |
| HBI | 8.89 | 6.589286 | 6.47619 | 7.534653 |
| %Dominant taxon | 0.28 | 0.294643 | 0.133333 | 0.481481 |
| %Collector-Gatherers | 0.56 | 0.839286 | 0.628571 | 0.657407 |
| %Filterers | 0.14 | 0 | 0 | 0.083333 |
| | | | | |
| **Total taxa** | | | | |
| POET | 1 | 3 | 5 | 3 |
| Chironomidae taxa | 1 | 5 | 5 | 3 |
| Crustacea + Mollusca | 3 | 5 | 5 | 3 |
| % Chironomidae | 1 | 1 | 3 | 1 |
| Orthocladiinae/Chir | 1 | 1 | 1 | 3 |
| %Amphipoda | 1 | 1 | 3 | 5 |
| %Crustacea + %Mollusca | 5 | 3 | 3 | 1 |
| HBI | 3 | 5 | 5 | 3 |
| %Dominant taxon | 1 | 5 | 5 | 3 |
| %Collector-Gatherers | 5 | 5 | 5 | 3 |
| %Filterers | 3 | 5 | 3 | 3 |
| | 1 | 3 | 3 | 1 |
| | | | | |
| | 26 | 42 | 46 | 32 |
| | 0.433333 | 0.7 | 0.766667 | 0.533333 |
| | poor | optimal | optimal | Sub-optimal |

**Aquatic Invertebrate Taxonomic Data**

**Site Name** CLOUD RANCH POND **Date Collected**

| Order | Family | Taxon | Count | Percent | Unique | BI | FFG |
|---|---|---|---|---|---|---|---|
| | | Ostracoda | 10 | 9.26% | Yes | 8 | CG |
| | | Copepoda | 2 | 1.85% | Yes | 8 | CG |
| **Amphipoda** | | | | | | | |
| | Talitridae | | | | | | |
| | | *Hyalella* | 1 | 0.93% | Yes | 8 | CG |
| **Basommatophora** | | | | | | | |
| | Lymnaeidae | | | | | | |
| | | Lymnaeidae | 15 | 13.89% | No | 6 | SC |
| | | *Stagnicola* | 1 | 0.93% | Yes | 6 | SC |
| **Diplostraca** | | | | | | | |
| | | Cladocera | 10 | 9.26% | Yes | 8 | CF |
| **Diptera** | | | | | | | |
| | Ceratopogonidae | | | | | | |
| | | Ceratopogoninae | 2 | 1.85% | Yes | 6 | PR |
| | Chironomidae | | | | | | |
| | | *Ablabesmyia* | 2 | 1.85% | Yes | 8 | CG |
| | | *Acricotopus* | 6 | 5.56% | Yes | 10 | CG |
| | | *Apedilum* | 12 | 11.11% | Yes | 11 | CG |
| | | *Cricotopus (Isocladius)* | 1 | 0.93% | Yes | 7 | SH |
| | | *Psectrocladius* | 11 | 10.19% | Yes | 8 | CG |
| | | *Pseudochironomus* | 13 | 12.04% | Yes | 5 | CG |
| **Ephemeroptera** | | | | | | | |
| | Baetidae | | | | | | |
| | | *Callibaetis* | 5 | 4.63% | Yes | 9 | CG |
| **Haplotaxida** | | | | | | | |
| | Naididae | | | | | | |
| | | *Nais* | 11 | 10.19% | Yes | 8 | CG |
| **Odonata** | | | | | | | |
| | Coenagrionidae | | | | | | |
| | | Coenagrionidae | 6 | 5.56% | Yes | 7 | PR |
| **Grand Total** | | | **108** | | | | |

**Aquatic Invertebrate Data Summary**

**Project ID:** MDT04LW
**STORET Station ID:**
**Station Name:** CLOUD RANCH POND

**Activity ID:**
**Sample Date:**

| | |
|---|---|
| Sample type | |
| SUBSAMPLE TOTAL ORGANISMS | 108 |
| Portion of sample used | 45.00% |
| Estimated number in total sample | 240 |
| Conversion factor | 2.989 |
| Estimated number in 1 square meter | 323 |
| Sampling effort | |
| | |
| Habitat type | |
| EPT abundance | 5 |
| Taxa richness | 15 |
| Number EPT taxa | 1 |
| Percent EPT | 4.63% |

**DOMINANCE**

| TAXON | ABUNDANCE | PERCENT |
|---|---|---|
| Lymnaeidae | 15 | 13.89% |
| Pseudochironomus | 13 | 12.04% |
| Apedilum | 12 | 11.11% |
| Nais | 11 | 10.19% |
| Psectrocladius | 11 | 10.19% |
| SUBTOTAL 5 DOMINANTS | 62 | 57.41% |
| Cladocera | 10 | 9.26% |
| Ostracoda | 10 | 9.26% |
| Coenagrionidae | 6 | 5.56% |
| Acricotopus | 6 | 5.56% |
| Callibaetis | 5 | 4.63% |
| TOTAL DOMINANTS | 99 | 91.67% |

**TAXONOMIC COMPOSITION**

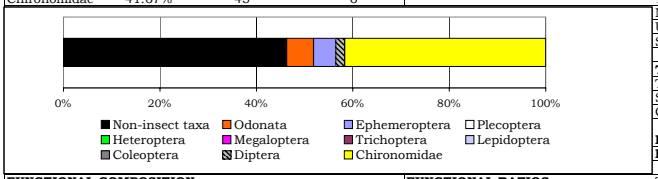
| GROUP | PERCENT | ABUNDANCE | #TAXA |
|---|---|---|---|
| Non-insect taxa | 46.30% | 50 | 7 |
| Odonata | 5.56% | 6 | 1 |
| Ephemeroptera | 4.63% | 5 | 1 |
| Plecoptera | 0.00% | 0 | 0 |
| Heteroptera | 0.00% | 0 | 0 |
| Megaloptera | 0.00% | 0 | 0 |
| Trichoptera | 0.00% | 0 | 0 |
| Lepidoptera | 0.00% | 0 | 0 |
| Coleoptera | 0.00% | 0 | 0 |
| Diptera | 1.85% | 2 | 1 |
| Chironomidae | 41.67% | 45 | 6 |

**TAXONOMIC RATIOS**

| METRIC | VALUE |
|---|---|
| EPT/Chironomidae | 0.11 |
| Baetidae/Ephemeroptera | 1.00 |
| Hydropsychidae/Trichopt | #DIV/0! |

**TOLERANCE/CONDITION INDICES**

| | |
|---|---|
| Community Tolerance Quotient (CTQa) | 104.40 |
| Hilsenhoff Biotic Index | 7.32 |




**DIVERSITY**

| | |
|---|---|
| Shannon H (loge) | 3.97 |
| Shannon H (log2) | 2.76 |
| Margalef D | 3.20 |
| Simpson D | 0.09 |
| Evenness | 0.17 |

**VOLTINISM**

| TYPE | ABUNDANCE | # TAXA | PERCENT |
|---|---|---|---|
| Multivoltine | 72 | 10 | 66.67% |
| Univoltine | 36 | 6 | 33.33% |
| Semivoltine | 0 | 0 | 0.00% |

| TAXA CHARACTERS | #TAXA | PERCENT |
|---|---|---|
| Tolerant | 6 | 37.04% |
| Sensitive | 0 | 0.00% |
| Clinger | 1 | 0.93% |

**FUNCTIONAL COMPOSITION**

| GROUP | PERCENT | ABUNDANCE | #TAXA |
|---|---|---|---|
| Predator | 7.41% | 8 | 2 |
| Parasite | 0.00% | 0 | 0 |
| Gatherer | 67.59% | 73 | 10 |
| Filterer | 9.26% | 10 | 1 |
| Herbivore | 0.00% | 0 | 0 |
| Piercer | 0.00% | 0 | 0 |
| Scraper | 14.81% | 16 | 2 |
| Shredder | 0.93% | 1 | 1 |
| Omnivore | 0.00% | 0 | 0 |
| Unknown | 0.00% | 0 | 0 |

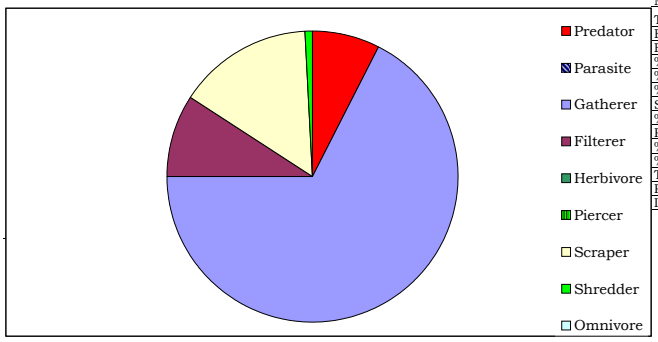
**FUNCTIONAL RATIOS**

| METRIC | VALUE |
|---|---|
| Scraper/Filterer | 1.60 |
| Scraper/Scraper + Filtere | 0.62 |

**BIOASSESSMENT INDICES**

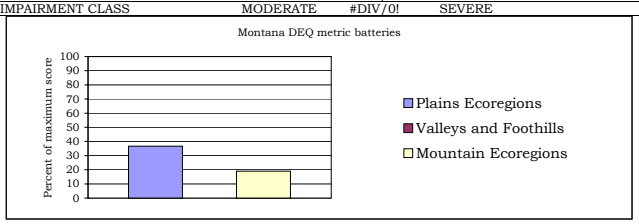
**B-IBI (Karr et al. )**

| METRIC | VALUE | SCORE |
|---|---|---|
| Taxa richness | 15 | 1 |
| E richness | 1 | 1 |
| P richness | 0 | 1 |
| T richness | 0 | 1 |
| Long-lived | 0 | 1 |
| Sensitive richness | 0 | 1 |
| %tolerant | 37.04% | 3 |
| %predators | 7.41% | 1 |
| Clinger richness | 1 | 1 |
| %dominance (3) | 37.04% | 5 |
| | TOTAL SCORE | 16 32% |




**MONTANA DEQ INDICES (Bukantis 1998)**

| METRIC | VALUE | Plains Ecoregions | Valleys and Foothills | Mountain Ecoregions |
|---|---|---|---|---|
| Taxa richness | 15 | 1 | 1 | 0 |
| EPT richness | 1 | 0 | 0 | 0 |
| Biotic Index | 7.32 | 0 | 0 | 0 |
| %Dominant taxon | 13.89% | 3 | 3 | 3 |
| %Collectors | 76.85% | 2 | 1 | 1 |
| %EPT | 4.63% | 0 | 0 | 0 |
| Shannon Diversity | 2.76 | 2 | | |
| %Scrapers +Shredde | 15.74% | 2 | 1 | 0 |
| Predator taxa | 2 | 0 | | |
| %Multivoltine | 66.67% | 1 | | |
| %H of T | #DIV/0! | | #DIV/0! | |
| TOTAL SCORES | | 11 | #DIV/0! | 4 |
| PERCENT OF MAXIMUM | | 36.67 | #DIV/0! | 19.05 |
| IMPAIRMENT CLASS | | MODERATE | #DIV/0! | SEVERE |




**COMMUNITY TOLERANCES**

| | |
|---|---|
| Sediment tolerant taxa | 2 |
| Percent sediment tolerant | 14.81% |
| Sediment sensitive taxa | 0 |
| Percent sediment sensitive | 0.00% |
| Metals tolerance index (McGuire) | 3.11 |
| Cold stenotherm taxa | 0 |
| Percent cold stenotherms | 0.00% |

**Montana Valleys and Foothills revised index (Bollman 1998)**

| | | | |
|---|---|---|---|
| Percent max. | 11.11% | Impairment class | SEVERE |

**Montana Plains ecoregions metrics (Bramblett and Johnson 2002)**

| *Riffle* | | *Pool* | |
|---|---|---|---|
| EPT richness | 1 | E richness | 1 |
| Percent EPT | 4.63% | T richness | 0 |
| Percent Oligochaetes and Leeches | 10.19% | Percent EPT | 4.63% |
| Percent 2 dominants | 25.93% | Percent non-insect | 46.30% |
| Filterer richness | 1 | Filterer richness | 1 |
| Percent intolerant | 0.00% | Univoltine richness | 6 |
| Univoltine richness | 6 | Percent supertolerant | 64.81% |
| Percent clingers | 0.93% | | |
| Swimmer richness | 1 | | |

**HABITUS MEASURES**

| | |
|---|---|
| Hemoglobin bearer richness | 1 |
| Percent hemoglobin bearers | 12.04% |
| Air-breather richness | 0 |
| Percent air-breathers | 0.00% |
| Burrower richness | 2 |
| Percent burrowers | 13.89% |
| Swimmer richness | 1 |
| Percent swimmers | 4.63% |

**Aquatic Invertebrate Taxonomic Data**

**Site Name** CLOUD RANCH STREAM **Date Collected**

| Order | Family | Taxon | Count | Percent | Unique | BI | FFG |
|---|---|---|---|---|---|---|---|
| **Coleoptera** | | | | | | | |
| | Dytiscidae | | | | | | |
| | | Dytiscidae | 1 | 1.00% | Yes | 5 | PR |
| **Diptera** | | | | | | | |
| | Chironomidae | | | | | | |
| | | Eukiefferiella Brehmi Gr. | 1 | 1.00% | Yes | 8 | CG |
| | | *Micropsectra* | 38 | 38.00% | Yes | 4 | CG |
| | | *Odontomesa* | 11 | 11.00% | Yes | 4 | CG |
| | | *Orthocladius* | 8 | 8.00% | Yes | 6 | CG |
| | | *Pagastia* | 1 | 1.00% | Yes | 1 | CG |
| | | *Parametriocnemus* | 3 | 3.00% | Yes | 5 | CG |
| | | *Phaenopsectra* | 3 | 3.00% | Yes | 7 | SC |
| | | *Stempellinella* | 1 | 1.00% | Yes | 4 | CG |
| | | *Tanytarsus* | 15 | 15.00% | Yes | 6 | CF |
| | | Thienemannimyia Gr. | 1 | 1.00% | Yes | 5 | PR |
| | | Tvetenia Bavarica Gr. | 2 | 2.00% | Yes | 5 | CG |
| | Empididae | | | | | | |
| | | *Chelifera* | 3 | 3.00% | Yes | 5 | PR |
| | Tipulidae | | | | | | |
| | | *Hexatoma* | 1 | 1.00% | Yes | 2 | PR |
| **Ephemeroptera** | | | | | | | |
| | Baetidae | | | | | | |
| | | *Centroptilum* | 1 | 1.00% | Yes | 2 | CG |
| | Leptohyphidae | | | | | | |
| | | *Tricorythodes* | 1 | 1.00% | Yes | 4 | CG |
| **Haplotaxida** | | | | | | | |
| | Naididae | | | | | | |
| | | *Nais* | 6 | 6.00% | Yes | 8 | CG |
| **Trichoptera** | | | | | | | |
| | Brachycentridae | | | | | | |
| | | *Brachycentrus* | 1 | 1.00% | No | 1 | CF |
| | | *Brachycentrus americanus* | 1 | 1.00% | Yes | 1 | CF |
| **Veneroida** | | | | | | | |
| | Pisidiidae | | | | | | |
| | | Pisidiidae | 1 | 1.00% | Yes | 8 | CG |
| **Grand Total** | | | **100** | | | | |

**Aquatic Invertebrate Data Summary**

**Project ID:** MDT04LW
**STORET Station ID:**
**Station Name:** CLOUD RANCH STREAM

**Activity ID:**
**Sample Date:**

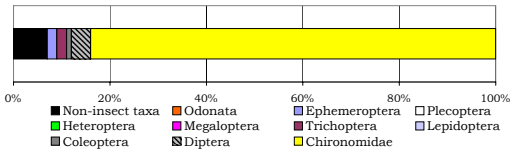
| | |
|---|---|
| Sample type | |
| SUBSAMPLE TOTAL ORGANISMS | 100 |
| Portion of sample used | 4.17% |
| Estimated number in total sample | 2400 |
| Conversion factor | 32.280 |
| Estimated number in 1 square meter | 3228 |
| Sampling effort | |
| | |
| Habitat type | |
| EPT abundance | 4 |
| Taxa richness | 19 |
| Number EPT taxa | 3 |
| Percent EPT | 4.00% |

**TAXONOMIC COMPOSITION**

| GROUP | PERCENT | ABUNDANCE | #TAXA |
|---|---|---|---|
| Non-insect taxa | 7.00% | 7 | 2 |
| Odonata | 0.00% | 0 | 0 |
| Ephemeroptera | 2.00% | 2 | 2 |
| Plecoptera | 0.00% | 0 | 0 |
| Heteroptera | 0.00% | 0 | 0 |
| Megaloptera | 0.00% | 0 | 0 |
| Trichoptera | 2.00% | 2 | 2 |
| Lepidoptera | 0.00% | 0 | 0 |
| Coleoptera | 1.00% | 1 | 1 |
| Diptera | 4.00% | 4 | 2 |
| Chironomidae | 84.00% | 84 | 11 |

**TAXONOMIC RATIOS**

| METRIC | VALUE |
|---|---|
| EPT/Chironomidae | 0.05 |
| Baetidae/Ephemeroptera | 0.50 |
| Hydropsychidae/Trichopt | 0.00 |

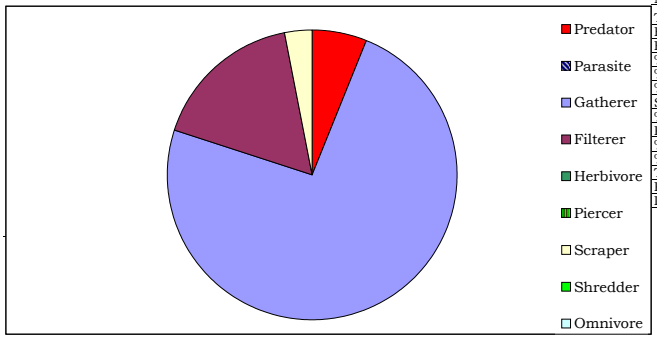



**FUNCTIONAL COMPOSITION**

| GROUP | PERCENT | ABUNDANCE | #TAXA |
|---|---|---|---|
| Predator | 6.00% | 6 | 4 |
| Parasite | 0.00% | 0 | 0 |
| Gatherer | 74.00% | 74 | 12 |
| Filterer | 17.00% | 17 | 3 |
| Herbivore | 0.00% | 0 | 0 |
| Piercer | 0.00% | 0 | 0 |
| Scraper | 3.00% | 3 | 1 |
| Shredder | 0.00% | 0 | 0 |
| Omnivore | 0.00% | 0 | 0 |
| Unknown | 0.00% | 0 | 0 |

**FUNCTIONAL RATIOS**

| METRIC | VALUE |
|---|---|
| Scraper/Filterer | 0.18 |
| Scraper/Scraper + Filtere | 0.15 |




**COMMUNITY TOLERANCES**

| | |
|---|---|
| Sediment tolerant taxa | 2 |
| Percent sediment tolerant | 2.00% |
| Sediment sensitive taxa | 0 |
| Percent sediment sensitive | 0.00% |
| Metals tolerance index (McGuire) | 2.77 |
| Cold stenotherm taxa | 0 |
| Percent cold stenotherms | 0.00% |

**HABITUS MEASURES**

| | |
|---|---|
| Hemoglobin bearer richness | 1 |
| Percent hemoglobin bearers | 3.00% |
| Air-breather richness | 2 |
| Percent air-breathers | 2.00% |
| Burrower richness | 2 |
| Percent burrowers | 4.00% |
| Swimmer richness | 1 |
| Percent swimmers | 1.00% |

**DOMINANCE**

| TAXON | ABUNDANCE | PERCENT |
|---|---|---|
| Micropsectra | 38 | 38.00% |
| Tanytarsus | 15 | 15.00% |
| Odontomesa | 11 | 11.00% |
| Orthocladius | 8 | 8.00% |
| Nais | 6 | 6.00% |
| SUBTOTAL 5 DOMINANTS | 78 | 78.00% |
| Chelifera | 3 | 3.00% |
| Parametriocnemus | 3 | 3.00% |
| Phaenopsectra | 3 | 3.00% |
| Tvetenia Bavarica Gr. | 2 | 2.00% |
| Pisidiidae | 1 | 1.00% |
| TOTAL DOMINANTS | 90 | 90.00% |

**TOLERANCE/CONDITION INDICES**

| | |
|---|---|
| Community Tolerance Quotient (CTQa) | 87.94 |
| Hilsenhoff Biotic Index | 4.84 |

**DIVERSITY**

| | |
|---|---|
| Shannon H (loge) | 2.98 |
| Shannon H (log2) | 2.07 |
| Margalef D | 4.12 |
| Simpson D | 0.19 |
| Evenness | 0.10 |

**VOLTINISM**

| TYPE | ABUNDANCE | # TAXA | PERCENT |
|---|---|---|---|
| Multivoltine | 85 | 12 | 85.00% |
| Univoltine | 12 | 5 | 12.00% |
| Semivoltine | 3 | 3 | 3.00% |

| **TAXA CHARACTERS** | #TAXA | PERCENT |
|---|---|---|
| Tolerant | 3 | 3.00% |
| Sensitive | 0 | 0.00% |
| Clinger | 4 | 20.00% |

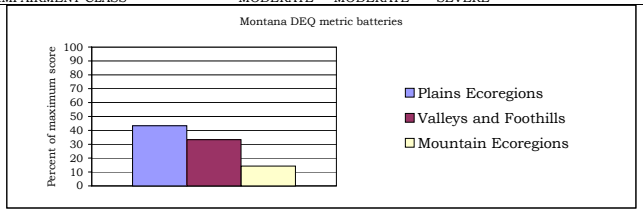
**BIOASSESSMENT INDICES**

**B-IBI (Karr et al. )**

| METRIC | VALUE | SCORE |
|---|---|---|
| Taxa richness | 19 | 1 |
| E richness | 2 | 1 |
| P richness | 0 | 1 |
| T richness | 2 | 1 |
| Long-lived | 3 | 3 |
| Sensitive richness | 0 | 1 |
| %tolerant | 3.00% | 5 |
| %predators | 6.00% | 1 |
| Clinger richness | 4 | 1 |
| %dominance (3) | 64.00% | 3 |
| TOTAL SCORE | | 18 36% |

**MONTANA DEQ INDICES (Bukantis 1998)**

| METRIC | VALUE | Plains Ecoregions | Valleys and Foothills | Mountain Ecoregions |
|---|---|---|---|---|
| Taxa richness | 19 | 2 | 1 | 1 |
| EPT richness | 3 | 1 | 0 | 0 |
| Biotic Index | 4.84 | 3 | 2 | 1 |
| %Dominant taxon | 38.00% | 2 | 2 | 1 |
| %Collectors | 91.00% | 1 | 0 | 0 |
| %EPT | 4.00% | 0 | 0 | 0 |
| Shannon Diversity | 2.07 | 1 | | |
| %Scrapers +Shredde | 3.00% | 1 | 0 | 0 |
| Predator taxa | 4 | 2 | | |
| %Multivoltine | 85.00% | 0 | | |
| %H of T | 0.00% | | 3 | |
| TOTAL SCORES | | 13 | 8 | 3 |
| PERCENT OF MAXIMUM | | 43.33 | 33.33 | 14.29 |
| IMPAIRMENT CLASS | | MODERATE | MODERATE | SEVERE |




**Montana Valleys and Foothills revised index (Bollman 1998)**

| | | | |
|---|---|---|---|
| Percent max. | 33.33% | Impairment class | MODERATE |

**Montana Plains ecoregions metrics (Bramblett and Johnson 2002)**

| *Riffle* | | *Pool* | |
|---|---|---|---|
| EPT richness | 3 | E richness | 2 |
| Percent EPT | 4.00% | T richness | 2 |
| Percent Oligochaetes and Leeches | 6.00% | Percent EPT | 4.00% |
| Percent 2 dominants | 53.00% | Percent non-insect | 7.00% |
| Filterer richness | 3 | Filterer richness | 3 |
| Percent intolerant | 5.00% | Univoltine richness | 5 |
| Univoltine richness | 5 | Percent supertolerant | 8.00% |
| Percent clingers | 20.00% | | |
| Swimmer richness | 1 | | |

# Appendix G

## U.S. Army Corp of Engineers
## Preliminary Wetland Credit Assessment

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

RECEIVED
OCT 31 2002
ENVIRONMENTAL
REPLY TO
ATTENTION OF:

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

October 7, 2002

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

Subject: Corps File Number 2002-90-578
Heminway Property Wetland Project
Preliminary Wetland Credit Assessment

Mr. 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 |
| **Summary of Potential Wetland Credit Available:** | -- | **5.49 acres** |

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, and reference Corps File Number 2002-90-578.

Sincerely,

Todd N. Tillinger, P.E.
Project Manager

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