MONTANA DEPARTMENT OF TRANSPORTATION
WETLAND MITIGATION MONITORING REPORT: YEAR 2006

Cloud Ranch
Big Timber, Montana

Prepared for:

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

Prepared by:

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

December 2006

Project No: B43054.00 - 0504

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1.0 INTRODUCTION

This report summarizes the methods and results of the third 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** in **Appendix A**.

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

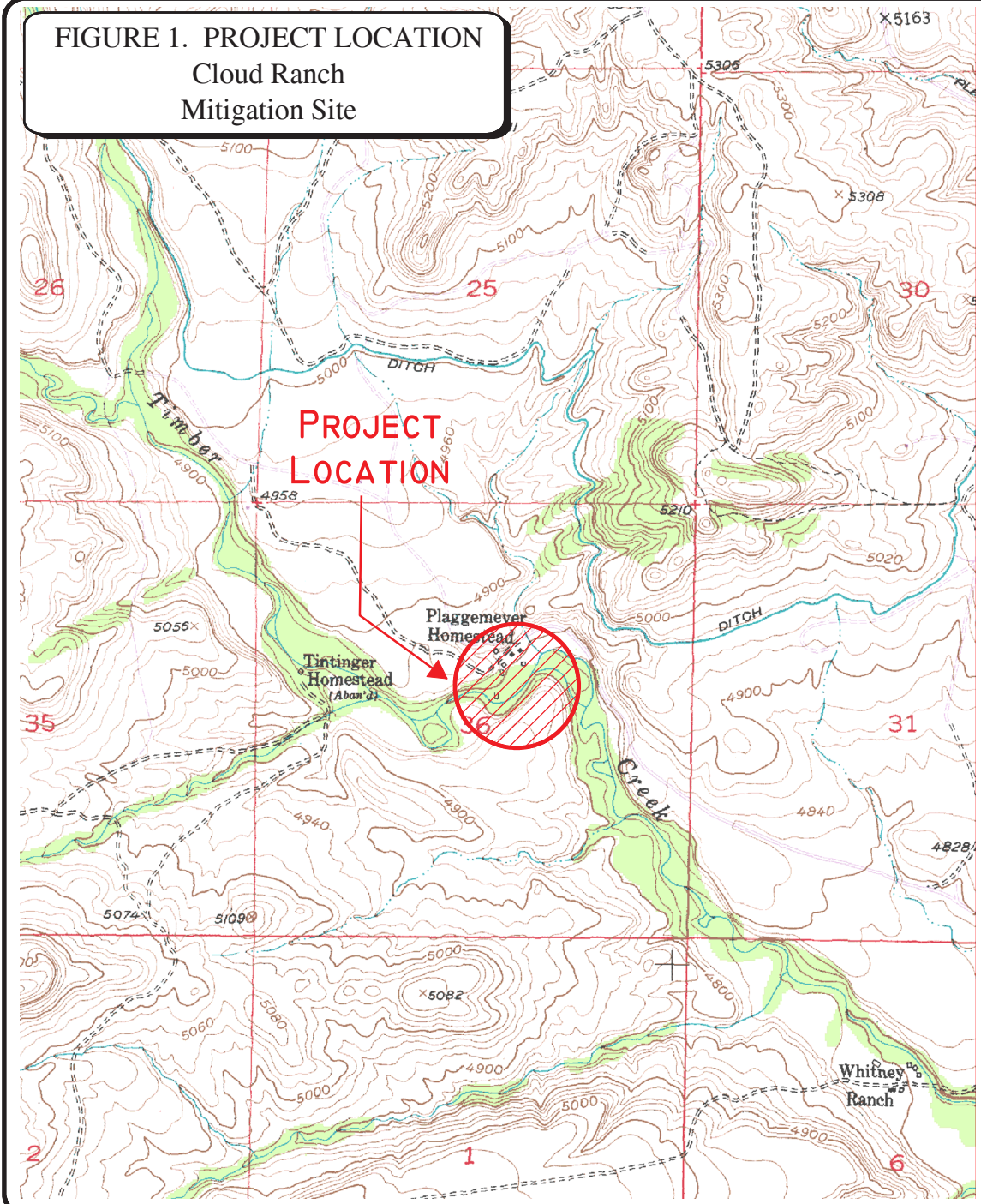
Wetland restoration and creation activities resulted in the temporary disturbance of 0.03 acre of existing wetlands. For the purposes of the report, each area (off-channel wetlands and Big Timber Creek) will be addressed separately, but the acreages will be tallied as one site.

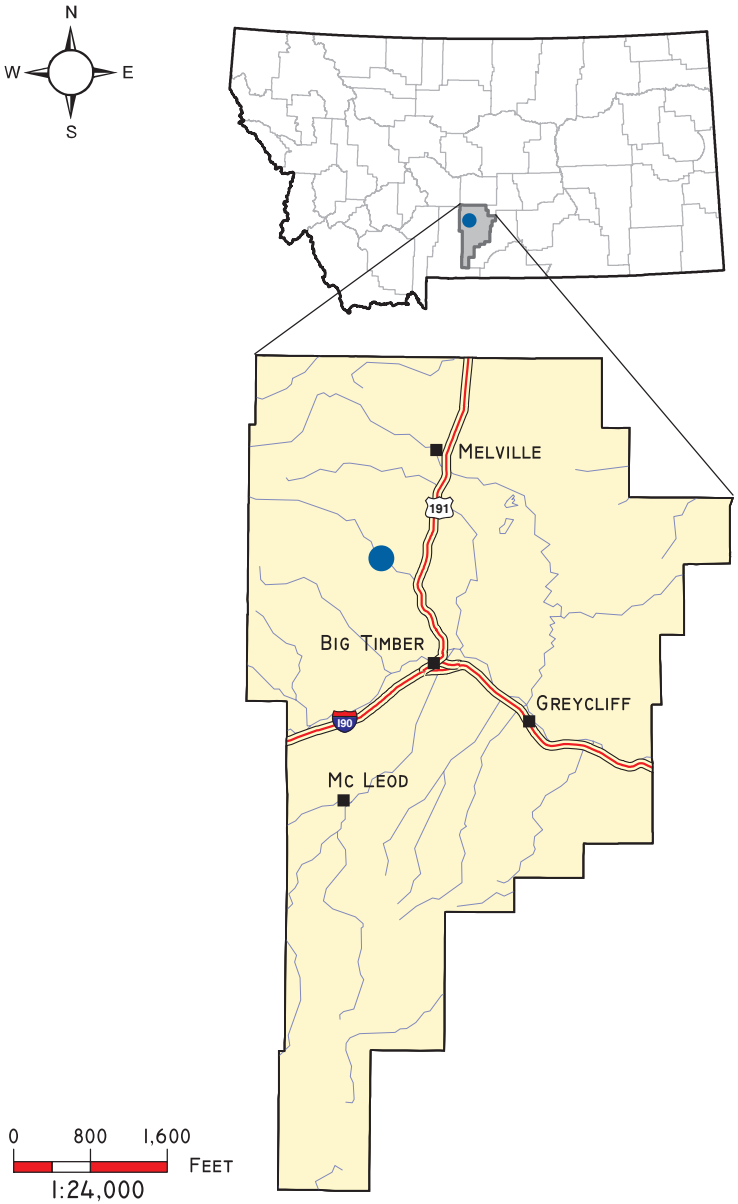
2.0 METHODS

2.1 Monitoring Dates and Activities

The project site was visited on July 24, 2006 to ascertain breeding bird and other wildlife use. The primary monitoring visit was conducted on August 1, 2006 **(Appendix B)**. Activities and information conducted/collected during the monitoring event included: wetland delineation; wetland/open water boundary mapping; vegetation community mapping; survival of planted woody vegetation, vegetation transects; soils data; hydrology data; bird and general wildlife use; photograph points; macroinvertebrate sampling; functional assessment; and maintenance needs.

FIGURE 1. PROJECT LOCATION
Cloud Ranch
Mitigation Site





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

LAND & WATER CONSULTING
PO Box 239
Helena, MT 59624
A Division Of PBS&J

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 2006 were compared to the 1894-2006 average (WRCC 2006).

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** in **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** in **Appendix A)**. Coverage of the dominant species in each community type is listed on the Wetland Mitigation Site Monitoring Form **(Appendix B)**. A comprehensive plant species list for the entire site was compiled and will be updated as new species are encountered. Observations from past year will be compared with new data to document vegetation changes over time. The assessment area is fenced and woody species were planted along the creek. Qualitative observations were used to assess the survival of the planted woody species. The visual assessment included written estimates of species survival along the transect length as well as the stream channel and floodplain.

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

2.4 Soils

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

2.5 Wetland Delineation

A wetland delineation was conducted within the assessment area according to the 1987 COE Wetland Delineation Manual. Wetland and upland areas within the monitoring area were investigated for the presence of wetland hydrology, hydrophytic vegetation and hydric soils. The

information was recorded on the COE Routine Wetland Delineation Forms **(Appendix B)**. The indicator status of vegetation was derived from the National List of Plant Species that Occur in Wetlands: Northwest Region 9 (Reed 1988). The wetland/upland and open water boundaries were mapped onto 2005 aerial photos in the field and 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 Mitigation Site 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 is updated as new species are encountered.

2.7 Birds

Bird observations were recorded during the July 24th site visit according to the established bird survey protocol **(Appendix E).** A general, qualitative bird list has been compiled using these observations.

2.8 Macroinvertebrates

One macroinvertebrate composite sample was collected during the site visit following the Macroinvertebrate Samping Protocol (**Appendix F**). A sample was collected from the existing wetland pond located in the northeast corner of the project site. The sample was preserved as outlined in the sampling procedure and sent to Rhithron Associates for analysis. The approximate sampling location is indicated on **Figure 2** in **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 (Berglund 1999). 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 have thus far not been received for use in monitoring reports. For each wetland or group of wetlands (that share similar functions and values) a Functional Assessment form was completed (**Appendix B**).

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** in **Appendix A**. All photographs were taken using a digital camera.

2.11 GPS Data

During the 2004 monitoring season survey points were collected using a resource grade Trimble Geoexplorer III hand-held GPS unit (**Appendix E**). Points collected included: the beginning and end locations of the vegetation transects, the wetland boundary, and the sample point (SP) locations. In addition, GPS data were collected for four (4) landmarks recognizable on the air photo for purposes of line fitting to the topography. In 2004, the wetland delineation boundary was recorded on an aerial photo along the creek channel where GPS signals were unattainable. No additional GPS data were collected in 2006.

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

<u>Big Timber Creek</u>

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 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** in **Appendix A**.

During the 2006 monitoring visit, continued channel movement was observed within the re-constructed creek and floodplain. High water marks, overbank flows, and bank loss were noted. High water flows have eroded deposition sediments (silts and clay) and organic matter from point bars of inside bends and wetlands mapped during 2004 and 2005 monitoring. Many of these areas have been replaced with gravels and/or cobbles. The most notable change in the channel movement was near photo point F (**Figure 2**). The stream has created a new channel by

cutting through a small point bar/wetland. The abandoned channel is now a broad dry rocky meander (**Photograph E** in **Appendix C**). The lateral movement of the creek will continue to create terraces with varying levels and changes in vegetation. Primary hydrology indicators observed during the August 1, 2006 monitoring visit included saturation within the upper 12 inches, and/or inundation, water marks, drift lines, and sediment deposits.

According to USGS data collected on the Boulder River (Big Timber station) for 2006, high daily discharge flows in May through June 2006 were approximately 4,000 cubic per second (cfs) compared to daily flows of less than 100 cfs in August through September 2006. It is likely that the warm temperatures in May, followed by the June rain showers were responsible for the changes in the Big Timber Creek high flows and subsequent channel migration and bank loss (USGS 2006).

In addition to peak flows in the spring, the Cloud Ranch measured almost 6 inches of rain in 4 hours which also contributed to high flows. The project designer, Tom Coleman (Aquatic Design & Construction), observed similar channel movements on other reaches of Big Timber Creek resulting from the same 6 inch/4 hour rainfall event. Based on his August 2006 review, he commented that the upper reach of channel has narrowed, which is favorable. According to Mr. Coleman, the upper end of the lowest reach is likely to continue shifting before it stabilizes and some minor intervention in this area may be warranted.

Off-channel restored/created wetlands

A drained pond within an historic oxbow of Big Timber Creek was graded and revegetated with herbaceous wetland plants. The unnamed spring creek channel was originally ditched through most of the pond system. As part of the restoration activities, a new sinuous channel was developed through the wetland complex where a series of low structures were created to mimic a condition analogous to a series of abandoned beaver ponds. Three (3) water level control structures were installed as well as several small dikes to promote inundation of the created and existing wetlands. An embankment was also removed from the pond to lower water surface levels consistent with the existing wetland area to the south. Several ponds or "over-widened" sections of the existing spring creek channel were filled and revegetated with herbaceous wetland plants. During the August 1, 2006 monitoring visit approximately 90% 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** in **Appendix A**.

According to the Western Regional Climate Center (WRCC), the Big Timber weather station has calculated a mean annual precipitation of 15.38 inches from 1894 through July 2006 (last updated file). The average precipitation through the month of May for that period was 6.24 inches. For the year 2006, precipitation through May was 4.49 inches or 72% of the mean indicating that the spring of 2006 (through May) was drier compared to historic precipitation. However, the 4 inch precipitation event measured at the Cloud Ranch was not shown/recorded on the Big Timber weather station data.

3.2 Vegetation

Vegetation species identified on the site are presented in **Table 1,** and in the Monitoring Form **(Appendix B)**. A total of seven community types were documented at the site, of which five are vegetated wetland types. These vegetation community types were identified and mapped on the

Table 1: ***2004 to 2006 Big Timber Creek riverine and off-channel wetland vegetation species list.***

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

Table 1 (continued): ***2004 to 2006 Big Timber Creek riverine and off-channel wetland vegetation species list.***

Scientific Name	Region 9 (Northwest) Wetland Indicator Status [1, 2]
Juncus ensifolius	FACW
Juncus longistylis	FACW
Juncus mertensianus	OBL
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 palustris	FAC
Poa pratensis	FACU+
Prunus virginiana	FACU
Puccinellia distans	OBL
Rumex crispus	FAC+
Salix exigua	OBL
Scirpus acutus	OBL
Scirpus microcarpus	OBL
Scirpus validus	OBL
Senecio integerimus	**FAC**
Solidago c*anadensis*	FACU
Solidago occidentalis	FACW
Spartina pectinata	OBL
Symphoricarpos albus	FACU
Trifolium fragiferum	FACU
Tragopogon dubius	(FACU)
Typha latifolia	OBL
Veronica americana	OBL
Verbascum thapsus	(UPL)

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

mitigation areas (**Figure 3** in **Appendix A**). The vegetation types along the Big Timber Creek include: Type 1 *Bromus inermis/Agropyron repens,* Type 2, *Populus angustifolia/Agrostis alba* and, Type 3, *Agrostis alba.* Dominant species within each community are listed on the Monitoring Form (**Appendix B**). Hydrophytic vegetation communities are changing in size, diversity and cover values over time.

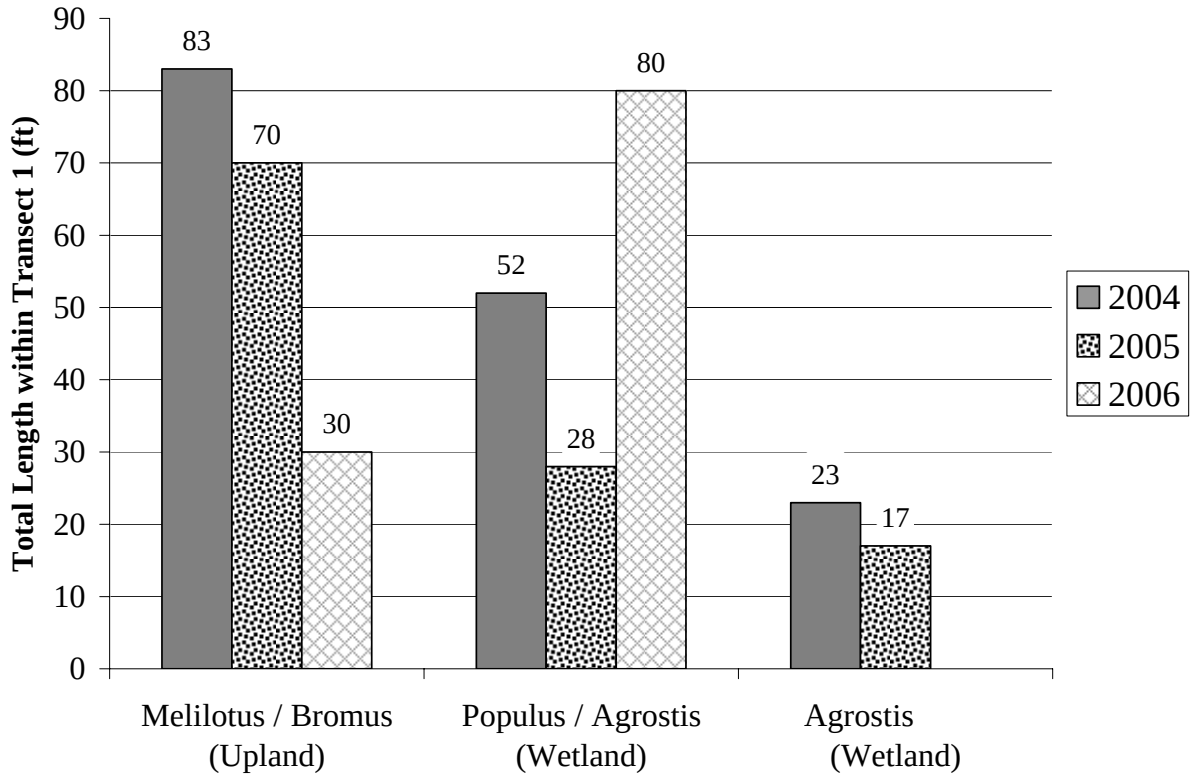
The vegetation types within the off-channel wetlands include: Type 4, *Juncus sp./Mixed Herbaceous Species*, Type 5, *Glyceria sp./Carex sp.*, Type 6, *Typha latifolia/Scirpus sp.* and, Type 7, *Bromus sp./Agropyron sp*. Dominant species within each community are also listed on the Monitoring Form (**Appendix B**). There are approximately 37 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 and are summarized below in **Tables 2a** and **2b**. Transect 1 is located in the upper reach of Big Timber Creek and spans from upland to upland across the channel, wetlands and floodplain (**Table 2a; Charts 1** and **2**).

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

Monitoring Year	2004	2005	2006
Transect Length (feet)	195	195	195
# Vegetation Community Transitions along Transect	3	3	3
# Vegetation Communities along Transect	3	3	2
# Hydrophytic Vegetation Communities along Transect	1	2	1
Total Vegetative Species	19	18	15
Total Hydrophytic Species	11	8	7
Total Upland Species	9	10	8
Estimated % Total Vegetative Cover	60	71	73
% Transect Length Comprised of Hydrophytic Vegetation Communities	25	23	41
% Transect Length Comprised of Upland Vegetation Communities	40	36	15
% Transect Length Comprised of Unvegetated Open Water	25	15	8
% Transect Length Comprised of Bare Substrate	10	26	36

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



The charts evaluate trends in vegetation community cover as well as the effects of the Big Timber creek flows within the project area. **Chart 1** presents the length of each vegetation community along the transect with a comparison between the past three years. **Chart 1** shows a significant increase in the wetland Community type 2 in 2006 and a reduction in the upland Community type 1. Factors influencing the increase in 2006 are attributed to the high flows in 2006. **Chart 2** shows the effect of high flows with an increase of gravels and a narrowing of the creek channel.

Transect 2 is located along the northern quarter of the off-channel restored wetlands (**Table 2b; Charts 3** and **4**). These charts show graphically the length of the different vegetation communities for the past three years. The off-channel wetland Community type 4 represents over 93 percent of the cover along Transect 2 and has gained 78 feet since 2004. The upland Community type 7 shows a steady reduction in the overall length of 11 feet since 2004.

Chart 2: ***Transect map showing vegetation types of Transect 1 from start (0 feet) to end (195 feet) from 2004 to 2006.***

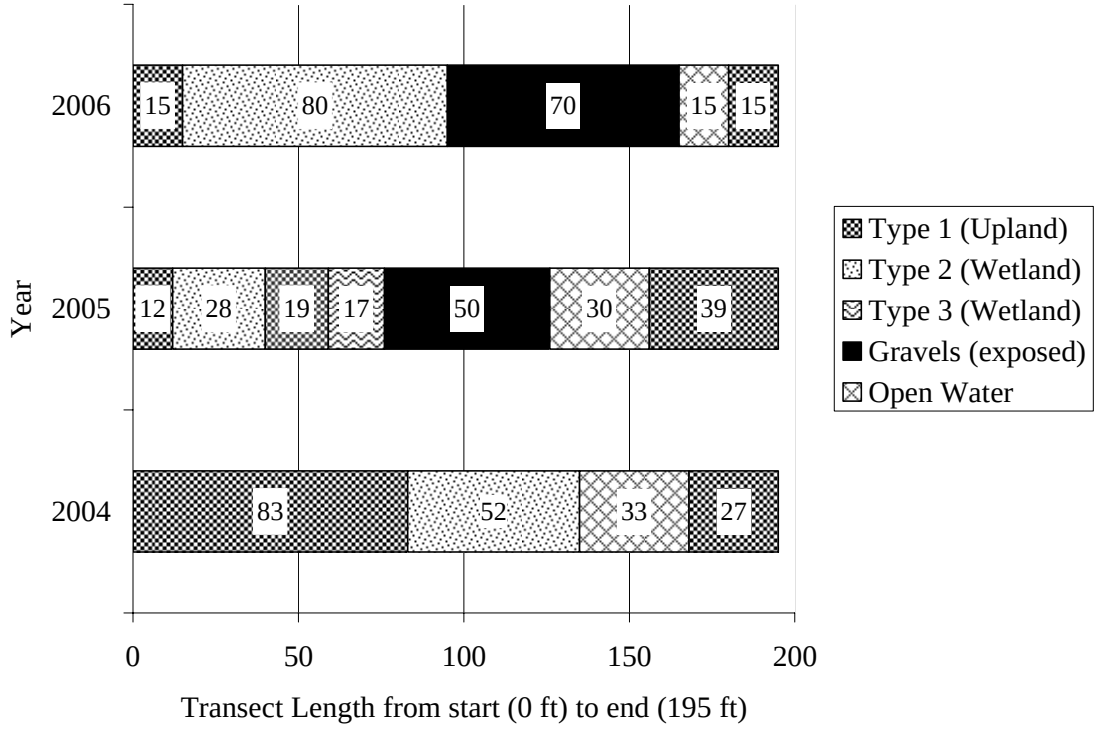


Table 2b: ***2004 to 2006 Transect 2 data summary.***

Monitoring Year	2004	2005	2006
Transect Length (feet)	200	200	200
# Vegetation Community Transitions along Transect	2	2	2
# Vegetation Communities along Transect	3	2	2
# Hydrophytic Vegetation Communities along Transect	1	1	1
Total Vegetative Species	12	15	19
Total Hydrophytic Species	7	10	9
Total Upland Species	3	5	10
Estimated % Total Vegetative Cover	60	70	83
% Transect Length Comprised of Hydrophytic Vegetation Communities	54	90	93
% Transect Length Comprised of Upland Vegetation Communities	21	8	6.5
% Transect Length Comprised of Unvegetated Open Water	0	2	0
% Transect Length Comprised of Bare Substrate	25	2	.5

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

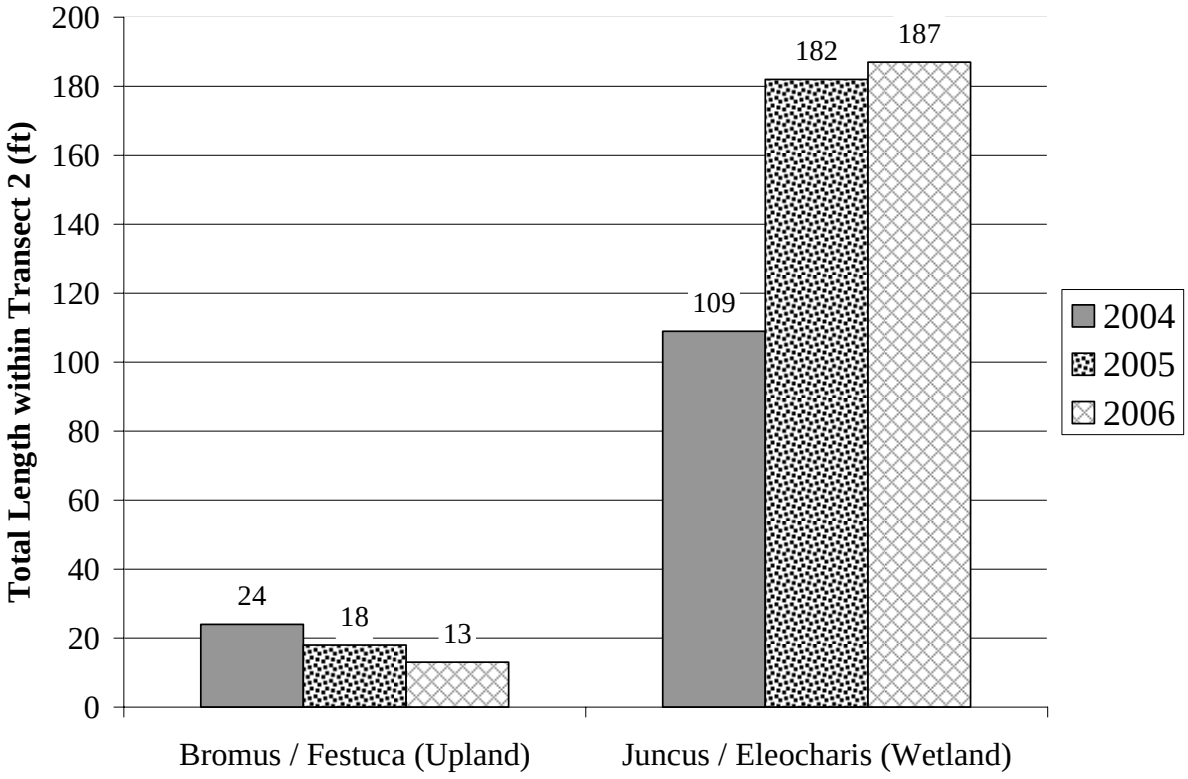
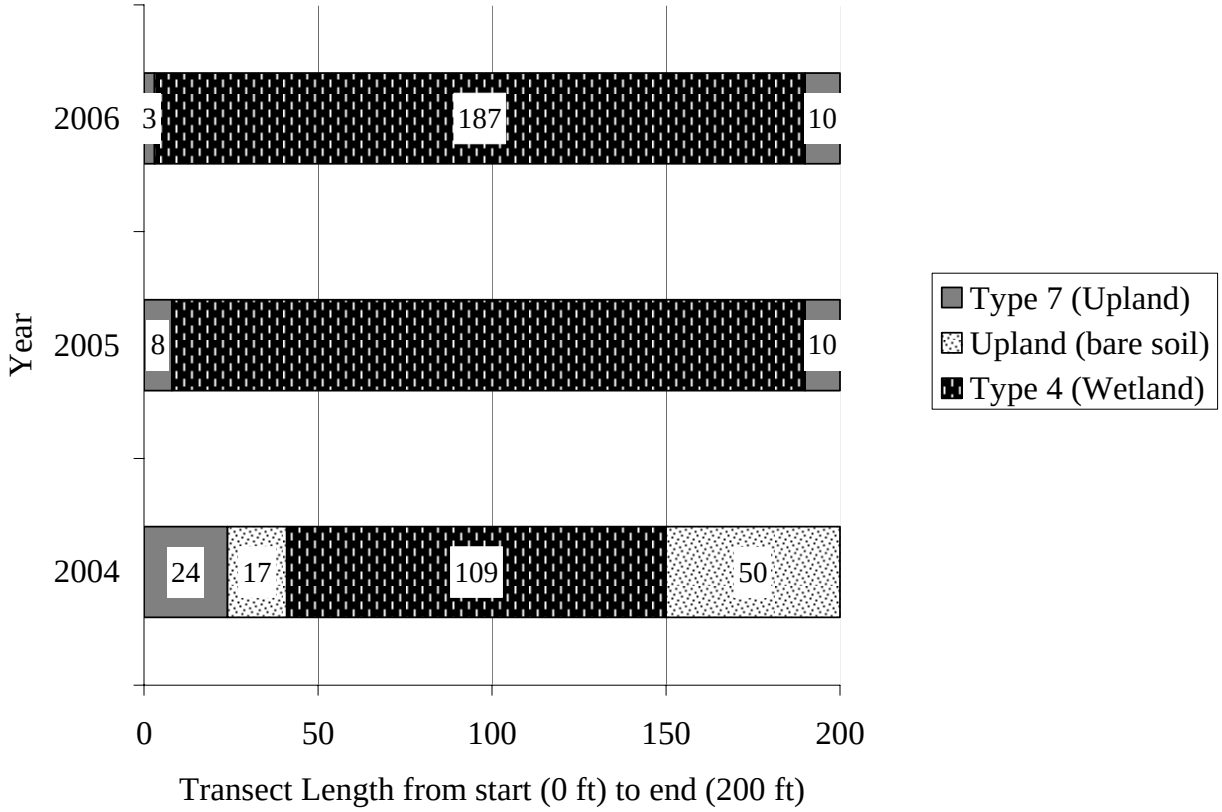


Chart 4: ***Transect map showing vegetation types of Transect 2 from start (0 feet) to end (200 feet) from 2004 to 2006.***



The south, southwestern and southeastern portions of upland Community type 7 was inundated with several inches of water during the August monitoring visit. As the saturation zones expand into the upland areas, hydrophytic vegetation is encroaching into the saturated/inundated soils. *Agrostis alba* (FACW) is encroaching into saturated upland areas and replaced an upland area in the far southeast corner of the project site. The expansion of Community type 5 continues to encroach into Community type 7 boundaries, as noted during the 2005 and 2006 monitoring visits. Community type 5 is the most diverse wetland type, with a wide variety of wetland species. Community type 6 is expanding into areas of ponded or flowing water. There is a reduction in sparsely vegetated or bare soil compared to 2005.

Changes in the vegetation along Big Timber Creek include the transition of uplands areas to wetland areas, loss of wetland/upland banks due to channel migration, and improved vegetation cover and diversity in both riparian wetland and uplands in addition to the buffer areas. Young *Populus angustifolia* and *Salix* species seedlings are increasing in size, ranging from 12 to 32 inches tall. As these plants mature, there growth habit will eventually aid in reducing the energy of high water flows.

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

original willow cuttings planted are still in place and alive. In 2006, the majority of the willow cuttings planted in the upper reaches of the reconstructed channel were gone due to high water flows. Cuttings were still present and viable in the lower reaches of the channel. It is estimated that approximately 10 percent of the original willow cuttings planted remain in place and alive.

In 2004, the estimated survival of transplanted cottonwood seedlings was approximately 60 to 65 percent. The cottonwoods were planted further inland and were not negatively affected by high water flows. Few dead or declining cottonwood seedlings were noted during the 2005 and 2006 field survey. During the 2006 field survey, cottonwood seedlings were generally robust and healthy with new growth. Details of the plant survival along the stream channel can be found in **Appendix B (**page 6).

Natural recruitment of willows and cottonwoods was noted primarily on the two larger, more stable terraces along the creek. Numerous volunteer cottonwoods were noted on the terrace along the western side of the creek where the transect is located. The large inside curve on the southwestern side of the creek was growing numerous cottonwood root suckers and some young willows.

Three Category I state noxious weed species were present at the site in 2006: hounds tongue (*Cynoglossum officinale*), Canada thistle (*Cirsium arvense*), and spotted knapweed (*Centaurea maculosa*). Areas with weeds were not mapped on the 2006 **Figure 3** as they do not constitute discreet vegetation communities. Canada thistle, hounds tongue and spotted knapweed were observed in the bank areas along Big Timber Creek as small and sporadic infestations. Canada thistle was observed within the off-channel restored/created wetlands and the disturbed uplands as small and sporadic infestations. Canada thistle and hounds tongue in upland or transition areas had been sprayed prior to the 2006 August site visit. Because Canada thistle, hounds tongue and spotted knapweed are present, there is potential for these weeds 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 Nesda-Mcilwaine loam (107A). These soils are found on low stream terraces and flood plains. The Mesda-Mcilwaine soils are both well drained, non hydric soils with approximately 12 inches of loam over extremely gravelly coarse sand. The soil classification is a Fluventic Haploboroll. There are two small inclusions of Albicalis (5%) and Meadowcreek (5%). Albicalis is a loamy textured, hydric soil that is poorly drained. Meadowcreek is not listed as a hydric soil.

Soils were sampled at four (4) sample points (SP-1, SP-2 Transect 1 and SP-3, SP-4 Transect 2). Soil pits 1 and 4 are within a wetland, soil pits 2 and 3 are an upland soil. Soils at SP-1 (Transect 1) were a very dark gray (10YR 3/1) silty clay loam from 2 -6 inches and a sandy clay loam, very dark grayish brown (10YR 3/2) from 6 to 12 inches with dark yellowish (10YR 4/6) mottles. Soils were saturated at 8 inches. The soils at SP-4 (Transect 2) were very dark gray (10YR 3/1) clay loam from 0-12 inches with dark yellowish brown (10YR 4/6) mottles. Soils

were saturated at the surface and shallow areas of ponded water (2 – 4 inches deep) were observed.

Soil pits sampled within the upland areas (SP-2 and SP-3) revealed soils with similar textures (silty loam to sandy clay loam). Hydric soils were observed in SP-2 (low chroma values and mottles below 4 inches), however vegetation and hydrology do not meet the wetland criteria. Soil at SP-3, with a chroma value of 10YR 5/2 (without mottles), was not considered hydric.

3.4 Wetland Delineation

The delineated wetland boundary is depicted on **Figure 3** in **Appendix A**. The COE Forms are included in **Appendix B**. Riverine wetlands generally include low areas or portions of vegetated point or side bars. The vegetation within the off-channel wetlands consisted primarily of emergent vegetation, generally within topographically low areas where saturation has occurred and is developing into wetland areas. Aquatic vegetation such as cattails and bulrush were more common along the perimeter of the spring creek channel and as wide bands south of large open water pond. A total of 2.93 acres of wetlands and open water were delineated in the off-channel wetland development area within the defined monitoring area. This included 0.24 acre of shallow (< 4 feet deep) open water and 0.72 acre of pre-existing wetlands. Approximately 0.71 acre of wetlands were delineated along Big Timber Creek (the Big Timber Creek open water channel is not included in this total).

Subtracting the pre-existing wetlands from the total yields a net gain of 2.92 aquatic habitat acres (1.97 wetland acres off-channel, 0.24 shallow open water acres off-channel, and 0.71 wetland acres along Big Timber Creek) at the monitoring sites.

3.5 Wildlife

Wildlife species observed on the site in 2006 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: ***200 to 2006 fish and wildlife species observed within the Cloud Ranch Wetland Mitigation Site.***

REPTILES
Western terrestrial garter snake *(Thamnophis elegans)*
AMPHIBIANS
Western Chorus Frog (*Pseudacris triseriata*)[1]
FISH
Brook trout (*Salvelinus fontinalis*) [1]
Brown trout (*Salmo trutta*) [1]
Rainbow trout (*Oncorhynchus mykiss*) [1]
BIRDS
American Goldfinch (*Carduelis psaltria*)
Bald Eagle (*Haliaeetus leucocephalus*) [1]
Common Yellowthroat (*Geothylypis trichas*)
House Wren **(***Troglodytes aedon***)**
Least Flycatcher (*Empidonax minimus*)
Red-naped Sap sucker **(***Sphyrapicus nuchalis)*
Red-winged Blackbird (Agelaius phoeniceus)
Song Sparrow *(Melospiza melodia)*
Spotted Sandpiper (*Actitis macularia*)
Western Wood Peewee (*Contopus sordidulus*)
Unidentified sparrow sp.
Warbling Vireo *(Vireo gilvus***)**
Yellow-rumped Warbler (*Dendroica coronata***)**
MAMMALS
Black bear (U*rsus americanus*) [1]
White-tailed deer *(Odocoileus virginianus)*
Mule deer (*Odocoileus hemionus*) [1]
Raccoon (*Procyon lotor*)

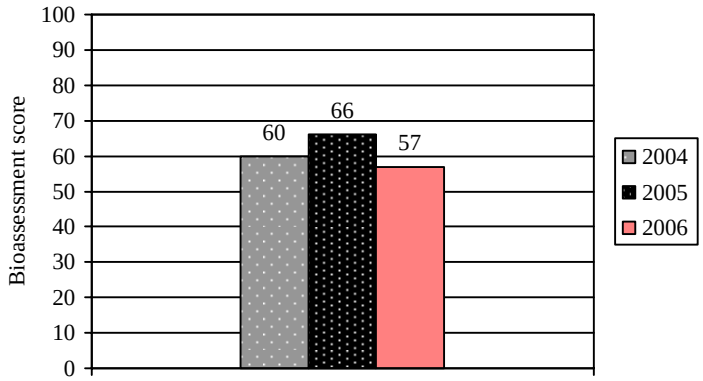
[1] Observed by Aquatic Design & Construction, Inc.
Bolded species indicate those documented within the analysis area in 2006.

3.6 Macroinvertebrates

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

Sub-optimal conditions were indicated by the bioassessment scores calculated for this site in all years of the study. Taxa richness decreased between 2005 and 2006. Sandy, hypoxic substrates are suggested by the midge fauna. Large numbers of the worm Nais sp. persisted at the site, suggesting that bacterial films were a dominant energy source here. Abundant ceratopogonid larvae suggest that the proximity of cattle influenced the biology. No mayflies were collected, and the biotic index value was slightly higher than average for the wetlands sampled in this study. Water quality may have been slightly degraded by nutrient enrichment.

Chart 5: ***2004 to 2006 Cloud Ranch pond bioassessment scores***



3.7 Functional Assessment

Completed Functional Assessment Forms are included in **Appendix B** and summarized in **Table 4**. Pre-construction functional assessments were completed for the wetlands by ADC (2003) but have thus far not been received for use in monitoring reports. The creek corridor wetlands currently rate as a Category II community, primarily due to wildlife habitat, while the off-channel wetlands were assigned a Category III rating. The ratings have been consistent over the monitoring period to date. An erroneous rating for surface water storage in 2004 and 2005 at both sites resulted in incorrect Category II designations for the off-channel wetlands in those years, which was corrected for 2004-2006 as shown on **Table 4**.

3.8 Photographs

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

3.9 Maintenance Needs/Recommendations

The site supports three State of Montana-listed noxious weeds: Canada thistle, hounds tongue, and spotted knapweed. Canada thistle, hounds tongue and a few spotted knapweed plants were observed along Big Timber Creek. Canada thistle and hounds tongue were observed within the off-channel wetland assessment area. As mentioned earlier, the spotted knapweed, hounds tongue and Canada thistle appeared to have been sprayed in 2006 (as requested by MDT) in the upland areas adjacent to the off-channel wetlands. Continued chemical or biological control measures are recommended for Canada thistle, hounds tongue, and spotted knapweed.

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

Function and Value Parameters From the 1999 MDT Montana Wetland Assessment Method	2004 Post-Construction Off-Channel Wetlands	2004 Post-Construction Big Timber Creek	2005 Off-Channel Wetlands	2005 Big Timber Creek	2006 Off-Channel Wetlands	2006 Big Timber Creek
Listed/Proposed T&E Species Habitat	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)
MNHP Species Habitat	Low (0.1)	Mod (0.6)	Low (0.1)	Mod (0.6)	Low (0.1)	Mod (0.6)
General Wildlife Habitat	Mod (0.7)	High (0.9)	Mod (0.7)	High (0.9)	Mod (0.7)	High (0.9)
General Fish/Aquatic Habitat	NA	Mod (0.7)	NA	Mod (0.7)	NA	Mod (0.7)
Flood Attenuation	Mod (0.5)	Mod (0.4)	Mod (0.5)	Mod (0.4)	Mod (0.5)	Mod (0.4)
Short and Long Term Surface Water Storage	Mod (0.6)	Mod (0.6)	Mod (0.6)	Mod (0.6)	Mod (0.6)	Mod (0.6)
Sediment, Nutrient, Toxicant Removal	High (1.0)	Mod (0.6)	High (1.0)	Mod (0.6)	High (1.0)	Mod (0.6)
Sediment/Shoreline Stabilization	High (1.0)	Mod (0.7)	High (1.0)	Mod (0.7)	High (1.0)	Mod (0.7)
Production Export/Food Chain Support	Mod (0.7)	Mod (0.7)	Mod (0.7)	Mod (0.7)	Mod (0.7)	Mod (0.7)
Groundwater Discharge/Recharge	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)
Uniqueness	Mod (0.4)	Mod (0.4)	Mod (0.4)	Mod (0.4)	Mod (0.4)	Mod (0.4)
Recreation/Education Potential	Mod (0.7)	Mod (0.7)	Mod (0.7)	Mod (0.7)	Mod (0.7)	Mod (0.7)
Actual Points/Possible Points	7/11	7.6/12	7/11	7.6/12	7/11	7.6/12
% of Possible Score Achieved	64%	63%	64%	63%	64%	63%
Overall Category	III	II	III	II	III	II
Total Acreage of Assessed Wetlands and Open Water within Easement (ac)	**2.19**	**2.65**	**2.75**	**2.93**	**2.93**	**2.88**
Baseline Acreage of Assessed Wetlands and Open Water within Easement (ac)	**0.72**	**2.17 (ow)**	**0.72**	**2.17 (ow)**	**0.72**	**2.17 (ow)**
Functional Units (acreage x actual points) (fu)	**15.33**	**20.14**	**19.25**	**22.27**	**20.51**	**21.89**
Net Acreage Gain (ac)	**1.47 (1.2 wetland, 0.27 ow)**	**0.48 (wetland)**	**2.03 (1.79 wetland, 0.24 ow)**	**0.76 (wetland)**	**2.21 (1.97 wetland, 0.24 ow)**	**0.71 (wetland)**
Net Functional Unit Gain[1]	**Presently unavailable**	**Presently unavailable**	**3.92 (since 2004)**	**2.13 (since 2004)**	**5.18 (since 2004)**	**1.75 (since 2004)**
Total Functional Unit Gain[1]	**Presently unavailable**		**6.05 (since 2004)**		**6.93 (since 2004)**	

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

The water level control structures within the off-channel wetlands were functioning and in good working order at the time of the August monitoring. Big Timber Creek channel migration resulting in bank loss, gravel bars and new deposition areas will continue to be monitored to track riparian wetland gains or losses, and negative or undesirable changes in vegetation. As mentioned earlier, the project designer observed similar channel movements on other reaches of Big Timber Creek resulting from the same 6 inch/4 hour rainfall event. Based on his August 2006 review, the upper end of the lowest reach is likely to continue shifting before it stabilizes and some minor intervention in this area may eventually be warranted. If ultimately considered necessary by the designer, landowner, and MDT, any such intervention should be completed within the monitoring period.

3.10 Current Credit Summary

MDT anticipated creation and restoration of this site to provide 5.5 acres of credit within a 15.5 acre conservation easement. A summary table from the COE of potential wetland credits is provided in **Appendix G** (COE 2002 letter). The COE allows a 1:1 ratio for creation and restoration for Big Timber Creek and the off-channel wetlands as well as a 4:1 ratio for a buffer zone. **Table 5** outlines the target wetland credits and ratios from the COE (2002) and the net acres delineated during the 2006 wetland monitoring.

In 2006, the new net off-channel wetland/open water acreage is 2.21 acres (2.69 acres total wetland +0.24 acre open water – 0.72 acre of pre-existing wetlands = 2.21 acres). Wetland expansion was noted primarily in the southeastern corner of the project area. The Big Timber Creek wetland acreage is 0.71 acre which is a slight reduction of 0.05 acre compared to 2005 due to high water flows. Riparian wetlands comprise 0.53 acre along Big Timber Creek with 0.18 acre of emergent wetlands (compared to 0.23 acre in 2005). The Big Timber Creek channel itself is not included in acreage totals.

In 2006 the mitigation efforts have so far resulted in a total of 2.68 wetland credit acres, 0.24 shallow open water credit acres, and 0.89 credit acre of wetland/upland buffer. The grand total for the Cloud Ranch to date is 3.81 credit acres or 69 percent of the 5.49-acre goal.

It may be difficult to attain the 2.58-acre wetland development goal along the creek in the short term. Minor wetland acreage was lost in this area in 2006 due to a high-water scour event. This event left much of the non-wetland creek area dominated by gravel/cobbles which may take a considerable amount of time to collect sediment and establish wetland vegetation.

Table 5. ***2006 credit acreages and ratios for the Cloud Ranch Wetland Mitigation Site.***

Wetland Mitigation	Current Net Acres	Ratio	2006 Credit Acres	Target Credit Acres	Comments
Off-channel [1] Creation and restoration wetlands and open water	2.21	1:1	2.21	2.02	
Subtotal	**2.21**		**2.21**	**2.02**	
Big Timber Creek [2] Riparian wetland restoration	0.53	1:1	0.53	2.00	Riparian wetland community represented by Type 2.
Emergent wetland restoration	0.18	1:1	0.18	0.58	Emergent wetland restoration represented by Type 3.
Subtotal	**0.71**		**0.71**	**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	**6.48**		**3.81**	**5.49**	**69% 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.

4.0 REFERENCES

Berglund, J. 1999. *MDT Montana Wetland Assessment Method*. Prepared for Montana Department of Transportation. May 1999.

Bollman, W. 2006. MDT Mitigated Wetland Monitoring Project – Aquatic Invertebrate Monitoring Summary 2004-2006. Rhithron Associates Inc. Missoula, MT.

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

Reed, P.B. 1988. National list of plant species that occur in wetlands: North West (Region 9). Biological Report 88(26.9), May 1988. U.S. Fish and Wildlife Service. Washington, D.C.

USDA Natural Resource Conservation Service. 1981. *Soil Survey of Sweetgrass County, Montana.*

USGS Real Time Water Data for USGS 0620000 Boulder River at Big Timber MT. 2006. http://waterdata. usgs.gov/mt/nwis/dv?site_no=0620000&agency_cd=USGS&referred.

Western Regional Climate Center (WRCC). 2006. Big Timber Station: http://www.wrcc.dri.edu/cgi-bin/cliMONtpre.pl?mtbigt.

Appendix A

FIGURES 2 & 3

MDT Wetland Mitigation Monitoring
Cloud Ranch
Big Timber, Montana

Figure 2 Monitoring Activity Locations 2006

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 6, 2006

L,M
MI
Monitoring Limits
SP1 SP2 Vegetation Transect
N,P
J,K
I
H
G
B
A
C,D,E
F

PROJECT NAME
MDT CLOUD RANCH WETLAND MITIGATION
DRAWING TITLE
MONITORING ACTIVITY LOCATIONS 2006

PROJ NO: B43054.00 0504	DRAWN: SH/JR		
LOCATION: BIG TIMBER, MT	PROJ MGR: J. BERLUND		
SCALE: 1" = 150'	CHECKED: CH	APPVD: JB	
FILE NAME: 2006 Base.dwg			

3810 Valley Commons Drive
Suite 4
Bozeman, MT 59718

FIGURE 2 OF

REV -

Oct/31/2006

Figure 3 Mapped Site Features 2006

N
W E
S

SCALE 1"=150ft

VEGETATION COMMUNITY TYPES

① Bromus inermis/Agropyron repens
② Populus angustifolia/Agrostis alba
③ Agrostis alba
④ Juncus sp./Mixed Herbaceous Species
⑤ Glyceria sp./Carex sp.
⑥ Typha latifolia/Scirpus sp.
⑦ Bromus sp./Agropyron sp.

LEGEND

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

Base photograph July 6, 2006

Off Channel Wetland Area

Gross Wetland	2.93 Acres
Open Water	0.24 Acres
Historic Wetland	0.72 Acres
Net Wetland	1.97 Acres

Big Timber Creek Wetlands

Net Wetland	0.71 Acres

OPEN WATER
OW
Monitoring Limits

PROJECT NAME
MDT CLOUD RANCH WETLAND MITIGATION
DRAWING TITLE
MAPPED SITE FEATURES 2006

PROJ NO: B43054.00 0504	DRAWN: SH/JR		
LOCATION: BIG TIMBER, MT	PROJ MGR: J. BERLUND		
SCALE: 1" = 150'	CHECKED: CH	APPVD: JB	
FILE NAME: 2006 Base.dwg			

PBSJ
3810 Valley Commons Drive
Suite 4
Bozeman, MT 59718

FIGURE 3 OF
REV -
Nov/09/2006

Appendix B

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

MDT Wetland Mitigation Monitoring
Cloud Ranch
Big Timber, Montana

LWC / MDT WETLAND MITIGATION SITE MONITORING FORM

Project Name: **Cloud Ranch** Project Number: **B43054-0504**
Assessment Date: **August 1, 2006** Person(s) conducting the assessment: **CH**
Location: **12 miles north of Big Timber** MDT District: **Billings** Milepost: _____
Legal Description: T **3N** R **13E** Section **36**
Weather Conditions: **cloudy/warm/rainy** Time of Day: **12 AM**
Initial Evaluation Date: **August 23, 2004** Monitoring Year: **third** # Visits in Year: **1**
Size of evaluation area: **5.5 acres** Land use surrounding wetland: **pasture/rangeland/residential**

HYDROLOGY

Surface Water Source: **Big Timber Creek and an unnamed spring creek**
Inundation: **Present** Average Depth: **0.5** Range of Depths: **0-1**
Percent of assessment area under inundation: **90%**
Depth at emergent vegetation-open water boundary: **0.5 feet**
If assessment area is not inundated then are the soils saturated within 12 inches of surface: **Yes**
Other evidence of hydrology on the site (ex. – drift lines, erosion, stained vegetation, etc.):
water marks, drift lines and surface water

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

Well Number	Depth	Well Number	Depth	Well Number	Depth

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

COMMENTS / PROBLEMS:
Surface water was observed in approximately 90 percent of the off-channel assessment area during the August monitoring trip. The unnamed tributary supplying water to the off-channel wetlands was bankfull.

VEGETATION COMMUNITIES

Community Number: **1** Community Title (main spp): **Bromus inermis/Agropyron repens**

Dominant Species	% Cover	Dominant Species	% Cover
Bromus inermis	3 = 11-20%	Deschampsia cespitosa	1 = 1-5%
Agropyron repens	3 = 11-20%	Tragopogon dubius	1 = 1-5%
Populus angustifolia	2 = 6-10%	Trifolium fragiferum	1 = 1-5%
Phleum pratensis	1 = 1-5%	Agropyron riparium	1 = 1-5%
Equisetum hymoides	1 = 1-5%	Bromus marginatus	1 = 1-5%
Agrostis alba	1 = 1-5%	Cobbles/bare soil	2 = 6-10%

Comments / Problems: **Big Timber creek continues to migrate within the project reach during the past year. This is evidenced by new unvegetated exposed gravel bars within the transect, as well as up-stream and down-stream. High water flows removed the vegetation and soil, leaving behind large rocks. cobbles and gravels. Fewer areas of sediment deposition (silts and clay) were noted in 2006 compared to 2005. Young cottonwoods are surviving and thriving. A few Canada thistle, houndstongue and burdock plants were noticed in this community type.**

Community Number: **2** Community Title (main spp): **Populus angustifolia/Agrostis alba**

Dominant Species	% Cover	Dominant Species	% Cover
Populus angustifolia-seedlings	3 = 11-20%	Bromus ciliatus	1 = 1-5%
Agrostis alba	3 = 11-20%	Elymus canadensis	1 = 1-5%
Deschampsia cespitosa	2 = 6-10%	Cirsium arvense	1 = 1-5%
Poa palustris	1 = 1-5%	Juncus torreyi	1 = 1-5%
Juncus ensifolius	1 = 1-5%	Alopecurus pratensis	1 = 1-5%
Juncus tenuis	1 = 1-5%	Cobbles/rock	3 = 11-20%

Comments / Problems: **Rivering wetland vegetation is dependent upon creek flows and periodic flooding. Weather (precipitation and flow events) influence the percent cover, species diversity and rate of wetland development along the creek. Some of the weland species noted previously along the waters edge or in backwater areas (such as Veronica americana, Mentha sp. and Glyceria grandis) were lacking in 2006. Most likely plants were washed away as a result of high flows and subsequent bank loss. Several of the point or side bars have lost several feet of vegetated bank.**

Community Number: **3** Community Title (main spp): **Agrostis alba**

Dominant Species	% Cover	Dominant Species	% Cover
Agrostis alba	4 = 21-50%	Phalaris arundinacea	1 = 1-5%
Alopecurus pratensis	1 = 1-5%	Salix exigua (cuttings)	1 = 1-5%
Deschampsia cespitosa	1 = 1-5%	Poa palustris	1 = 1-5%
Juncus torreyi	1 = 1-5%	Epibolium ciliatum	1 = 1-5%
Glyceria elata	1 = 1-5%	Elymus canadensis	1 = 1-5%
Mentha arvensis	+ = < 1%	Rocks/cobbles/gravels	3 = 11-20%

Comments / Problems: **This community lacks the woody component noted in CT 1.**

VEGETATION COMMUNITIES (continued)

Community Number: **4** Community Title (main spp): **Juncus sp./Mixed Herbaceous Species**

Dominant Species	% Cover	Dominant Species	% Cover
Juncus torreyi	3 = 11-20%	Agrostis alba	1 = 1-5%
Juncus mertensianus	2 = 6-10%	Glyceria sp.	1 = 1-5%
Juncus longifolia	2 = 6-10%	Carex utriculata	2 = 6-10%
Eleocharis palustris	2 = 6-10%	Carex nebrascensis	2 = 6-10%
Typha latifolia	2 = 6-10%	Surface water	1 = 1-5%
Scripus validus	1 = 1-5%		

Comments / Problems: **Approximately 95% of this CT was inundated. Juncus species represent the majority of the cover in this community type. Eleocharis palustris was a co-dominant in 2005 but because there is less open soil and greater canopy cover, the Eleocharis is decreasing in abundance and is being replaced by Juncus and Carex sp.**

Community Number: **5** Community Title (main spp): **Glyceria sp./Carex sp.**

Dominant Species	% Cover	Dominant Species	% Cover
Glyceria grandis	3 = 11-20%	Juncus torreyi	1 = 1-5%
Glyceria elata	2 = 6-10%	Juncus mertensianus	1 = 1-5%
Carex utriculata	3 = 11-20%	Juncus balticus	1 = 1-5%
Carex languinosa	1 = 1-5%	Agrostis alba	2 = 6-10%
Carex aquatilis	2 = 6-10%	Calamagrostis canadensis	1 = 1-5%
Typha latifolia	1 = 1-5%	Carex nebrascensis	1 = 1-5%

Comments / Problems: **This community typically forms a distinct community adjacent to the Typha latifolia/Scirpus community. This is a diverse community type with a variety of species.**

Community Number: **6** Community Title (main spp): **Typha latifolia/Scirpus sp.**

Dominant Species	% Cover	Dominant Species	% Cover
Typha latifolia	4 = 21-50%	Bechmannia syzigachne	+ = < 1%
Scirpus validus	2 = 6-10%	Glyceria grandis	1 = 1-5%
Scirpus microcarpus	2 = 6-10%	Mentha arvensis	+ = < 1%
Scirpus acutus	2 = 6-10%	Carex vulpinoidea	1 = 1-5%
Carex utriculuta	1 = 1-5%		
Carex aquatilis	1 = 1-5%		

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

Community Number: **7** Community Title (main spp): **Bromus sp./Agropyron sp.**

Dominant Species	% Cover	Dominant Species	% Cover
Bromus inermis	3 = 11-20%	Dactylis glomerata	2 = 6-10%
Bromus marginatus	2 = 6-10%	Populus angustifolia*	1 = 1-5%
Agropyron riparium	3 = 11-20%	Agrostia alba	1 = 1-5%
Agropyron repens	2 = 6-10%	Cirsium arvensis	+ = < 1%
Agropyron trachycaulum	2 = 6-10%	Festuca arundinacea	1 = 1-5%
Phleum pratensis	1 = 1-5%		

Comments / Problems: ***Populus angustifolia represents scattered mature trees within this community type. This community type represents the buffer area around the off-channel wetlands.**

Additional Activities Checklist: ☒ Record and map vegetative communities on aerial photograph.

COMPREHENSIVE VEGETATION LIST

Plant Species	Vegetation Community Number (s)	Plant Species	Vegetation Community Number (s)
Achillea millefolium	1	Glyceria elata	3, 4, 5
Agropyron repens	1, 7	Glyceria grandis	4, 5, 6
Agropyron riparium	1, 7	Glycyrrhiza lepidota	1
Agropyron smithii	7	Helianthis annuus	1
Agropyron trachycaulum	7	Hordeum jubatum	3, 4, 7
Agrostis alba	1, 2, 3, 4, 5, 7	Hyoscyamus niger	7
Alopercurus aequalis	4	Juncus balticus	5
Alopecurus arundinaceus	3	Juncus ensifolius	2, 5
Alopecurus pratensis	2, 3	Juncus longistylis	4
Ambrosia trifida	1	Juncus mertensianus	4, 5
Arctium minus	1, 2	Juncus tenuis	2, 5
Bechmannia syzigachne	3, 4, 6,	Juncus torreyi	2, 3, 4, 5
Betula occidentalis	1	Melilotus officinalis	1
Bromus ciliatus	2	Mentha arvensis	2, 3, 6
Bromus inermis	1, 7	Mimulus guttatus	2
Bromus marginatus	7	Phalaris arundinacea	3
Bromus japonicus	7	Phleum pratense	1
Calamagrostis canadensis	5	Populus angustifolia	1, 2, 3, 7
Carex aquatilis	5, 6	Poa palustris	2, 3, 4, 5
Carex languinosa	5, 6	Poa pratensis	1, 7
Carex nebrascensis	4, 5	Prunus virginiana	7
Carex utriculata	4, 5, 6	Puccinellia distans	2
Carex vulpinoides	6	Rumex crispus	2
Centaurea maculosa	1	Salix exigua	2, 3,
Chenopodium sp.	1	Senecio integerrimus	2
Cirsium arvense	1, 5, 7	Scirpus acutus	4, 6
Crepis runinata	1	Scirpus microcarpus	6
Cynoslossum officinale	5, 7,	Scirpus validus	4, 6
Dactylis glomerata	7	Solidago canadensis	1
Deschampsia cespitosa	1, 2, 3, 5	Solidago occidentalis	1
Eleocharis palustris	3, 4, 5	Spartina pectinata	4
Elymus canadensis	2, 3	Symphoricarpos albus	1
Epilobium ciliatum	3	Tragopogon dubois	1
Equisetum arvense	1, 2	Trifolium fragiferum	1
Equisetum hymoides	1, 2	Typha latifolia	4, 5, 6
Festuca arundinacea	7	Veronica americana	2
		Veronica thapsus	1, 7

Comments / Problems: _____

PLANTED WOODY VEGETATION SURVIVAL

Plant Species	Number Originally Planted	Number Observed	Mortality Causes
Salix exigua cuttings	2500	250	Planted too close to the waters edge, mortality due high flow
Populus angustifolia	1310	851	Very few dead or declining seedlings noted along the channel
Betula occidentalis	392	0	None were noted in 2005 or in 2006

Comments / Problems: **Estimated overall survival of the Salix exigua cuttings along Big Timber creek is approximately 10% or 250 plants.**

The estimated survival of the transplanted Populus angustifolia seedlings is approximately 65% or 851 plants. The seedlings are robust and thriving, ranging in height from 12 to 30 inches.

Approximately 392 Betula occidentalis plants were transplanted along Big Timber Creek following construction. To date no young plants have been observed but will continue to look for plants during future monitoring visits.

WILDLIFE

Birds

Were man-made nesting structures installed? **No**
If yes, type of structure: _____ How many? _____
Are the nesting structures being used? **NA**
Do the nesting structures need repairs? _____

Mammals and Herptiles

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

Additional Activities Checklist:
Yes Macroinvertebrate Sampling (if required)

Comments / Problems: Collected a sample from the large open water pond (see Figure 2)

PHOTOGRAPHS

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

Photograph Checklist:

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

Location	Photograph Frame #	Photograph Description	Compass Reading (°)
A		Big Timber Creek - Transect 1, west side	West
B		Big Timber Creek - Transect 1, bank to bank	South
C		Big Timber Creek - Bank and wetland loss	North
D		Big Timber Creek - Transect 1, east side	East
E		Big Timber Creek new channel	South
F		Big Timber Creek point bar left side of channel	North
G		Big Timber Creek - riverine wetland	West
H		Big Timber Creek - side bar loss	East
I		Big Timber Creek riverine wetland with woodies	SE
J		Off-channel developing wetlands	West
K		Off-channel wetlands - unnamed tributary	East
L		Off-channel wetlands - embankment removal area	East
M		Off-channel wetlands and buffer around pond	SE
N		Off-channel wetlands - Transect 2	West
O		Off-channel wetlands - Transect 2	SE
P		Off-channel wetlands - two community types	SW
Q		Off-channel wetlands - far SE corner wetlands	South

Comments / Problems: _____

GPS SURVEYING

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

GPS Checklist:

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

Comments / Problems: _____

WETLAND DELINEATION

(attach COE delineation forms)

At each site conduct these checklist items:

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

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

Comments / Problems: _____

FUNCTIONAL ASSESSMENT

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

Comments / Problems: _____

MAINTENANCE

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

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

Comments / Problems: _____

MDT WETLAND MONITORING – VEGETATION TRANSECT

Site: **Cloud Ranch - Big Timber Creek** Date: **August 1, 2006** Examiner: **CH/LWC**
Transect Number: **1** Approximate Transect Length: **195 feet** Compass Direction from Start: **44˚** Note: **Perpendicular across bar**

Vegetation Type A: **CT 1 (transitional riparian floodplain)**	
Length of transect in this type: 15 feet	
Plant Species	**Cover**
BROINE	3 = 11-20%
AGRREP	3 = 11-20%
PHLPRA	2 = 6-10%
POPANG (seedlings/root sprouts)	3 = 11-20%
TRIFRA	1 = 1-5%
DESCES	1 = 1-5%
AGRALB	1 = 1-5%
TRADUB	1 = 1-5%
Rock/cobbles	1 = 1-5%
Bare soil	2 = 6-10%
Litter	2 = 6-10%
Total Vegetative Cover:	75%

Vegetation Type B: **CT2 (Riverine wetland)**	
Length of transect in this type: 80 feet	
Plant Species	**Cover**
POPANG	3 = 11-20%
AGRALB	3 = 11-20%
DESCES	2 = 6-10%
POAPAL	1 = 1-5%
EQUHYM	1 = 1-5%
ELYCAN	1 = 1-5%
Gravels/silts/sediments	4 = 21-50%
SALEXI	1 = 1-5%
AGRREP	1 = 1-5%
Total Vegetative Cover:	65%

Vegetation Type C: **Exposed gravels**	
Length of transect in this type: 70 feet	
Plant Species	**Cover**
Newly exposed gravels from channel migration	
Total Vegetative Cover:	0%

Vegetation Type D: **Open water**	
Length of transect in this type: 24 feet	
Plant Species	**Cover**
Open water- creek channel	
Total Vegetative Cover:	0%

MDT WETLAND MONITORING – VEGETATION TRANSECT

Site: **Cloud Ranch - Big Timber Creek** Date: **August 1, 2006** Examiner: **CH/LWC**
Transect Number: **1** Approximate Transect Length: **195 feet** Compass Direction from Start: **44˚** Note: **Perpendicular across bar**

Vegetation Type E: **CT 1(transitional riparian floodplain)**	
Length of transect in this type: 15 feet	
Plant Species	**Cover**
BROINE	4 = 21-50%
AGRREP	3 = 11-20%
AGRRIP	3 = 11-20%
SOLOCC	1 = 1-5%
SMYALB	3 = 11-20%
Total Vegetative Cover:	80%

Vegetation Type F:	
Length of transect in this type: feet	
Plant Species	**Cover**
Total Vegetative Cover:	%

Vegetation Type G:	
Length of transect in this type: feet	
Plant Species	**Cover**
Total Vegetative Cover:	%

Vegetation Type H:	
Length of transect in this type: feet	
Plant Species	**Cover**
Total Vegetative Cover:	%

MDT WETLAND MONITORING – VEGETATION TRANSECT

Site: **Cloud Ranch - Wetlands** Date: **August 1, 2006** Examiner: **CH/LWC**
Transect Number: **2** Approximate Transect Length: **200 feet** Compass Direction from Start: **75˚** Note: **SW**

Vegetation Type I: **CT 7 (upland)**	
Length of transect in this type: 3 feet	
Plant Species	**Cover**
BROINE	3 = 11-20%
AGRTRA	3 = 11-20%
AGRREP	3 = 11-20%
BROMAR	2 = 6-10%
ELYCAN	1 = 1-5%
CIRARV	+ = < 1%
AGRALB	3 = 11-20%
Litter	1 = 1-5%
Bare soil	2 = 6-10%
Total Vegetative Cover:	85%

Vegetation Type J: **CT 4 (restored wetland)**	
Length of transect in this type: 187 feet	
Plant Species	**Cover**
JUNTOR	3 = 11-20%
JUNMER	2 = 6-10%
JUNLON	1 = 1-5%
TYPLAT	2 = 6-10%
ELEPAL	1 = 1-5%
SCIVAL	1 = 1-5%
AGRALB	2 = 6-10%
CARUTR	2 = 6-10%
CARNEB	1 = 1-5%
Shallow surface water	3 = 11-20%
Total Vegetative Cover:	80%

Vegetation Type K: **CT 7 (Upland)**	
Length of transect in this type: 10 feet	
Plant Species	**Cover**
BROINE	3 = 11-20%
AGRREP	2 = 6-10%
AGRRIP	3 = 11-20%
AGRTRA	2 = 6-10%
FESARU	3 = 11-20%
PHLPRA	3 = 11-20%
POAPRA	2 = 6-10%
Litter	1 = 1-5%
Bare-saturated soil	3 = 11-20%
Total Vegetative Cover:	85%

Vegetation Type L:	
Length of transect in this type: feet	
Plant Species	**Cover**
Total Vegetative Cover:	%

MDT WETLAND MONITORING – VEGETATION TRANSECT

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

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

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

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

Comments: **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 tranplanted woody species along the restored stream channel to determine percent survival/mortality. However, the point where the 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 channel to determine an average survival.**

BIRD SURVEY – FIELD DATA SHEET

Site: **Cloud Ranch** Date: **7/24/06**
Survey Time: **7 am** to **11 am**

Bird Species	#	Behavior	Habitat	Bird Species	#	Behavior	Habitat
*Spotted Sandpiper	3	BD	OW				
*Western Kingbird	1	BD	OW				
*Western Flycatcher	1	BD	OW				
Song Sparrow	1	BD	MA				
Common Yellowthroat	1	BD	MA				
Least Flycatcher	1	BD	MA				
Western Wood Peewee	1	BD	MA				
American Goldfinch	1	BD	MA				
Red-winged Blackbird	1	BD	MA				
^*Cordilleran Flycatcher	1	BD	OW				

BEHAVIOR CODES
BP = One of a breeding pair
BD = Breeding display
F = Foraging
FO = Flyover
L = Loafing
N = Nesting

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

Weather: **overcast**

Notes: ***River Habitat; ^Not Confirmed**

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

Project / Site: **Cloud Ranch**	Date: **August 1, 2006**
Applicant / Owner: **MDT**	County: **Sweetgrass**
Investigator: **CH/LWC**	State: **Montana**

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

VEGETATION

Dominant Species	Stratum	Indicator	Dominant Species	Stratum	Indicator
1. *DESCES*	Herb	FACW	11.		
2. *AGRALB*	Herb	FACW	12.		
3. *POPANG (seedling/sprout)*	Tree	FACW	13.		
4. *EQUHYM*	Herb	FACW	14.		
5. *POAPAL*	Herb	FAC	15.		
6. *PHLPRA*	Herb	FACU	16.		
7.			17.		
8.			18.		
9.			19.		
10.			20.		
Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-): **5** / **6** = **83**%			FAC Neutral: / = %		
Remarks: **83% hydrophytic vegetation**					

HYDROLOGY

Yes Recorded Data (Describe in Remarks): **N/A** Stream, Lake, or Tide Gauge **Yes** Aerial Photographs **N/A** Other **No** No Recorded Data	Wetland Hydrology Indicators Primary Indicators: **NO** Inundated **YES** Saturated in Upper 12 Inches **NO** Water Marks **NO** Drift Lines **YES** Sediment Deposits **NO** Drainage Patterns in Wetland
Field Observations: Depth of Surface Water **N/A** ____ (in.) Depth to Free Water in Pit **N/A** ____ (in.) Depth to Saturated Soil = **8** (in.)	Secondary Indicators (2 or more required): **NO** Oxidized Root Channels in Upper 12 inches **NO** Water-Stained Leaves **NO** Local Soil Survey Data **NO** FAC-Neutral Test **NO** Other (Explain in Remarks)
Remarks: **Soils saturated at 8 inches, noted debris and sediment from high flows**	

SOILS

Map Unit Name (Series and Phase): **Nesda-McIlwaine loams, 0-2% slopes**
Map Symbol: _____ Drainage Class: **well-drained** Mapped Hydric Inclusion? _
Taxonomy (Subgroup): _____ Field Observations confirm Mapped Type? **No**

Profile Description

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Color(s) (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-2		10 YR 2/1	/ /	N/A N/A	 Silts, fines
2-6		10 YR 3/1	/ /	N/A N/A	 Silty clay loam
6-12	A/B	10 YR 3/2	10 YR 4/6 /	Few Faint	 Sandy clay loam
		/	/ /	N/A N/A	
		/	/ /	N/A N/A	

Hydric Soil Indicators:

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

Remarks: **Silts, fines and organic material on the surface. Mottles noted at 6 inches.**

WETLAND DETERMINATION

Hydrophytic Vegetation Present? **YES** Wetland Hydrology Present? **YES** Hydric Soils Present? **YES**	Is this Sampling Point within a Wetland? **YES**

Remarks: **Wetland boundary is expanding to the north, northeast.**

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

Project / Site: **Cloud Ranch**	Date: **August 1, 2006**
Applicant / Owner: **MDT**	County: **Sweetgrass**
Investigator: **CH/LWC**	State: **Montana**

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

VEGETATION

Dominant Species	Stratum	Indicator	Dominant Species	Stratum	Indicator
1. *BROINE*	Herb	NI	11.		
2. *AGRREP*	Herb	FACU	12.		
3. *PHLPRA*	Herb	FACU	13.		
4. *MELOFF*	Herb	FACU	14.		
5. *TRADUB*	Herb	FACU	15.		
6.			16.		
7.			17.		
8.			18.		
9.			19.		
10.			20.		

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-): **0** / **5** = **0**%	FAC Neutral: / = %

Remarks: **0% hydrophytic vegetation - upland vegetation dominants this higher terrace along Big Timber Creek.**

HYDROLOGY

Yes Recorded Data (Describe in Remarks): **N/A** Stream, Lake, or Tide Gauge **Yes** Aerial Photographs **N/A** Other **No** No Recorded Data	Wetland Hydrology Indicators Primary Indicators: **NO** Inundated **NO** Saturated in Upper 12 Inches **NO** Water Marks **NO** Drift Lines **NO** Sediment Deposits **NO** Drainage Patterns in Wetland
Field Observations: Depth of Surface Water **N/A** ____ (in.) Depth to Free Water in Pit **N/A** ____ (in.) Depth to Saturated Soil > **12** (in.)	Secondary Indicators (2 or more required): **NO** Oxidized Root Channels in Upper 12 inches **NO** Water-Stained Leaves **NO** Local Soil Survey Data **NO** FAC-Neutral Test **NO** Other (Explain in Remarks)

Remarks: **Soils were moist at the surface (raining during the monitoring) but dry below 0.5 inches.**

PBS&J

SOILS

Map Unit Name (Series and Phase): **Nesda-McIlwaine loams, 0-2% slopes**
Map Symbol: _____ Drainage Class: **well-drained** Mapped Hydric Inclusion? _
Taxonomy (Subgroup): _____ Field Observations confirm Mapped Type? **Yes**

Profile Description

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Color(s) (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-4		10 YR 4/2	/ /	N/A N/A	 Silty loam
4-12	A	10 YR 4/2	7.5 YR 4/6 /	Few Faint	 Sandy clay loam
		/	/ /	N/A N/A	
		/	/ /	N/A N/A	
		/	/ /	N/A N/A	

Hydric Soil Indicators:

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

Remarks: **Low chroma values and mottles. Thin layers of sand were noted from 4 to 12 inches.**

WETLAND DETERMINATION

Hydrophytic Vegetation Present? **NO** Wetland Hydrology Present? **NO** Hydric Soils Present? **YES**	Is this Sampling Point within a Wetland? **NO**

Remarks: **Upland terrace along Big Timber Creek. Hydric soils but hydrology and vegetation do not meet wetland criteria.**

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

Project / Site: **Cloud Ranch**	Date: **August 1, 2006**
Applicant / Owner: **MDT**	County: **Sweetgrass**
Investigator: **CH/LWC**	State: **Montana**

Do Normal Circumstances exist on the site? **Yes** Is the site significantly disturbed (Atypical Situation)? **No** Is the area a potential Problem Area? **No** (If needed, explain on reverse side)	Community ID: **Restored wetland** Transect ID: **2** Plot ID: **SP-3**

VEGETATION

Dominant Species	Stratum	Indicator	Dominant Species	Stratum	Indicator
1. *BROINE*	Herb	NI	11.		
2. *AGRREP*	Herb	FACU	12.		
3. *AGRRIP*	Herb	NI	13.		
4. *AGRTRA*	Herb	FAC	14.		
5. *BROMAR*	Herb	NI	15.		
6. *ELYCAN*	Herb	FAC	16.		
7. *FESARU*	Herb	FACU	17.		
8. *POAPAL*	Herb	FAC	18.		
9.			19.		
10.			20.		

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-): **3** / **8** = **37** %	FAC Neutral: / = %

Remarks: **This area will likely remain a buffer area around the wetland perimeter. Improved species diversity and cover compared to 2005. Cirsuim arvense noted in 2005 has been sprayed.**

HYDROLOGY

Yes Recorded Data (Describe in Remarks): **N/A** Stream, Lake, or Tide Gauge **Yes** Aerial Photographs **N/A** Other **No** No Recorded Data	Wetland Hydrology Indicators Primary Indicators: **NO** Inundated **YES** Saturated in Upper 12 Inches **NO** Water Marks **NO** Drift Lines **NO** Sediment Deposits **NO** Drainage Patterns in Wetland
Field Observations: Depth of Surface Water **N/A** ____ (in.) Depth to Free Water in Pit **N/A** ____ (in.) Depth to Saturated Soil = **0** (in.)	Secondary Indicators (2 or more required): **NO** Oxidized Root Channels in Upper 12 inches **NO** Water-Stained Leaves **NO** Local Soil Survey Data **NO** FAC-Neutral Test **NO** Other (Explain in Remarks)

Remarks: **Soils were saturated in the upper 12 inches.**

SOILS

Map Unit Name (Series and Phase): **Nesda-McIlwaine loams, 0-2% slopes**
Map Symbol: _____ Drainage Class: **well-drained** Mapped Hydric Inclusion? _
Taxonomy (Subgroup): _____ Field Observations confirm Mapped Type? **No**

Profile Description

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Color(s) (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-2		10 YR 5/1	/ /	N/A N/A	 Organics/roots
2-12	A	10 YR 5/2	/ /	N/A N/A	 Silty loam
		/	/ /	N/A N/A	
		/	/ /	N/A N/A	
		/	/ /	N/A N/A	

Hydric Soil Indicators:

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

Remarks: **Hydric soil indicators were not noted.**

WETLAND DETERMINATION

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

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

Remarks: **Soils were saturated in the upper 12 inches. Species diversity and cover by desirable species continues to improve compared to 2004 and 2005.**

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

Project / Site: **Cloud Ranch**	Date: **August 1, 2006**
Applicant / Owner: **MDT**	County: **Sweetgrass**
Investigator: **CH/LWC**	State: **Montana**

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

VEGETATION

Dominant Species	Stratum	Indicator	Dominant Species	Stratum	Indicator
1. *JUNTOR*	Herb	FACW	11.		
2. *JUNMER*	Herb	OBL	12.		
3. *ELEPAL*	Herb	OBL	13.		
4. *TYPLAT*	Herb	OBL	14.		
5. *AGRALB*	Herb	FACW	15.		
6. *GLYGRA*	Herb	OBL	16.		
7. *CARNEB*	Herb	OBL	17.		
8. *SCIVAL.*	Herb	OBL	18.		
9.			19.		
10.			20.		

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-): **8** / **8** = **100**%	FAC Neutral: / = %

Remarks: **Diverse wetland vegetation.**

HYDROLOGY

Yes Recorded Data (Describe in Remarks): **N/A** Stream, Lake, or Tide Gauge **Yes** Aerial Photographs **N/A** Other **No** No Recorded Data	Wetland Hydrology Indicators Primary Indicators: **YES** Inundated **YES** Saturated in Upper 12 Inches **YES** Water Marks **NO** Drift Lines **NO** Sediment Deposits **NO** Drainage Patterns in Wetland
Field Observations: Depth of Surface Water +/- **2-4** (in.) Depth to Free Water in Pit **N/A** ____ (in.) Depth to Saturated Soil = **0** (in.)	Secondary Indicators (2 or more required): **NO** Oxidized Root Channels in Upper 12 inches **NO** Water-Stained Leaves **NO** Local Soil Survey Data **NO** FAC-Neutral Test **NO** Other (Explain in Remarks)

Remarks: **Approximately 95% of this wetland was inundated.**

PBS&J

SOILS

Map Unit Name (Series and Phase): **Nesda-McIlwaine loams, 0-2% slopes**
Map Symbol: _____ Drainage Class: **well-drained** Mapped Hydric Inclusion? _
Taxonomy (Subgroup): _____ Field Observations confirm Mapped Type? **No**

Profile Description

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

Hydric Soil Indicators:

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

Remarks: **Hydric soils based on mottles and low chroma values.**

WETLAND DETERMINATION

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

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

Remarks: **Wetland area has increased in size from 2004.**

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

1. Project Name: Cloud Ranch **2. Project #:** STPX 0049(021) **Control #:** 5231

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

6. Wetland Location(s) i. T: 3 N **R:** 13 E **S:** 36 **T:** __ N **R:** __ E **S:** _____

ii. Approx. Stationing / Mileposts: _____

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

Other Location Information: _____

7. A. Evaluating Agency MDT

8. Wetland Size (total acres): ____ (visually estimated)
0.71 (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): 2.88 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	Rock Bottom	Permanently Flooded	---	80
Riverine	Palustrine	None	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, spotten knapweed, mullein, burdock.

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

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

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

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

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

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

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

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

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

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

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

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

Primary or Critical habitat **(list species)**	☐ D	☐ S	_____
Secondary habitat **(list species)**	☐ D	☒ S	yellowstone cutthroat
Incidental habitat **(list species)**	☐ D	☒ S	Greater-sage grouse
No usable habitat	☐ D	☐ S	_____

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

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

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

14C. General Wildlife Habitat Rating

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

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

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

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

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

Structural Diversity (from #13)	☐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	--	--	--
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**	--	--	--	--	.6 (M)	--	--	--	--
Wetlands in AA flood or pond **< 5 out of 10 years**	--	--	--	--	--	--	--	--	--

Comments: _____

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

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

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

Sediment, Nutrient, and Toxicant Input Levels Within AA	AA receives or surrounding land use has potential to deliver low to moderate levels of sediments, nutrients, or compounds such that other functions are not substantially impaired. Minor sedimentation, sources of nutrients or toxicants, or signs of eutrophication present.				Waterbody on MDEQ list of waterbodies in need of TMDL development for "probable causes" related to sediment, nutrients, or toxicants **or** AA receives or surrounding land use has potential to deliver high levels of sediments, nutrients, or compounds such that other functions are substantially impaired. Major sedimentation, sources of nutrients or toxicants, or signs of eutrophication present.			
% cover of wetland vegetation in AA	☐ ≥ 70%		☒ < 70%		☐ ≥ 70%		☐ < 70%	
Evidence of flooding or ponding in AA	☐ Yes	☐ No	☐ Yes	☐ No	☐ Yes	☐ No	☐ Yes	☐ No
AA contains **no or restricted outlet**	--	--	--	--	--	--	--	--
AA contains **unrestricted outlet**	--	--	.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	M	0.60	1	
G. Sediment/Nutrient/Toxicant Removal	H	0.60	1	
H. Sediment/Shoreline Stabilization	M	0.70	1	
I. Production Export/Food Chain Support	M	0.70	1	
J. Groundwater Discharge/Recharge	H	1.00	1	
K. Uniqueness	M	0.40	1	
L. Recreation/Education Potential	M	0.70	1	
	Totals:	7.60	12.00	5
	Percent of Total Possible Points:		**63%** (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 #:** STPX 0049(021) **Control #:** 5231

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

6. Wetland Location(s) i. T: 3 N **R:** 13 E **S:** 36 **T:** __ N **R:** __ E **S:** _____

ii. Approx. Stationing / Mileposts: _____

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

Other Location Information: _____

7. A. Evaluating Agency MDT

8. Wetland Size (total acres): _____ (visually estimated)
1.97 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): _____ (visually estimated)
2.93 ac (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, burdock, 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	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	_____
Incidental habitat **(list species)**	☐ D	☒ S	Peregrine Falcon, Black Tern
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	--	--	--	.1 (L)

Comments: _____

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

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

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

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

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

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

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

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

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

Comments: _____

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

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

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

Sediment, Nutrient, and Toxicant Input Levels Within AA	AA receives or surrounding land use has potential to deliver low to moderate levels of sediments, nutrients, or compounds such that other functions are not substantially impaired. Minor sedimentation, sources of nutrients or toxicants, or signs of eutrophication present.				Waterbody on MDEQ list of waterbodies in need of TMDL development for "probable causes" related to sediment, nutrients, or toxicants **or** AA receives or surrounding land use has potential to deliver high levels of sediments, nutrients, or compounds such that other functions are substantially impaired. Major sedimentation, sources of nutrients or toxicants, or signs of eutrophication present.			
% cover of wetland vegetation in AA	☒ ≥ 70%		☐ < 70%		☐ ≥ 70%		☐ < 70%	
Evidence of flooding or ponding in AA	☒ Yes	☐ No	☐ Yes	☐ No	☐ Yes	☐ No	☐ Yes	☐ No
AA contains **no or restricted outlet**	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	M	0.60	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:	7.00	11.00	
	Percent of Total Possible Points:		**64%** (Actual / Possible) x 100 [rd to nearest whole #]	

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

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

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

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

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

☐ **I** ☐ **II** ☒ **III** ☐ **IV**

Appendix C

2006 REPRESENTATIVE PHOTOGRAPHS

MDT Wetland Mitigation Monitoring
Cloud Ranch
Big Timber, Montana

CLOUD RANCH WETLAND MITIGATION SITE 2006

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

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

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

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

Photograph E: Description: Big Timber Creek new channel. **Compass Reading:** South

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

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

Photograph H: Description: Big Timber Creek – side bar loss smaller than in 2005**. Compass Reading**: East

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

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

Photograph K: Description: Off-channel wetland - unnamed tributary. **Compass Reading**: East

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

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

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

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

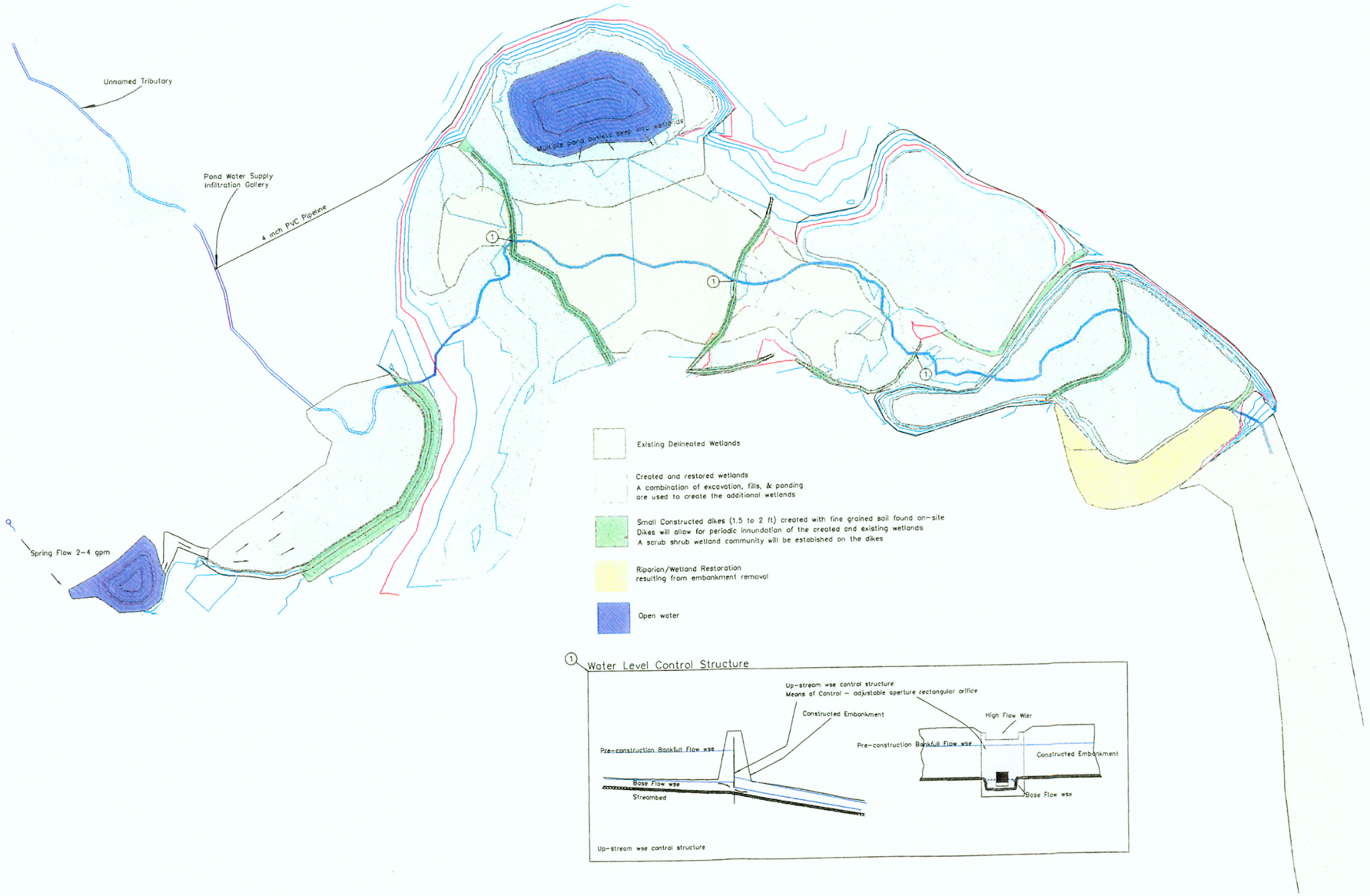
Photograph P: Description: Two community type wetlands. **Compass Reading**: Southwest

Photograph Q: Description: Far SE corner of the project side. **Compass Reading**: South

Appendix D

WETLAND MITIGATION SITE MAP

MDT Wetland Mitigation Monitoring
Cloud Ranch
Big Timber, Montana



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

BIRD SURVEY PROTOCOL
GPS PROTOCOL

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

2006 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 <u>see</u> that you've collected some invertebrates. Rinse the net out into the bucket, and look for insects, crustaceans, etc. If necessary, repeat the sampling process in a nearby location, and add the net contents to the bucket. Remember to sample all four environments.

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

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

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

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

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

Photograph the sampled site.

Sample Handling/Shipping

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

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

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

INTRODUCTION

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

METHODS

Sample processing

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

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

Assessment

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

Scoring criteria for metrics were developed by generally following the tactic used by Stribling et al. Boxplots were generated using a statistical software package (Statistica™), and distributions, median values, ranges, and quartiles for each metric were examined. All sites in all years of sampling were used. Camp Creek, which was sampled in 2002, 2003, 2004, 2005 and 2006, and Kleinschmidt Creek, sampled in 2003, 2004, 2005 and 2006, were assessed using the tested metric battery developed for montane streams of Western Montana (Bollman 1998).Invertebrate assemblages at these sites differed from those of the other sites, and suggested montane or foothill stream conditions rather than wetland conditions. For the wetland sites, "optimal" scores were generally those that fell above the 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 since our understanding of the interrelationships of natural environmental factors and anthropogenic disturbances is tentative. Thus, the further interpretive remarks accompanying the raw taxonomic and metric data in this summary are offered cautiously. Year-to-year comparisons depend on an assumption that specific sites were revisited in each year, and that equivalent sampling methods were utilized at each site revisit.

Bioassessment metrics

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

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

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

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

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

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

Quality control

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

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

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

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

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

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

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

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

RESULTS

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

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Quality Assurance

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

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

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

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

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

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

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

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

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

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

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

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

Literature cited

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

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

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

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

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

Taxa Listing

Project ID: MDT06PBSJ
RAI No.: MDT06PBSJ019

RAI No.: MDT06PBSJ019 **Sta. Name:** Cloud Ranch
Client ID:
Date Coll.: **No. Jars:** 1 **STORET ID:**

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Non-Insect							
Lymnaeidae							
Lymnaeidae	4	4.76%	Yes	Immature		6	SC
Naididae							
Naididae	31	36.90%	Yes	Unknown		8	CG
Physidae							
Physidae	2	2.38%	Yes	Unknown		8	SC
Talitridae							
Hyalella sp.	4	4.76%	Yes	Unknown		8	CG
Odonata							
Coenagrionidae							
Enallagma sp.	7	8.33%	Yes	Larva		7	PR
Diptera							
Ceratopogonidae							
Ceratopogoninae	12	14.29%	Yes	Larva		6	PR
Ceratopogoninae	2	2.38%	No	Pupa		6	PR
Culicidae							
Anopheles sp.	2	2.38%	Yes	Larva		8	CF
Chironomidae							
Chironomidae							
Acricotopus sp.	6	7.14%	Yes	Larva		10	CG
Dicrotendipes sp.	3	3.57%	Yes	Larva		8	CG
Orthocladiinae	1	1.19%	No	Larva	Early Instar	6	CG
Psectrocladius sp.	6	7.14%	Yes	Larva		8	CG
Pseudochironomus sp.	3	3.57%	Yes	Larva		5	CG
Tanypodinae	1	1.19%	Yes	Larva	Early Instar	7	PR
Sample Count	**84**						

Metrics Report

Project ID: MDT06PBSJ
RAI No.: MDT06PBSJ019
Sta. Name: Cloud Ranch
Client ID:
STORET ID:
Coll. Date:

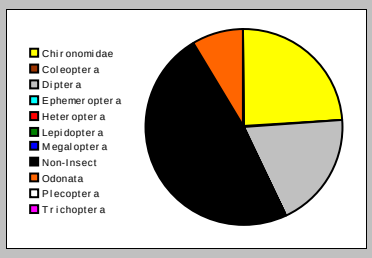
Abundance Measures

Sample Count: 84
Sample Abundance: 84.00 100.00% of sample used

Coll. Procedure:
Sample Notes:

Taxonomic Composition

Category	R	A	PRA
Non-Insect	4	41	48.81%
Odonata	1	7	8.33%
Ephemeroptera			
Plecoptera			
Heteroptera			
Megaloptera			
Trichoptera			
Lepidoptera			
Coleoptera			
Diptera	2	16	19.05%
Chironomidae	5	20	23.81%

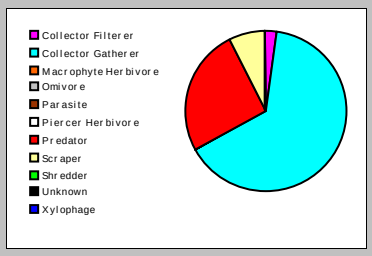


Dominant Taxa

Category	A	PRA
Naididae	31	36.90%
Ceratopogoninae	14	16.67%
Enallagma	7	8.33%
Psectrocladius	6	7.14%
Acricotopus	6	7.14%
Lymnaeidae	4	4.76%
Hyalella	4	4.76%
Pseudochironomus	3	3.57%
Dicrotendipes	3	3.57%
Physidae	2	2.38%
Anopheles	2	2.38%
Tanypodinae	1	1.19%
Orthocladiinae	1	1.19%

Functional Composition

Category	R	A	PRA
Predator	3	22	26.19%
Parasite			
Collector Gatherer	6	54	64.29%
Collector Filterer	1	2	2.38%
Macrophyte Herbivore			
Piercer Herbivore			
Xylophage			
Scraper	2	6	7.14%
Shredder			
Omivore			
Unknown			

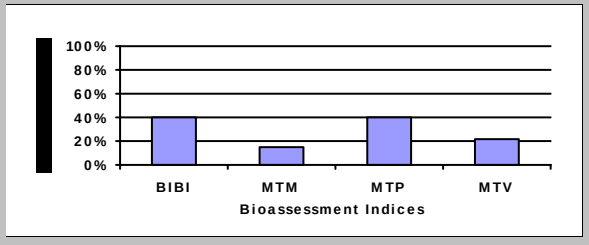


Metric Values and Scores

Metric	Value	BIBI	MTP	MTV	MTM
Composition					
Taxa Richness	12	1	1		0
Non-Insect Percent	48.81%				
E Richness	0	1		0	
P Richness	0	1		0	
T Richness	0	1		0	
EPT Richness	0		0		0
EPT Percent	0.00%		0		0
Oligochaeta+Hirudinea Percent	36.90%				
Baetidae/Ephemeroptera	0.000				
Hydropsychidae/Trichoptera	0.000				
Dominance					
Dominant Taxon Percent	36.90%		2		1
Dominant Taxa (2) Percent	53.57%				
Dominant Taxa (3) Percent	61.90%	3			
Dominant Taxa (10) Percent	95.24%				
Diversity					
Shannon H (loge)	2.026				
Shannon H (log2)	2.923		2		
Margalef D	2.503				
Simpson D	0.186				
Evenness	0.104				
Function					
Predator Richness	3		1		
Predator Percent	26.19%	5			
Filterer Richness	1				
Filterer Percent	2.38%			3	
Collector Percent	66.67%		2		2
Scraper+Shredder Percent	7.14%		1		0
Scraper/Filterer	3.000				
Scraper/Scraper+Filterer	0.750				
Habit					
Burrower Richness	3				
Burrower Percent	23.81%				
Swimmer Richness	1				
Swimmer Percent	2.38%				
Clinger Richness	0	1			
Clinger Percent	0.00%				
Characteristics					
Cold Stenotherm Richness	0				
Cold Stenotherm Percent	0.00%				
Hemoglobin Bearer Richness	2				
Hemoglobin Bearer Percent	7.14%				
Air Breather Richness	1				
Air Breather Percent	2.38%				
Voltinism					
Univoltine Richness	7				
Semivoltine Richness	0	1			
Multivoltine Percent	23.81%		3		
Tolerance					
Sediment Tolerant Richness	1				
Sediment Tolerant Percent	4.76%				
Sediment Sensitive Richness	0				
Sediment Sensitive Percent	0.00%				
Metals Tolerance Index	4.250				
Pollution Sensitive Richness	0	1		0	
Pollution Tolerant Percent	17.86%	5		1	
Hilsenhoff Biotic Index	7.488		0		0
Intolerant Percent	0.00%				
Supertolerant Percent	64.29%				
CTQa	108.000				

Bioassessment Indices

BioIndex	Description	Score	Pct	Rating
BIBI	B-IBI (Karr et al.)	20	40.00%	
MTP	Montana DEQ Plains (Bukantis 1998)	12	40.00%	Moderate
MTV	Montana Revised Valleys/Foothills (Bollman 1998)	4	22.22%	Moderate
MTM	Montana DEQ Mountains (Bukantis 1998)	3	14.29%	Severe



Thursday, September 14, 2006

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