# MONTANA DEPARTMENT OF TRANSPORTATION
# WETLAND MITIGATION MONITORING REPORT: YEAR 2008

*DH Ranch*
*Edgar, Montana*

Prepared for:

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

Prepared by:

**POST, BUCKLEY, SCHUH, AND JERNIGAN**
801 North Last Chance Gulch, Suite 101
Helena, MT 59601-3360

December 2008

PBS&J Project No: 0B4308801.06.03

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# 1.0 INTRODUCTION

This report presents the results of the second year (2008) of wetland monitoring at the DH Ranch wetland mitigation project. This mitigation site was constructed during the spring of 2007 in the eastern portion of the Upper Yellowstone River watershed (Watershed #13). Approximately 17.4 acres of wetland credit at this site is to be provided to the Montana Department of Transportation (MDT) through a credit purchase agreement. It is anticipated that this site will compensate for wetland impacts resulting from MDT highway and bridge reconstruction projects in the watershed. The DH Ranch mitigation site was constructed on private property owned by Mr. George Duke. The goal of the project is to create wetland hydrology at the site, and thereby ultimately provide up to 23 acres of palustrine emergent and scrub-shrub wetland within the confines of the site. Prior to construction, approximately 0.38 acre of palustrine emergent and scrub-shrub wetland had been incidentally created along irrigation ditches traversing the site.

The site occurs at an elevation of approximately 3,430 feet above mean sea level and is located approximately three miles northeast of Edgar, Montana in Carbon County on the eastern floodplain of the Clark Fork of the Yellowstone River (**Figure 1**).. It can be found on the Silesia, MT U.S. Geologic Survey 7.5 minute topographic quadrangle in the SE ¼ of Section 1, Township 4 South, Range 23 East. Approximate universal transverse mercator (UTM) coordinates for the central portion of the site are in Zone 12 at 5,041,967 Northing and 669,792 Easting.

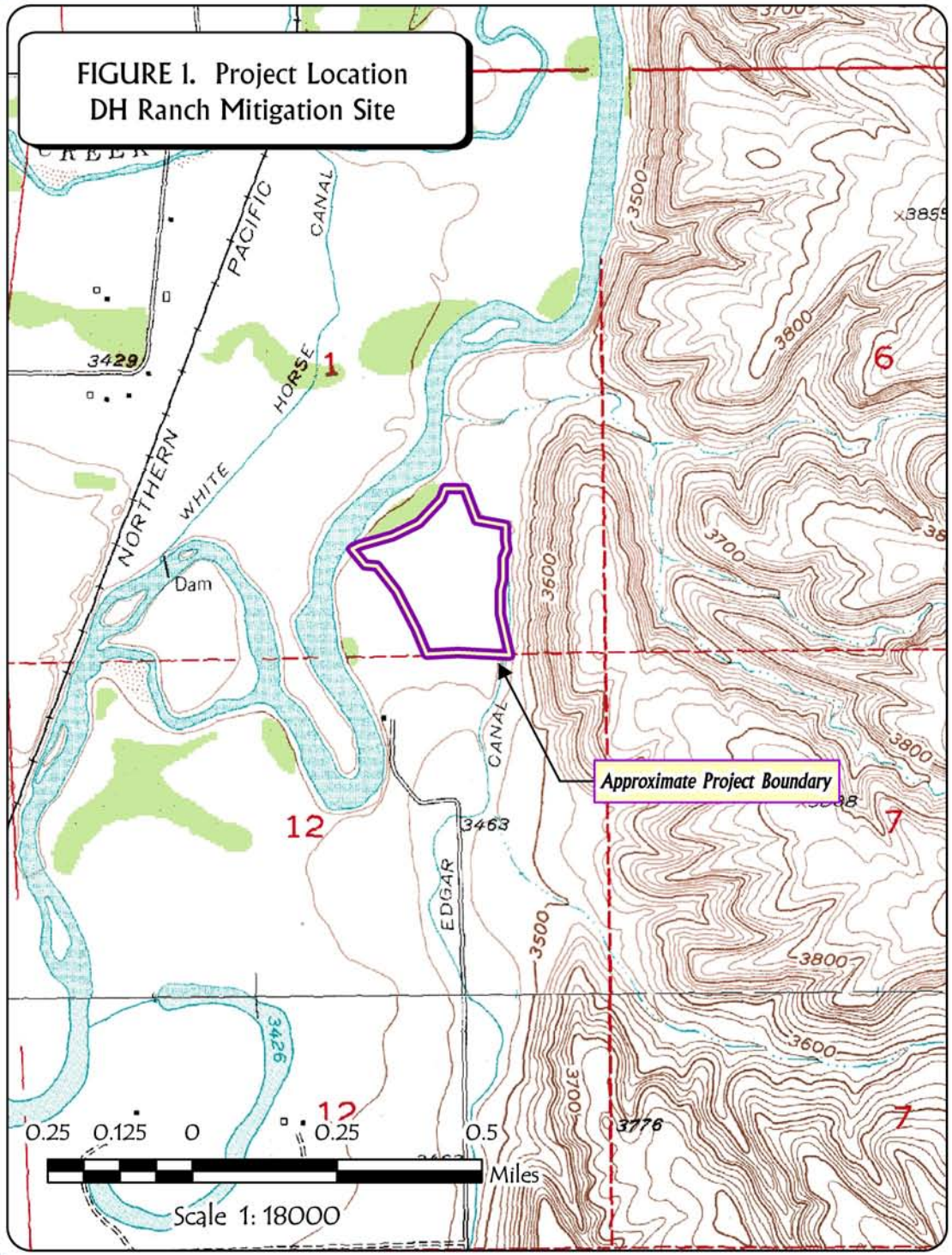
The approximate site boundary is illustrated on **Figure 2** (**Appendix A**) and on the plan sheet in **Appendix D**. The project is a wetland creation project and includes a series of wetland cells supplied primarily by irrigation return flow, with some minimal contributions from precipitation. Monitoring occurs on the site in mid-summer when all wetland data are collected. Wetland crediting ratios for the site are 1:1 for wetland creation areas and 4:1 for riparian buffers. The newly constructed jackleg fence around much of the site, combined with an existing barbwire fence, encompass roughly 27.78 acres.

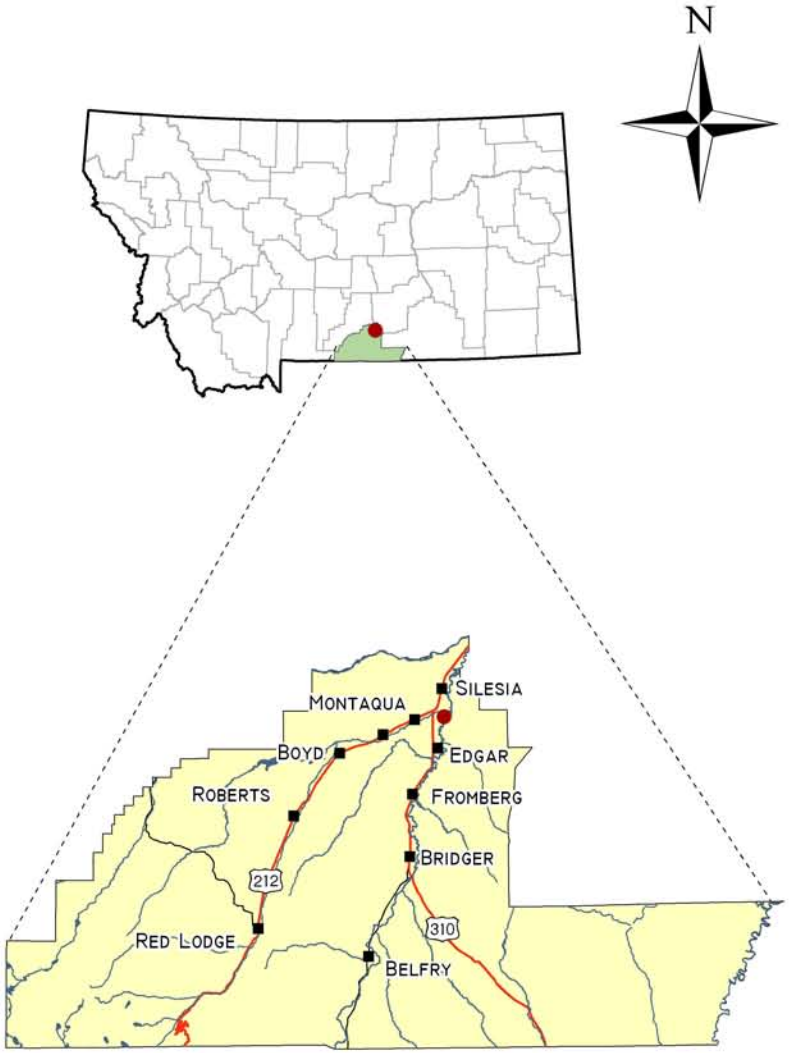
# 2.0 METHODS

## 2.1 Monitoring Dates and Activities

The site was monitored on July 10, 2008 (mid-season visit). The mid-season visit was conducted to document vegetation, soil, and hydrologic conditions used to map jurisdictional wetlands. The majority of the information contained on the Wetland Mitigation Site Monitoring Form (**Appendix B**) was collected at this time. Activities and information conducted/collected included: wetland delineation; wetland/open water boundary mapping; vegetation community mapping; vegetation transects; soils data; hydrology data; bird and general wildlife use; photograph points; macroinvertebrate sampling; functional assessment; and survival of planted woody vegetation.

# FIGURE 1. Project Location
# DH Ranch Mitigation Site




PROJECT #: B43088.00 0516
DATE: September 2007
LOCATION: DH Ranch
PROJECT MANAGER: R. McEldowney
DRAWN BY: MSA

PBS&J
801 N. Last Chance Gulch, Ste. 101 Helena, MT 59601

## 2.2 Hydrology

Hydrologic indicators were evaluated during the mid-season visit. Wetland hydrology indicators were recorded using procedures outlined in the Corps of Engineers (COE) Wetlands Delineation Manual (Environmental Laboratory 1987) and hydrology data were recorded on COE Routine Wetland Delineation Data Forms (**Appendix B**). If located within 18 inches of the ground surface (soil pit depth for purposes of delineation), groundwater depths were documented on the routine wetland delineation data form at each data point.

All additional hydrologic data were recorded on the mitigation site monitoring form (**Appendix B**). The boundary between wetlands and open water (no rooted vegetation) aquatic habitats was mapped on the aerial photograph and an estimate of the average water depth at this boundary was recorded.

## 2.3 Vegetation

General dominant species-based vegetation community types (e.g., *Scirpus acutus/Mixed graminoids*) were delineated on an aerial photograph. Standardized community mapping was not employed as many of these systems are geared towards climax vegetation and may not reflect yearly changes. Estimated percent cover of the dominant species in each community type was listed on the site monitoring form (**Appendix B**).

A 10-foot wide belt transect was established (**Figure 2** in **Appendix A**). Within the transect belt percent cover was estimated for each vegetative species for each vegetation community encountered within the "belt" using the following values: + (<1%); 1 (1-5%); 2 (6-10%); 3 (11-20%); 4 (21-50%); and 5 (>50%).

The purpose of the transect is to evaluate changes over time, especially the establishment and increase of hydrophytic vegetation. The transect location was marked on the aerial photo and all data recorded on the mitigation site monitoring form. Transect endpoint locations were recorded with a global positioning system (GPS) unit. Metal fence posts were utilized to physically mark the transect ends. Photos of the transect were taken from both ends during the mid-season visit. A comprehensive plant species list for the site was compiled.

Several woody species were planted at this mitigation site. The number of live and dead plants were recorded for each species.

## 2.4 Soils

Soils were evaluated during the mid-season visit according to hydric soils determination procedures 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 (USDA – NRCS 2006).

## 2.5 Wetland Delineation

A wetland delineation of the mitigation site was conducted during the 2008 mid-season visit according to the 1987 Corps of Engineers (COE) Wetland Delineation Manual. In July 2008, consultation with the COE (Steinle pers. comm.) confirmed that, where the 1987 manual was used to establish baseline wetland conditions at MDT wetland mitigation sites, it should continue to be applied at such sites for the duration of the monitoring period. Consequently, application of the new *Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Great Plains Region* (COE 2008) was not required or undertaken at this site in 2008. Wetland and upland areas within the monitoring area were investigated for the presence of wetland hydrology, hydrophytic vegetation and hydric soils. The indicator status of vegetation was derived from the *National List of Plant Species that occur in Wetlands: Northwest (Region 9)* (Reed 1988).

The information was recorded onto COE Routine Wetland Delineation Data Forms (**Appendix B**). The wetland/upland boundary was delineated both with a resource grade GPS and on aerial photographs. The wetland/upland boundary in combination with the wetland/open water habitat boundary was used to calculate the wetland area that has developed within the monitoring area.

## 2.6 Mammals, Reptiles, and Amphibians

Mammal, reptile, and amphibian species observations and other positive indicators of use, such as vocalizations, were recorded on the wetland monitoring form. Indirect use indicators, including tracks; scat; burrows; eggshells; skins; bones; etc., were also recorded. Observations were recorded as the observer traversed the site while conducting other required activities. Direct sampling methods, such as snap traps, live traps, and pitfall traps, were not implemented. A comprehensive list of observed species was compiled. Observations from past monitoring is compared to this data.

## 2.7 Birds

Bird observations were recorded during the mid-season visit. No formal census plots, spot mapping, point counts, or strip transects were conducted. During the mid-season visit, bird observations were recorded incidental to other monitoring activities. Observations were categorized by species, activity code, and general habitat association (**Appendix B**).

## 2.8 Macroinvertebrates

One macroinvertebrate sample was collected during the mid-season visit (**Figure 2** in **Appendix A**). Macroinvertebrate sampling procedures and analysis are included in **Appendix F**. The sample was preserved as outlined in the sampling procedure and sent to a laboratory for analysis.

## 2.9 Functional Assessment

In 2007, a functional assessment was conducted using the 1999 MDT Montana Wetland Assessment Method (Berglund 1999). In 2008, the 2008 MDT Montana Wetland Assessment Method (Berglund and McEldowney 2008) was applied. Field data necessary for this assessment were collected during the mid-season site visit.

## 2.10 Photographs

Photographs were taken during the mid-season visit showing the current land use surrounding the site, the upland buffer, the monitored area, macroinvertebrate sampling location, and the vegetation transect (**Appendix C**). Each photograph point location was recorded with a GPS. All photographs were taken using a digital camera, with no optical zoom used. A description and compass bearing for each photograph was recorded on the wetland monitoring form.

## 2.11 GPS Data

During the 2007 monitoring season, data were collected with a resource grade Magellan Mobile Mapper unit at the vegetation transect beginning and ending locations, at all photograph locations, wetland sample points, and at aerial photograph reference points. In 2008 additional GPS data were collected as necessary, including locations of noxious weed infestations. Procedures used for GPS mapping and aerial photography referencing are included in **Appendix E.**

## 2.12 Maintenance Needs

Where encountered, current or potential future problems were documented and conveyed to MDT and reported in this document.

# 3.0 RESULTS

## 3.1 Hydrology

Irrigation return flow is the primary source of water at the DH Ranch mitigation site. Irrigation return flows enter the south end of the site and are diverted to inundate/saturate the majority of the site. An outfall structure is located in the northeastern corner of the site.

The Natural Resources Conservation Service (NRCS) estimates that the growing season in Joliet, Montana extends from May 5$^{th}$ through September 29$^{th}$, and is approximately 147 days long (NRCS 2002). Therefore, wetland hydrology requirements are met if the site remains saturated to the soil surface for a minimum of seven consecutive days (5 percent of the growing season). The closest active weather station to the wetland monitoring area is Bridger, Montana station #241102. According to the Western Regional Climate Center (WRCC), mean annual precipitation at this station was approximately 11.49 inches; with the majority of precipitation occurring in April, May, June, September, and October (2008). The precipitation total through

mid-July 2008 at the Bridger weather station was 6.01 inches (WRCC 2008). To illustrate the amount of evapotranspiration in this area, the evapotranspiration rate (Penman equation) during the 2005 growing season (May – Sept) was calculated at approximately 35.59 inches from data obtained at the South Bridger, Montana remote automated weather station (RAWS) (BLM-RAWS 2007). This rate is more than three times the average yearly precipitation rate.

Inundation was present to various extents at all wetland cells within the monitoring area during the mid-season visit (**Figure 3** in **Appendix A**). Water depths ranged from zero to roughly two feet, with an average depth of approximately 0.25 foot.

### 3.2 Vegetation

Vegetation species identified on the site are presented in **Table 1** and on the **Monitoring Form** (**Appendix B**). Construction of the site was completed in July 2007; consequently, much of the site was dominated by invasive plant species. Cheatgrass (*Bromus tectorum*) was a dominant species in many of the Disturbed-Upland communities and even existed in some areas of the Disturbed-Wetland community type containing inundated soils. In addition, foxtail barley (*Hordeum jubatum*) has become dominant in many of the wetland areas, and has completely changed the Alkali Bulrush (*Scirpus maritimus*)/Mixed Graminoids dominated wetlands found in the southeast portion of the project area in 2007.

A total of seven main community types were documented at the site in 2008, with the Disturbed community type being divided into two subtypes – wetland and upland. Six of these community types are vegetated wetland community types (**Figure 3** in **Appendix A**): *Scirpus acutus*/Mixed graminoids (Bulrush), *Typha latifolia*/Mixed Graminoids (Cattail), *Salix amygdaloides*, Disturbed – Wetland, *Sporobolus airoides* (alkali sacaton), and *Hordeum jubatum*. The alkali sacaton community type is called the 'Alkali Sacaton Southern Plains Grassland' community type by the Montana Natural Heritage Program and is classified as S2 - at risk because of very limited and/or declining numbers, range, and/or habitat, making it vulnerable to extirpation in the state (MTNHP 2008). Dominant species within each of these communities are listed on the **Monitoring Form** (**Appendix B**).

The bulrush and cattail community types occur as pockets throughout the site in slightly deeper, more permanently flooded areas. Cattail communities expanded into some areas mapped as bulrush in 2007. Disturbed-wetland areas were just becoming established in 2007 and in 2008 continue to be dominated by a variety of species. Several of these disturbed wetland areas became dominated by foxtail barley and were reclassified as such. Similarly, the *Scirpus maritimus*/Mixed Graminoids (Alkali Bulrush) community type identified in 2007 transitioned into the foxtail barley community type in 2008.

Open water areas vary in depth but are relatively shallow and bulrush and cattails are beginning to encroach into deeper water. It is expected that if water levels are held relatively constant that open water areas will become smaller over time.

**Table 1:** ***2008 vegetation species list for the DH Ranch Wetland Mitigation Site.***

| Scientific Name | 1988 Region 9 (Northwest) Wetland Indicator Status | Scientific Name | 1988 Region 9 (Northwest) Wetland Indicator Status |
|---|---|---|---|
| *Achillea millefolium* | FACU | *Melilotus* sp. | FACU |
| *Agropyron repens* | FACU | *Panicum virgatum* | FAC+ |
| *Alopecurus arundinaceus* | NI | *Phalaris arundinaceae* | FACW |
| *Ambrosia trifida* | FAC | *Plantago major* | FAC+ |
| *Ambrosia* sp. | -- | *Poa pratensis* | FACU+ |
| *Artemisia cana* | FAC | *Polygonum sp.* | FACW |
| *Asclepias* sp. | -- | *Populus deltoides* | FAC |
| *Asparagus officinalis* | FACU | *Potentilla anserina* | OBL |
| *Aster* spp. [Purple] | -- | *Rhus trilobata* (planted) | NI |
| *Atriplex canescens* (planted) | UPL | *Rosa woodsii* | FACU |
| *Bromus inermis* | -- | *Rumex crispus* | FACW |
| *Bromus tectorum* | -- | *Salix amygdaloides* | FACW |
| *Capsella bursa-pastoris* | FAC- | *Salix exigua* (planted) | OBL |
| *Carex* sp. | (FACW) | *Salix* sp. | (FACW) |
| *Chenopodium album* | FAC | *Sarcobatus vermiculatus* | FACU+ |
| *Chrysothamnus nauseosus* | -- | *Scirpus acutus* | OBL |
| *Cirsium arvense* | FACU+ | *Scirpus maritimus* | OBL |
| *Convolvulus arvensis* | -- | *Scirpus microcarpus* | OBL |
| *Cynoglossum officinale* | -- | *Scirpus pungens* | OBL |
| *Distichlis spicata* | FACW | *Shepherdia argentea* (planted) | -- |
| *Echinochloa muricata* | FACW | *Sisymbrium altissimum* | FACU- |
| *Elaeagnus angustifolia* | FAC | *Solanum* sp. | -- |
| *Eleocharis palustris* | OBL | *Sporobolus airoides* | FAC- |
| *Elymus trachycaulus* | FAC | *Symphoricarpos albus* | FACU |
| *Festuca pratensis* | FACU+ | *Taraxacum officinale* | FACU |
| *Grindelia squarrosa* | FACU | *Thlaspi arvense* | NI |
| *Hordeum jubatum* | FAC+ | *Tragopogon dubius* | -- |
| *Juncus balticus* | OBL | *Trifolium hybridum* | FACU+ |
| *Juncus bufonius* | FACW+ | *Trifolium pratense* | FACU |
| *Juncus effusus* | FACW+ | *Trifolium repens* | FACU+ |
| *Juncus nevadensis* | FACW | *Typha angustifolia* | OBL |
| *Kochia scoparia* | FAC | *Typha latifolia* | OBL |
| *Lactuca serriola* | FACU | *Verbascum thapsus* | -- |
| *Lepidium perfoliatum* | FACU+ | *Verbena bracteata* | FACU+ |
| *Medicago sativa* | -- | *Veronica* sp. | (FACW-OBL) |

Disturbed-Upland communities differ from Disturbed-Wetland communities by having a distinctly different water regime and a prevalence of facultative, facultative-upland, and upland plant species. Without intervention these areas are not expected to develop into wetlands. In 2008 much of these areas were dominated by clasping pepperweed (*Lepidium perfoliatum*), a weedy winter annual, as well as cheatgrass and field bindweed (*Convolvulus arvensis*).

Vegetation community data were recorded from a 10-foot wide belt transect (**Monitoring Forms** in **Appendix B**) and summarized (**Table 2**). Vegetation continued to transition into hydrophytic

dominated communities (**Charts 1** and **2**). If a similar hydrologic regime is perpetuated in future years as was observed on the site in 2008, it is expected that the total number of plant species will decrease, number of upland species will decrease, and total vegetative cover will increase.

**Table 2:** ***2007 and 2008 vegetation transect data summary.***

| Monitoring Year | 2007 | 2008 |
|---|---|---|
| Transect Length (feet) | 645 | 645 |
| # Vegetation Community Transitions along Transect | 9 | 12 |
| # Vegetation Communities along Transect | 3 | 5 |
| # Hydrophytic Vegetation Communities along Transect | 2 | 4 |
| Total Vegetative Species | 39 | 47 |
| Total Hydrophytic Species | 20 | 15 |
| Total Upland Species | 19 | 32 |
| Estimated % Total Vegetative Cover | 50 | 66 |
| % Transect Length Comprised of Hydrophytic Vegetation Communities | 88.4 | 90 |
| % Transect Length Comprised of Upland Vegetation Communities | 11.6 | 10 |
| % Transect Length Comprised of Unvegetated Open Water | 0 | 0 |
| % Transect Length Comprised of Bare Substrate | 0 | 0 |

**Chart 1:** ***Transect map showing vegetation types from the start of transect (0 feet) to the end of transect (645 feet) for 2007 and 2008.***

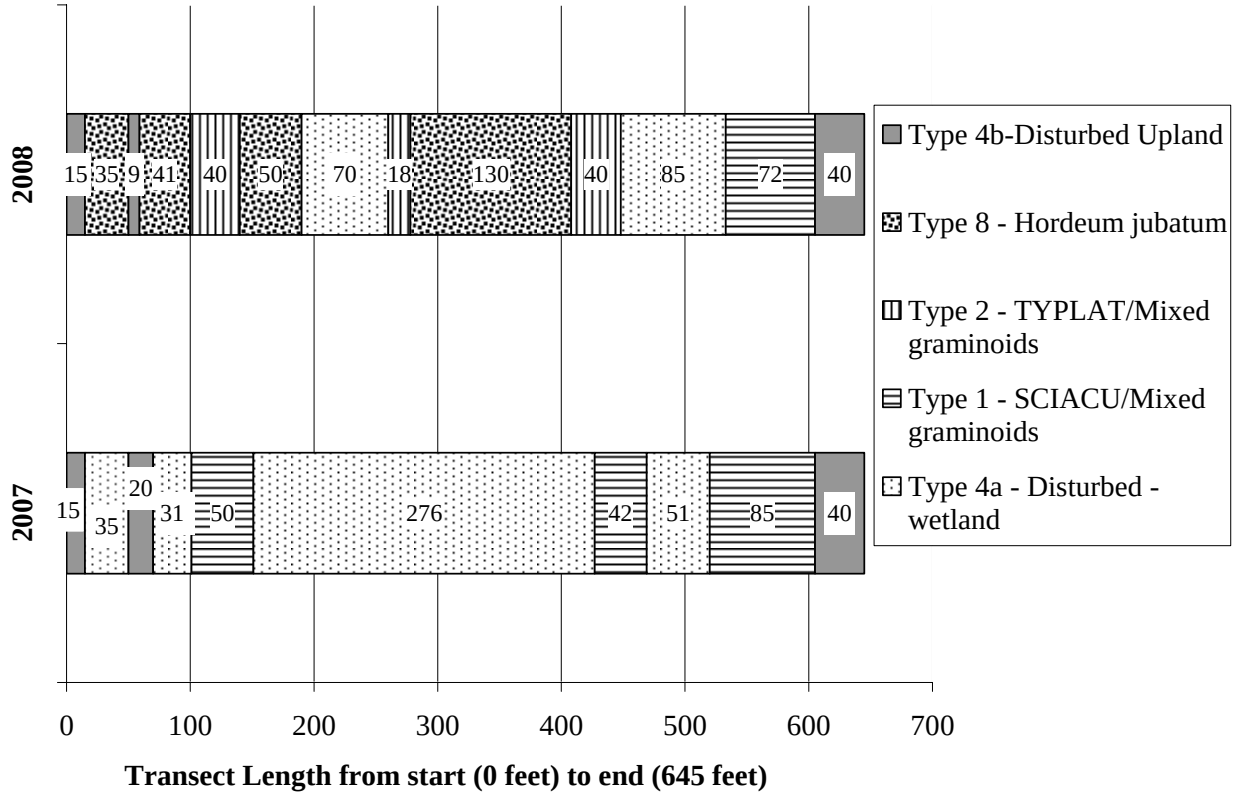
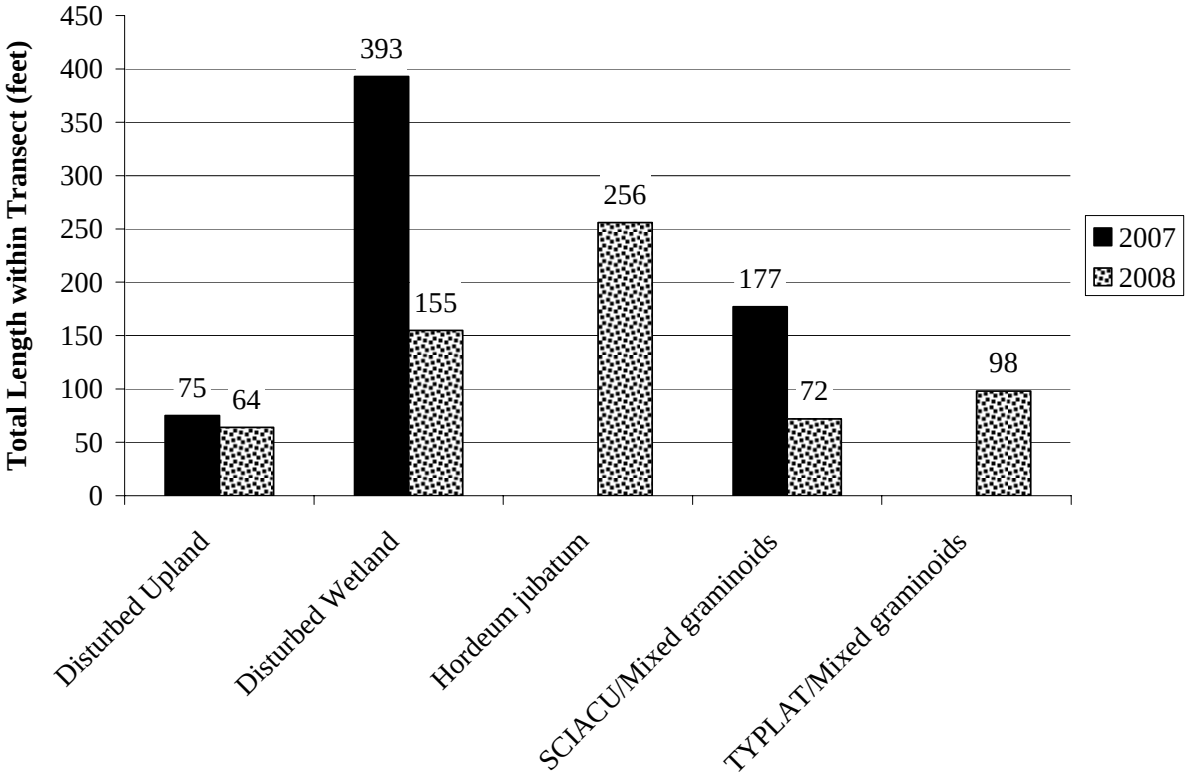


**Chart 2:** ***Length of vegetation communities within Transect 1 for 2007 and 2008.***




In 2007 a total of 320 woody plantings were found onsite, whereas in 2008 only 103 were able to be located during the mid-season visit. The reduced number of planted shrubs found during the 2008 mid-season visit is likely due both to mortality and increased vegetative cover (i.e., field bindweed) hiding the small shrubs from observation. A total of 217 shrubs were not found and are likely dead, though this is unsubstantiated. Observed mortality of planted woody vegetation species was summarized (**Table 3**). As of July 10, 2008, the verified survival rate is estimated at 56 percent, with a total of 45 individuals observed to be dead. If the additional 217 woody shrub plantings are in fact dead then the overall survival rate is 22 percent. The most commonly planted species was silver buffaloberry (*Shepherdia argentea*), but the species with the highest level of survival was four-wing saltbush (*Atriplex canescens*).

**Table 3:** ***2008 observed mortality of planted woody species for the DH Ranch Wetland Mitigation Site.***

| SPECIES | LIVE | DEAD |
|---|---|---|
| *Rhus trilobata* | 5 | 21 |
| *Shepherdia argentea* | 23 | 24 |
| *Atriplex canescens* | 30 | 0 |
| **Total Located*** | **58** | **45** |

*A total of 320 were found in 2007 versus the 103 found in 2008.

## 3.3 Soils

Since the site was excavated and graded in spring/early summer 2007, soils are highly disturbed throughout the site. Soils sampled in wetland areas were inundated and comprised of silty clay. The matrix color was 5PB 5/1 and contained prominent mottles (7.5YR 4/6).

## 3.4 Wetland Delineation

Total aquatic habitat on the site in 2008 was 17.44 acres (**Figure 3** in **Appendix A**). Open water comprised 6.05 acres of the 17.44-acre total, an increase of approximately 0.66 acres from 2007. Shallow open water habitat observed in 2008 is expected to continue to become vegetated with emergent hydrophytic species over time. Wetlands comprised 11.39 acres of the 17.44-acre total, a slight increase of 0.08 acre from 2007. Delineated wetland boundaries are illustrated on **Figure 3** (**Appendix A**). Soils, vegetation, and hydrology data for wetlands are found on the **COE Forms** (**Appendix B**). Credits that have developed to date are discussed in *Section 3.10.*

## 3.5 Wildlife

Though only constructed in 2007, the created wetland complex provides habitat for several wildlife and bird species. Three mammal, two amphibian, and eight bird species were observed at the site during 2008 monitoring (**Table 4**). The habitat value of the site is expected to increase as vegetation continues to establish and diversify.

**Table 4:** ***Fish and wildlife species observed in 2007 and 2008 at the DH Ranch Wetland Mitigation Site.***

| | |
|---|---|
| **AMPHIBIAN** | |
| **Northern leopard Frog (*Rana pipiens*)** | **Woodhouse's toad (*Bufo woodhousii*)** |
| **REPTILE** | |
| Plains garter snake (*Thamnophis radix*) | |
| **BIRD** | |
| American White Pelican (*Pelecanus erythrorhynchos*) | Grasshopper Sparrow (*Ammodramus savannarum*) |
| American Goldfinch (*Carduelis tristis*) | Greater Yellowlegs (*Tringa melanoleuca*) |
| **American Robin (*Turdus migratorius*)** | **Killdeer (*Charadrius vociferous*)** |
| **Bald Eagle (*Haliaeetus leucocephalus*)** | Lesser Yellowlegs (*Tringa flavipes*) |
| **Barn Swallow (*Hirundo rustica*)** | Mourning Dove (*Zenaida macroura*) |
| **Blue-winged Teal (*Anas discors*)** | **Red-winged Blackbird (*Agelaius phoeniceus*)** |
| Canada Goose (*Branta canadensis*) | **Sandhill Crane (*Grus canadensis*)** |
| Common Snipe (*Gallinago gallinago*) | Solitary Sandpiper (*Tringa solitaria*) |
| Eastern Kingbird (*Tyranus tyranus*) | Spotted Sandpiper (*Actitis macularia*) |
| **Golden Eagle (*Aquila chrysaetos*)** | Wild Turkey (*Meleagris gallopavo*) |
| **MAMMAL** | |
| Cottontail (*Sylvilagus* sp.) | **Raccoon *(Procyon lotor)*** |
| **Black-tailed prairie dog (*Cynomys ludovicianus*)** | **White-tailed Deer (*Odocoileus virginiana*)** |
| Black bear (*Ursus americanus*) (observed by landowner) | |

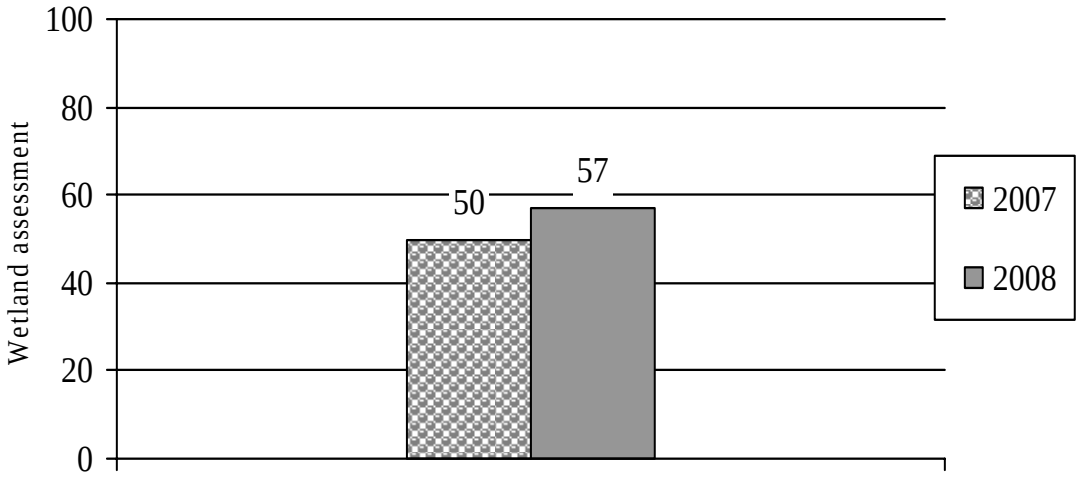
**Bolded** species indicate those that were observed in 2008.

## 3.6 Macroinvertebrates

Macroinvertebrates were sampled at the northeast corner of the site (**Figure 2** in **Appendix A**). These results are typical of a newly constructed mitigation site. Complete sampling results are provided in **Appendix F** and were summarized by Rhithron Associates in the italicized section below and in **Chart 3** (Bollman 2008).

> *2008: Invertebrates were abundant at this site, and in 2008, diversity was much higher compared to 2007. Snails (*Stagnicola sp. *and* Physa sp.*) remained abundant this year, but the chironomid fauna dominated the taxonomic composition in 2008. Hemoglobin-bearing midges (especially* Apedilum sp. *and* Dicrotendipes sp.*) were abundant, suggesting hypoxic sediments. The functional mix included a significant proportion of predators, and gatherers and scrapers dominated the remaining components. These findings suggest well-developed aquatic habitats. The calculated thermal preference of the assemblage was 18.2ºC.*

**Chart 3:** ***Bioassessment scores using the wetland index for the DH Ranch Wetland Mitigation Site during 2007 and 2008.***




## 3.7 Functional Assessment

Pre-construction and 2007 conditions were assessed using the 1999 MDT MWAM; conditions in 2008 conditions were assessed using the 2008 MDT MWAM. Although direct comparisons cannot be made, general trends in wetland development can still be determined. The 2005 baseline, 2007, and 2008 functional assessments were summarized for general comparison (**Table 5**). The complete 2008 functional assessment can be found in **Appendix B**. For comparative purposes, the functional assessment results for baseline conditions prepared by Oasis Environmental in 2005 are also included in **Table 5**.

**Table 5:** ***Summary of 2005, 2007, and 2008 wetland function/value ratings and functional point at the DH Ranch Wetland Mitigation Site.***

| Function and Value Parameters from the MDT Montana Wetland Assessment Method | 2005 Baseline[1] | 2007[1] | 2008[2] |
|---|---|---|---|
| Listed/Proposed T&E Species Habitat | Low (0.0) | Low (0.0) | Low (0.0) |
| MTNHP Species Habitat | Low (0.1) | Low (0.1) | Mod (0.6) |
| General Wildlife Habitat | Mod (0.5) | High (0.9) | High (0.9) |
| General Fish/Aquatic Habitat | NA | NA | NA |
| Flood Attenuation | NA | NA | NA |
| Short and Long Term Surface Water Storage | Low (0.3) | High (1.0) | High (1.0) |
| Sediment/Nutrient/Toxicant Removal | NA | Mod (0.7) | Mod (0.7) |
| Sediment/Shoreline Stabilization | High (0.9) | Low (0.3) | Low (0.3) |
| Production Export/Food Chain Support | Mod (0.5) | High (0.9) | High (1.0) |
| Groundwater Discharge/Recharge | NA | Low (0.1) | Low (0.1) |
| Uniqueness | Mod (0.4) | Low (0.3) | Mod (0.5) |
| Recreation/Education Potential | Low (0.1) | Low (0.1) | Low (0.05) |
| **Actual Points / Possible Points** | **2.8 / 8** | **4.4 / 10** | **5.15 / 9** |
| **% of Possible Score Achieved** | **35** | **44** | **57** |
| **Overall Category** | **III** | **II** | **II** |
| **Total Acreage of Assessed Aquatic Habitat within AA Boundaries** | **0.570** | **16.70** | **17.44** |
| **Functional Units** (acreage x actual points) | **1.596** | **73.50** | **89.82** |
| **Net Acreage Gain** | NA | **16.13** | **16.87** |
| **Net Functional Unit Gain** | NA | **71.90** | **88.22** |

[1] Assessed using the 1999 MDT Montana Wetland Assessment Method (MWAM).
[2] Assessed using the 2008 MDT MWAM. The completed form is in **Appendix B**.

The created wetlands at DH Ranch were ranked as Category II wetlands in 2007 and 2008 as compared to Category III in 2005. Functions that increased substantially over 2005 baseline conditions include MNHP species habitat, general wildlife habitat, short and long term surface water storage, sediment/nutrient/ toxicant removal, and production export. The pre-project site provided about 1.596 functional units within the monitoring area, and in 2008 provides about 89.82 functional units, for a conservative gain of roughly 88 functional units.

## 3.8 Photographs

Representative photographs taken from photo-points and transect ends are provided in **Appendix C**.

## 3.9 Maintenance Needs/Recommendations

In order to maximize wetland establishment on the site it may be worthwhile to adjust the distribution of water so that the areas in the southwestern portion of the site, between a berm and an inundated area, are wet for prolonged time periods during the growing season.

The mitigation design report designated that the berm areas were to be riparian scrub-shrub areas(ADC 2006) (**Appendix D**). In 2008 these areas were colonized by a variety of weedy species and had not been planted with riparian shrubs prior to the mid-season visit, though some cottonwood seedlings had become established. It is likely that these seedlings will continue to grow in subsequent years, however, they occur in a single line near the bases of the berms. If

these berm areas are to be counted for credit in future years it may be necessary to plant the upper portions of the berms with shrubby riparian species (see inset on figure in **Appendix D**).

Several infestations of Canada thistle (*Cirsium arvense*) and musk thistle (*Carduus nutans*) were identified (**Figure 3** in **Appendix A**). Canada thistle also generally occurs at low to very low (i.e., trace) densities throughout the southern portion of the project area, particularly in the disturbed-wetland community type. Cheatgrass, clasping pepperweed, and field bindweed are prevalent in the disturbed–upland community type. Control of all these weeds is recommended.

### 3.10 Current Credit Summary

The wetland mitigation design for DH Ranch indicated that a maximum of 21.1 acres of wetland, 1.7 acres of shrub dominated riparian islands and 0.8 acre of riparian buffer could be created on the site (ADC 2006). The status of all created wetland areas is compared against the success criteria in **Table 6** and **Tables 7** and **8** summarize the acreages and credits created as of the second year of wetland monitoring.

The COE will determine which crediting ratios are applicable to the site. However, using the credit ratios listed, **Table 8** summarizes compensatory mitigation credits developed to date at DH Ranch.

As no success criteria pertain to the upland buffer, credits for the upland buffer were assigned in 2008 despite its dominance by clasping pepperweed and that most of the planted shrubs have died. The wetland mitigation design report (ADC 2006) also includes a credit category for shrubby riparian islands located on the water diversion berms. These berms are generally vegetated by weedy species, such as cheatgrass, and do not have a woody component yet. Some natural recruitment of cottonwoods is occurring on their southern sides, at the base of the berms and will continue to be monitored. No credits were calculated for these berms this year.

Based on this information and assumed credit ratios for wetlands, open water, and upland buffer, approximately 12.73 acres of credit, or 73% of the 17.4-acre MDT credit purchase goal, are currently available at the DH Ranch mitigation site (**Table 8**). Note that the 2007 open water credits were over calculated and the correct 2007 credit total is 12.44. The 2007 monitoring report mistakenly used a credit ratio for open water of 20 percent of the wetland area, but should have been 10 percent of the wetland area. The latter is specifically stated in the crediting arrangement (ADC 2006), whereas the former is commonly used by the COE but is incorrect in this instance. Using the revised 2007 credit calculation, the credit total for 2008 represents an increase of 0.29 credits from 2007 credit totals. Credits for wetland creation and upland buffer areas may be negotiated between the COE and MDT at their discretion.

The pre-project site provided about 1.596 functional units within the monitoring area, and the post-project site currently provides about 89.82 functional units, for a conservative gain of roughly 88 functional units.

**Table 6. Success criteria for the DH Ranch Wetland Mitigation Site.**

| Success Criteria[1] | 2008 Status |
|---|---|
| **Wetland Characteristics:** Sites will develop hydrophytic vegetation, wetland hydrology, and hydric soils as outlined in the COE 1987 wetlands delineation manual. | *Criteria achieved* - wetlands mapped within the project area have developed all three criteria, though there remain several areas that were mapped as uplands in 2008 but, based on the design, were intended to be wetlands. |
| **Herbaceous Plants:** Ocular coverage of desirable herbaceous wetland plant species will be at least 80 percent. Except for desirable native emergent wetland species, no species may comprise more than 25 percent of a vegetated layer in a wetland community. Aggressive non-preferred species (such as reed canarygrass) may comprise a maximum of 10 percent of any given wetland area. | *Criteria partially achieved* – throughout most of the project area vegetative cover is below 80 percent. However, none of mapped emergent wetland communities contain any one non-native species in excess of 25% composition of a given vegetation layer. The *Salix amygdaloides* community contains *S. amygdaloides* in excess of 50% cover, but that is assumed desirable. |
| **Hydrology:** Soil saturation will be present for at least 12.5 percent of the growing season (18 days). The requirement for monitoring wells was removed in December 2007. | *Criteria achieved* in wetlands mapped in 2008. |
| **Open Water:** At the conclusion of the monitoring period, open water (aquatic bed) wetlands will encompass ≤ 10 percent of the total wetland area and will remain saturated for more than 12.5 percent of the growing season. | *Criteria partially achieved* – Open water areas comprise more than 10 percent of the total wetland area, but do remain saturated for more than 12.5 percent of the growing season. |
| **Woody Plants:** Woody planting zones (berms) will have a minimum of 1,000 stems/acre | *Criteria partially achieved* - No stems have been observed to be planted on the berms, but natural recruitment of numerous cottonwood seedlings has occurred in some areas. The survival of these seedlings at the end of the monitoring period will ultimately determine success. The upper (drier) portions of the berms were weedy and had no planted woody stems during the mid-season visit. |

[1] *Source:* ADC 2006.

**Table 7: *Summary of aquatic habitat at the DH Ranch Wetland Mitigation Site in 2005, 2007, and 2008.***

| Period | Open Water (acre) | Wetland (acre) | Total Aquatic Habitat (acre) |
|---|---|---|---|
| 2005 (pre-mitigation creation) | 0.00 | 0.57 | 0.57 |
| 2007 -Monitoring Year 1 (post-construction) | 5.39 | 11.31 | 16.70 |
| **2008 -Monitoring Year 2 (ongoing establishment)** | **6.05** | **11.39** | **17.44** |

**Table 8:** ***2008 mitigation credit summary for the DH Ranch Wetland Mitigation Site.***

| Credit Category | Acre | Assumed Credit Ratio[a] | Credit [a] |
|---|---|---|---|
| Emergent wetland creation | 11.39 | 1:1 | 11.39[c] |
| Open water | 6.05 | Up to 10% of wetland area | 1.14 |
| Shrubby riparian islands[b] (i.e. berms) | 1.65 | 1:1 | 0.00[c] |
| Upland buffer[b] | 0.80 | 4:1 | 0.20 |
| **TOTAL** | **19.17** | | **12.73** |

[a] The Corps of Engineers is the regulatory authority and will determine the actual mitigation ratios.
[b]The shrubby riparian islands and upland/riparian buffer acreage was derived from the ADC (2006) report.
[c]Not all success criteria have not been met. Credits for these areas may be negotiated between MDT and the COE.

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FIPS/County(FIPS): 30009 Start yr. - 1971 End yr. – 2000. Obtained in September from: http://www.wcc.nrcs.usda.gov/climate/clim-reports.html.

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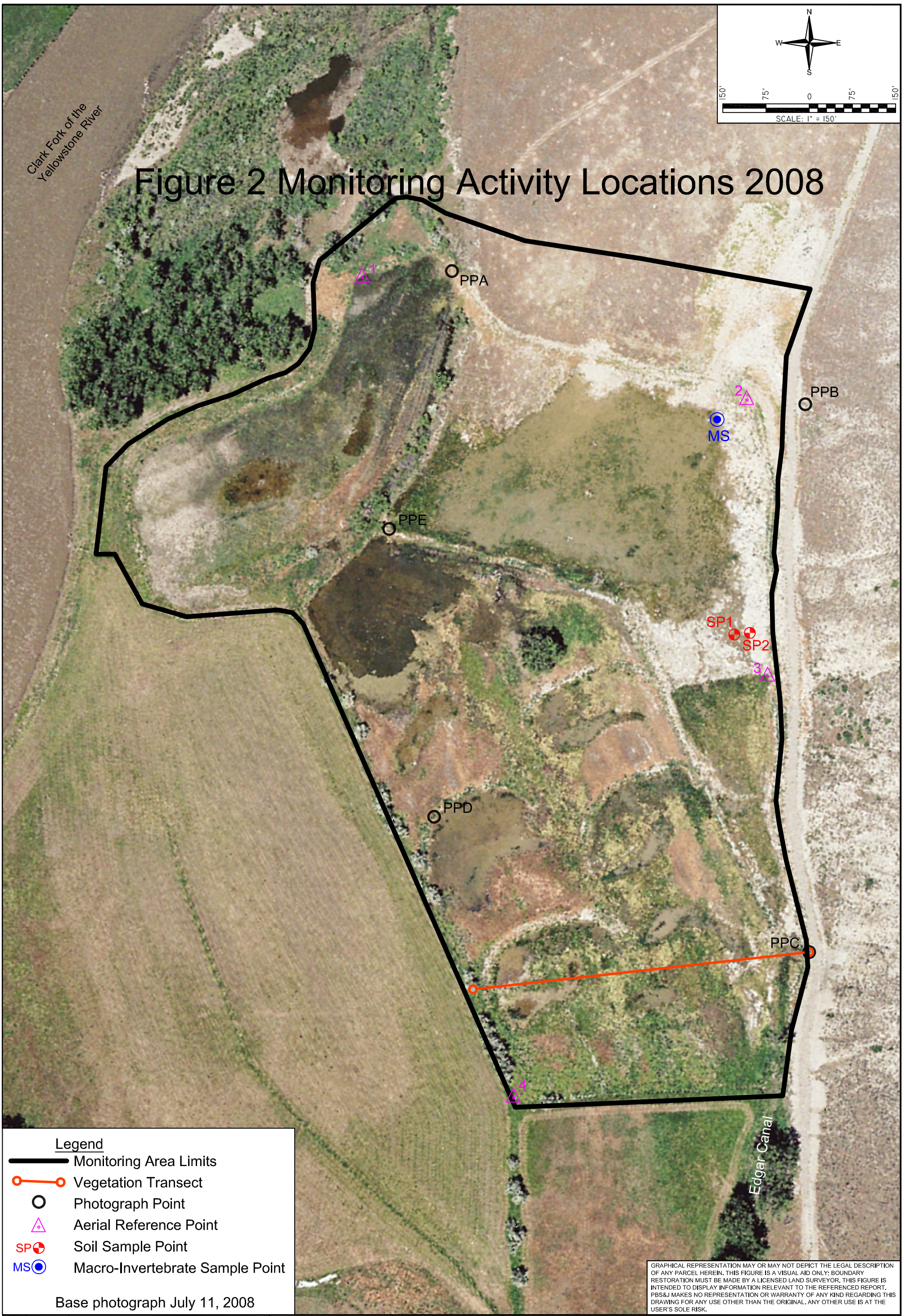
# Appendix A

## FIGURES 2 & 3

*MDT Wetland Mitigation Monitoring*
*DH Ranch*
*Edgar, Montana*

# Figure 2 Monitoring Activity Locations 2008

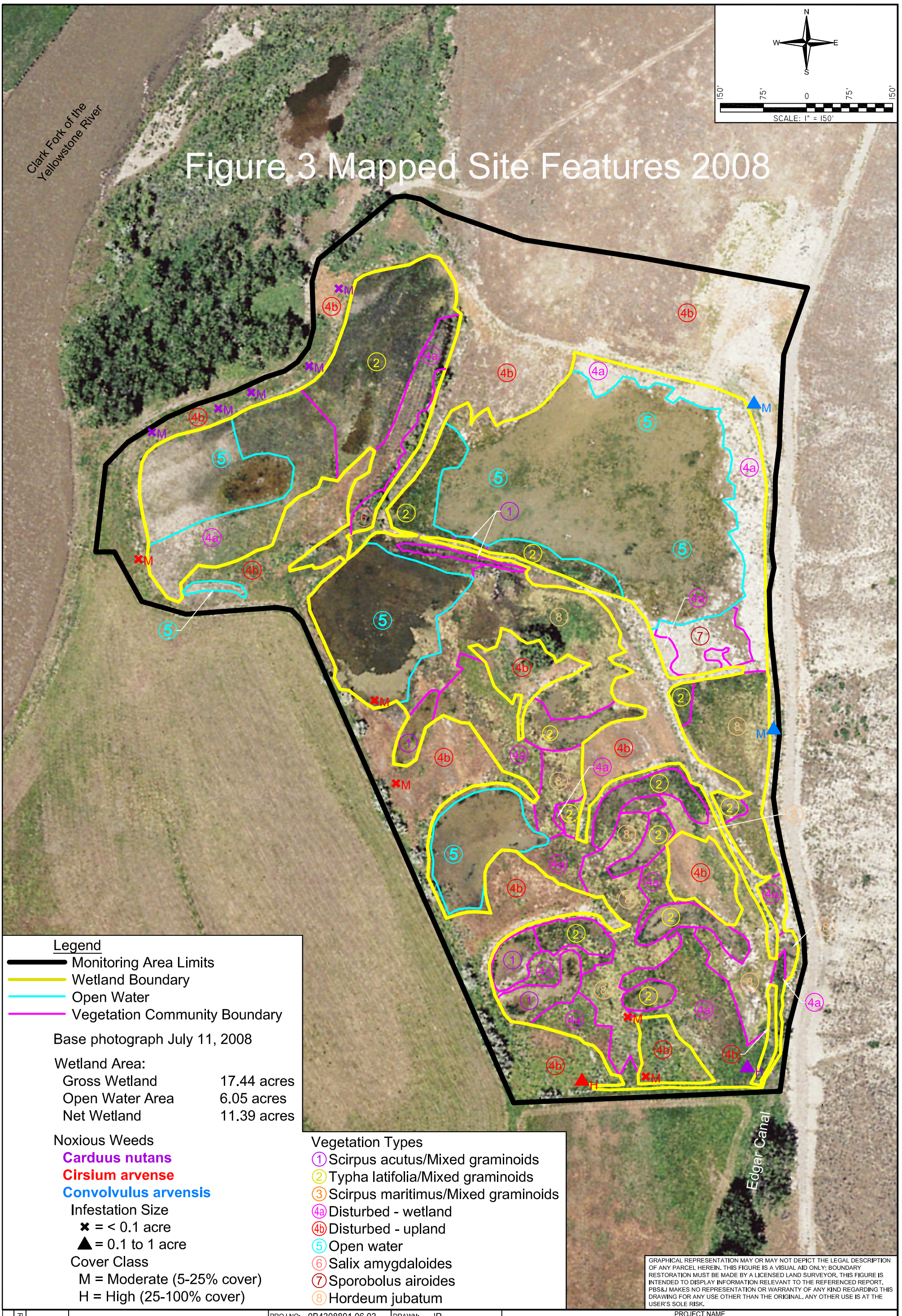





| | | | |
|---|---|---|---|
| 11/10/2008 | REV - | FIGURE 2 | PBSJ 3810 Valley Commons Drive Suite 4 Bozeman, MT 59718 |

| | | | |
|---|---|---|---|
| PROJ NO: 0B4308801 06.03 | DRAWN: JR | PROJECT NAME: MDT DH RANCH WETLAND MITIGATION | |
| LOCATION: EDGAR, MT | PROJ MGR: J. BERGLUND | | |
| SCALE: NOTED | CHECKED: RM APPVD: JB | DRAWING TITLE: MONITORING ACTIVITY LOCATIONS 2008 | |
| FILE NAME: | PLOTTED: | | |

# Figure 3 Mapped Site Features 2008




GRAPHICAL REPRESENTATION MAY OR MAY NOT DEPICT THE LEGAL DESCRIPTION OF ANY PARCEL HEREIN. THIS FIGURE IS A VISUAL AID ONLY; BOUNDARY RESTORATION MUST BE MADE BY A LICENSED LAND SURVEYOR. THIS FIGURE IS INTENDED TO DISPLAY INFORMATION RELEVANT TO THE REFERENCED REPORT. PBS&J MAKES NO REPRESENTATION OR WARRANTY OF ANY KIND REGARDING THIS DRAWING FOR ANY USE OTHER THAN THE ORIGINAL. ANY OTHER USE IS AT THE USER'S SOLE RISK.

| | | | | |
|---|---|---|---|---|
| 11/10/2008 | REV - | FIGURE 3 | PBS&J 3810 Valley Commons Drive Suite 4 Bozeman, MT 59718 | PROJ NO: 0B4308801 06.03 · DRAWN: JR · LOCATION: EDGAR, MT · PROJ MGR: J. BERGLUND · SCALE: NOTED · CHECKED: RM · APPVD: JB · FILE NAME: · PLOTTED: |

PROJECT NAME
MDT DH RANCH WETLAND MITIGATION

DRAWING TITLE
MAPPED SITE FEATURES 2008

# Appendix B

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## 2008 WETLAND MITIGATION SITE MONITORING FORMS
## 2008 BIRD SURVEY FORM
## 2008 COE WETLAND DELINEATION FORMS
## 2008 FUNCTIONAL ASSESSMENT FORMS

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***MDT Wetland Mitigation Monitoring***
***DH Ranch***
***Edgar, Montana***

**PBS&J / MDT WETLAND MITIGATION SITE MONITORING FORM**

Project Name: **DH Ranch** Project Number: **0B4308801**
Assessment Date: **July 10, 2008** Person(s) conducting the assessment: **McEldowney**
Location: **Edgar, MT** MDT District: **Billings** Milepost: _____
Legal Description: T **4S** R **23E** Section **1**
Weather Conditions: **Clear, 80 deg F, calm** Time of Day: **8 am - 5 pm**
Initial Evaluation Date: **September 7, 2007** Monitoring Year: **2** # Visits in Year: **1**
Size of evaluation area: **27.8 acres** Land use surrounding wetland: **Natural, agricultural**

## HYDROLOGY

Surface Water Source: **Irrigation return flow**
Inundation: **Present** Average Depth: **0.25 feet** Range of Depths: **0 - 3 ft**
Percent of assessment area under inundation: **50%**
Depth at emergent vegetation-open water boundary: **1 foot**
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.):
**Drift lines, algal mats**

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:**
**No groundwater wells observed onsite.**

## VEGETATION COMMUNITIES

Community Number: **1** Community Title (main spp): **Scirpus acutus/Mixed graminoids**

| Dominant Species | % Cover | Dominant Species | % Cover |
|---|---|---|---|
| Scirpus acutus | 3 = 11-20% | Polygonum sp. | + = < 1% |
| Typha latifolia | 2 = 6-10% | Echinochloa muricata | 1 = 1-5% |
| Scirpus maritimus | 1 = 1-5% | | |
| Eleocharis palustris | + = < 1% | | |
| Juncus effusus | + = < 1% | | |
| Hordeum jubatum | + = < 1% | | |

Comments / Problems: **Contains a significant component of open water.**

Community Number: **2** Community Title (main spp): **Typha latifolia/Mixed graminoids**

| Dominant Species | % Cover | Dominant Species | % Cover |
|---|---|---|---|
| Typha latifolia | 3 = 11-20% | | |
| Scirpus acutus | 1 = 1-5% | | |
| Scirpus maritimus | 1 = 1-5% | | |
| Scirpus pungens | 1 = 1-5% | | |
| | | | |
| | | | |

Comments / Problems: _____

Community Number: **3** Community Title (main spp): **Scirpus maritimus/Mixed graminoids**

| Dominant Species | % Cover | Dominant Species | % Cover |
|---|---|---|---|
| Scirpus maritimus | 5 = > 50% | | |
| Hordeum jubatum | 1 = 1-5% | | |
| Echinochloa muricata | + = < 1% | | |
| Sporoblus airoides (?) | 1 = 1-5% | | |
| Distichlis spicata | 1 = 1-5% | | |
| | | | |

Comments / Problems: _____

Community Number: **4** Community Title (main spp): **Disturbed**

| Dominant Species | % Cover | Dominant Species | % Cover |
|---|---|---|---|
| Kochia scoparia | 1 = 1-5% | Rumex crispus | 1 = 1-5% |
| Hordeum jubatum | 2 = 6-10% | Echinochloa muricata | 2 = 6-10% |
| Scirpus pungens | + = < 1% | Chenopodium sp. | 1 = 1-5% |
| Populus deltoides | 1 = 1-5% | Juncus balticus | + = < 1% |
| Convovulus arvensis | 1 = 1-5% | Plantago major | + = < 1% |
| Cirsium arvense | + = < 1% | Taraxacum officinale | |

Comments / Problems: **Contains a wide variety of species. Additional species include Trifolium alba, Trifolium pratense, Eleocharis palustris, Bromus inermis, Veronica sp., Purple aster, Typha angustifolia, Phalaris arundinaeae, Verbascum thapsus, Festuca pratensis, Bromus tectorum, and Lepidium perfoliatum.**

## VEGETATION COMMUNITIES (continued)

Community Number: **5** Community Title (main spp): **Open water**

| Dominant Species | % Cover | Dominant Species | % Cover |
|---|---|---|---|
| SCIACU | + = < 1% | | |
| | | | |
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Comments / Problems: _____

Community Number: **6** Community Title (main spp): **Salix amygdaloides**

| Dominant Species | % Cover | Dominant Species | % Cover |
|---|---|---|---|
| Salix amygdaloides | 5 = > 50% | | |
| Populus deltoides | 1 = 1-5% | | |
| | | | |
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Comments / Problems: _____

Community Number: **7** Community Title (main spp): **Sporobolus airoides**

| Dominant Species | % Cover | Dominant Species | % Cover |
|---|---|---|---|
| Sporobolus airoides | 4 = 21-50% | | |
| Chenopodium sp. | 1 = 1-5% | | |
| Hordeum jubatum | 2 = 6-10% | | |
| Scirpus maritimus | 1 = 1-5% | | |
| Scirpus microcarpus | 1 = 1-5% | | |
| | | | |

Comments / Problems: _____

Community Number: **8** Community Title (main spp): **Hordeum jubatum**

| Dominant Species | % Cover | Dominant Species | % Cover |
|---|---|---|---|
| Hordeum jubatum | 5 = > 50% | Festuca pratensis | 2 = 6-10% |
| Scirpus maritimus | 1 = 1-5% | Kochia scoparia | 1 = 1-5% |
| Typha latifolia | + = < 1% | | |
| Sporobolus airoides | + = < 1% | | |
| Alopecureus arundinaceus | + = < 1% | | |
| Trifolium repens | 2 = 6-10% | | |

Comments / Problems: _____

## COMPREHENSIVE VEGETATION LIST

| Plant Species | Vegetation Community Number (s) | Plant Species | Vegetation Community Number (s) |
|---|---|---|---|
| *Achillea millefolium* | 4 | *Panicum virgatum* | 4 |
| *Agropyron repens* | 2 | *Phalaris arundinaceae* | 4,8 |
| *Alopecurus arundinaceus* | 4,8 | *Plantago major* | 4 |
| *Ambrosia trifida* | 4 | *Polygonum sp.* | 1,5 |
| *Ambrosia sp.* | 4 | *Populus deltoides* | 4,6 |
| *Artemisia cana* | 4 | *Potentilla anserina* | 4 |
| *Asclepias* sp. | 4 | *Purple aster* | 4 |
| *Asparagus officinalis* | 4 | *Rhus trilobata* (planted) | 4 |
| *Atriplex canescens* (planted) | 4 | *Rosa woodsii* | 4 |
| *Bromus inermis* | 4 | *Rumex crispus* | 2,4,8 |
| *Bromus tectorum* | 4,8 | *Salix amygdaloides* | 4,6 |
| *Capsella bursa-pastoris* | 4 | *Salix exigua (planted)* | 4 |
| *Carduus nutans* | 4 | *Salix sp.* | 6 |
| *Carex sp.* | 4 | *Sarcobatus vermiculatus* | 4 |
| *Chenopodium album* | 4,8 | *Scirpus acutus* | 1,2,5,8 |
| *Chrysothamnus nauseosus* | 4 | *Scirpus maritimus* | 1,2,3,4,7,8 |
| *Cirsium arvense* | 4 | *Scirpus microcarpus* | 1,2,3,7,8 |
| *Convolvulus arvensis* | 4 | *Scirpus pungens* | 1,2,3,8 |
| *Cynoglossum officinale* | 4 | *Shepherdia argentea* (planted) | 4 |
| *Distichlis spicata* | 3,4 | *Sisymbrium altissimum* | 4,8 |
| *Echinochloa muricata* | 4 | *Solanum sp.* | 4 |
| *Elaeagnus angustifolia* | 4 | *Sporobolus airoides* | 3,7,8 |
| *Eleocharis palustris* | 1,2,3,4,5,8 | *Symphoricarpos albus* | 4 |
| *Elymus trachycaulus* | 4 | *Taraxacum officinale* | 4 |
| *Festuca pratensis* | 4,8 | *Thlaspi arvense* | 4 |
| *Gaura sp.* | 4 | *Tragopogon dubius* | 4 |
| *Grindelia squarrosa* | 4 | *Trifolium hybridum* | 8 |
| *Hordeum jubatum* | 4,7,8 | *Trifolium pratense* | 4 |
| *Juncus balticus* | 2,4 | *Trifolium repens* | 4,8 |
| *Juncus bufonius* | 4 | *Typha angustifolia* | 1,2,4,8 |
| *Juncus effusus* | 1,2,3 | *Typha latifolia* | 1,2,4,5,8 |
| *Juncus nevadensis* | 1,2,4 | *Verbascum thapsus* | 4 |
| *Kochia scoparia* | 4,8 | *Verbena bracteata* | 4 |
| *Lactuca serriola* | 4 | *Veronica sp.* | 1,2 |
| *Lepidium perfoliatum* | 4,8 | | |
| *Medicago sativa* | 4 | | |
| *Melilotus sp.* | 4 | | |

**Comments / Problems: <u>No stems have been observed to be planted on the berms, but natural recruitment of numerous cottonwood seedlings has occurred in some areas. The survival of these seedlings at the end of the monitoring period will ultimately determine success. The upper (drier) portions of the berms were weedy and had no planted woody stems during the mid-season visit.</u>**

## PLANTED WOODY VEGETATION SURVIVAL

| Plant Species | Number Originally Planted | Number Observed | Mortality Causes |
|---|---|---|---|
| *Rhus trilobata* | 103 | 5 | Unknown, could be water availability, related to planting dates, or transplanting shock |
| *Shepherdia argentea* | 172 | 23 | Unknown, could be water availability, related to planting dates, or transplanting shock |
| *Atriplex canescens* | 40 | 30 | Unknown, could be water availability, related to planting dates, or transplanting shock |
| *Unidentified* | 4 | 0 | Unknown, could be water availability, related to planting dates, or transplanting shock |
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**Comments / Problems:** _____

## 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 |
| Raccoon | | ☒ | ☐ | ☐ | |
| Whitetail Deer | 2 | ☒ | ☐ | ☐ | |
| Leopard frog | 1 | ☐ | ☐ | ☐ | |
| Woodhouse's toad | 1 | ☐ | ☐ | ☐ | |
| Black-tailed prairie dog | 2 | ☒ | ☐ | ☐ | |
| | | ☐ | ☐ | ☐ | |
| | | ☐ | ☐ | ☐ | |
| | | ☐ | ☐ | ☐ | |

**Additional Activities Checklist:**
**NA** Macroinvertebrate Sampling (if required)

**Comments / Problems: Snails (Stagnicola sp.?) also observed.**

## 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 (°) |
|---|---|---|---|
| Photopoint A | 1 | Lower marsh - cottonwood in center of photo. | 188 |
| Photopoint A | 2 | Lower marsh - Russian olive in center of photo | 207 |
| Photopoint A | 3 | Central portion of lower marsh | 221 |
| Photopoint A | 4 | West edge of lower marsh, berm | 256 |
| Photopoint B | 1 | Looking south along road. | 179 |
| Photopoint B | 2 | Lk across SE end of upper open water area | 203 |
| Photopoint B | 3 | Lk across main portion of open water area | 238 |
| Photopoint B | 4 | Lk along N end of open water area | 264 |
| Photopoint C | 1 | Lk at SE end of project area | 212 |
| Photopoint C | 2 | Lk toward house at S end of project area | 239 |
| Photopoint C | 3 | Lk toward river at south end of project area | 272 |
| Photopoint C | 4 | Lk diagonally across site toward NW corner | 304 |
| Photopoint C | 5 | Lk northward along road | 334 |
| Photopoint D | 1 | Lk toward NW corner of site. | 337 |
| Photopoint D | 2 | Lk toward N end of site. | 354 |
| Photopoint D | 3 | Lk toward NE corner of site. | 42 |
| Photopoint D | 4 | Lk along berm at E side of site. | 75 |
| Photopoint D | 5 | Lk E across open water area. | 104 |
| Photopoint D | 6 | Lk SE toward SE corner of site. | 142 |
| Photopoint D | 7 | Lk S along the SW side of the site. | 165 |
| Photopoint E | 1 | Lk N along vegetated berm at N end. | 36 |
| Photopoint E | 2 | Lk toward NE corner of site. | 66 |
| Photopoint E | 3 | Lk E along berm. | 97 |
| Photopoint E | 4 | Lk toward SE corner of site. | 153 |
| Photopoint E | 5 | Lk toward W side of site across open water area. | 182 |
| Photopoint E | 6 | Lk along berm toward W side of site. | 221 |
| Transect 1 | 1 | Lk E | 80 |
| Transect 1 | 2 | Lk W | 260 |
| Macro 1 | 1 | Lk SE at macroinvertebrate sample location | |

**Comments / Problems:** **None**

## 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.
- **NA** 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? **NA**
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: Weed control of Canada thistle and musk thistle needs to be implemented.

## MDT WETLAND MONITORING – VEGETATION TRANSECT

Site: **DH Ranch** Date: **July 10, 2008** Examiner: **McEldowney**
Transect Number: **1** Approximate Transect Length: **645 feet** Compass Direction from Start: **260˚** Note: **E to W**

| Vegetation Type A: **DISTURBED-UPLAND** | |
|---|---|
| Length of transect in this type: 15 feet | |
| **Plant Species** | **Cover** |
| KOCSCO | 5 = > 50% |
| HORJUB | + = < 1% |
| LATSER | + = < 1% |
| SYSALT | + = < 1% |
| SCIACU | + = < 1% |
| SCIPUN | + = < 1% |
| LEPPER | + = < 1% |
| DISSPI | + = < 1% |
| Unidentified annual grass | + = < 1% |
| | |
| | |
| Total Vegetative Cover: | 75% |

| Vegetation Type B: **HORDEUM JUBATUM** | |
|---|---|
| Length of transect in this type: 35 feet | |
| **Plant Species** | **Cover** |
| HORJUB | 2 = 6-10% |
| SCIACU | 2 = 6-10% |
| KOCSCO | + = < 1% |
| SCIPUN | 1 = 1-5% |
| Chenopodium sp. | 1 = 1-5% |
| SPOAIR | + = < 1% |
| SCIMAR | 1 = 1-5% |
| ALOARU | + = < 1% |
| | |
| OPEN WATER = 75% | |
| | |
| Total Vegetative Cover: | 25% |

| Vegetation Type C: **DISTURBED-UPLAND (DIKE)** | |
|---|---|
| Length of transect in this type: 9 feet | |
| **Plant Species** | **Cover** |
| SCIACU | 1 = 1-5% |
| HORJUB | 1 = 1-5% |
| KOCSCO | 2 = 6-10% |
| LEPPER | 3 = 11-20% |
| MEDSAT | 1 = 1-5% |
| CIRARV | + = < 1% |
| CONARV | + = < 1% |
| SCIPUN | + = < 1% |
| CHEALB | + = < 1% |
| | |
| | |
| | |
| Total Vegetative Cover: | 40% |

| Vegetation Type D: **HORDEUM JUBATUM** | |
|---|---|
| Length of transect in this type: 45 feet | |
| **Plant Species** | **Cover** |
| HORJUB | 5 = > 50% |
| SCIPUN | + = < 1% |
| ALOARU | + = < 1% |
| LEPPER | 1 = 1-5% |
| RUMCRI | + = < 1% |
| Unidentified grass | + = < 1% |
| CHEALB | 1 = 1-5% |
| FESPRA | 1 = 1-5% |
| Unidentified grass - tall with awns | + = < 1% |
| KOCSCO | + = < 1% |
| PHAARU | + = < 1% |
| ELEPAL | + = < 1% |
| Total Vegetative Cover: | 80% |

## MDT WETLAND MONITORING – VEGETATION TRANSECT

Site: **DH Ranch** Date: **July 10, 2008** Examiner: **McEldowney**
Transect Number: **1** Approximate Transect Length: **645 feet** Compass Direction from Start: **260˚** Note: **E to W**

| Vegetation Type E: **TYPLAT/Mixed graminoids** | |
|---|---|
| Length of transect in this type: 40 feet | |
| **Plant Species** | **Cover** |
| SCIACU | 2 = 6-10% |
| ELEPAL | 1 = 1-5% |
| SPOAIR | 1 = 1-5% |
| HORJUB | 1 = 1-5% |
| SCIMAR | 1 = 1-5% |
| TYPLAT | 1 = 1-5% |
| ALOARU, JUNBAL (EACH) | + = < 1% |
| LEPPER | + = < 1% |
| CHEALB | + = < 1% |
| PLAMAJ | + = < 1% |
| OPEN WATER = 40% | |
| Total Vegetative Cover: | 60% |

| Vegetation Type F: **HORDEUM JUBATUM** | |
|---|---|
| Length of transect in this type: 50 feet | |
| **Plant Species** | **Cover** |
| HORJUB | 3 = 11-20% |
| LEPPER | 1 = 1-5% |
| ALOARU | 3 = 11-20% |
| KOCSCO | + = < 1% |
| CHEALB | + = < 1% |
| FESPRA | 1 = 1-5% |
| RUMCRI | + = < 1% |
| | |
| | |
| | |
| | |
| Total Vegetative Cover: | 75% |

| Vegetation Type G: **DISTURBED-WETLAND** | |
|---|---|
| Length of transect in this type: 34 feet | |
| **Plant Species** | **Cover** |
| FESPRA | 5 = > 50% |
| ALOARU | + = < 1% |
| RUMCRI | + = < 1% |
| HORJUB | + = < 1% |
| | |
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| | |
| | |
| | |
| Total Vegetative Cover: | 80% |

| Vegetation Type H: **DISTURBED - WETLAND** | |
|---|---|
| Length of transect in this type: 40 feet | |
| **Plant Species** | **Cover** |
| BROINE | 5 = > 50% |
| TRIREP | 1 = 1-5% |
| HORJUB | 1 = 1-5% |
| CIRARV | 1 = 1-5% |
| VERTHA | + = < 1% |
| RUMCRI | + = < 1% |
| Mustard sp. | + = < 1% |
| CHEALB | + = < 1% |
| CAREX SP. | + = < 1% |
| ALOARU | + = < 1% |
| | |
| | |
| Total Vegetative Cover: | 70% |

## MDT WETLAND MONITORING – VEGETATION TRANSECT

Site: **DH Ranch** Date: **July 10, 2008** Examiner: **McEldowney**
Transect Number: **1** Approximate Transect Length: **645 feet** Compass Direction from Start: **260˚** Note: **E to W**

| Vegetation Type I: **TYPLAT/Mixed graminoids** | |
|---|---|
| Length of transect in this type: 18 feet | |
| **Plant Species** | **Cover** |
| ELEPAL | 2 = 6-10% |
| HORJUB | 2 = 6-10% |
| ALOARU | 1 = 1-5% |
| TYPLAT | 1 = 1-5% |
| CIRARV | + = < 1% |
| CHEALB | + = < 1% |
| FESPRA | + = < 1% |
| BROINE | + = < 1% |
| | |
| OPEN WATER = 5% | |
| | |
| Total Vegetative Cover: | 50% |

| Vegetation Type J: **HORDEUM JUBATUM** | |
|---|---|
| Length of transect in this type: 130 feet | |
| **Plant Species** | **Cover** |
| HORJUB | 4 = 21-50% |
| ALOARU | 1 = 1-5% |
| TRIREP | 3 = 11-20% |
| TAROFF | 1 = 1-5% |
| BROINE | 1 = 1-5% |
| FESPRA | 3 = 11-20% |
| TYPLAT | 1 = 1-5% |
| BROTEC | 1 = 1-5% |
| POA SP., SYSALT, TYPANG (EACH) | + = < 1% |
| LEPPER | + = < 1% |
| TRIHYB | + = < 1% |
| Total Vegetative Cover: | 80% |

| Vegetation Type K: **TYPLAT/Mixed graminoids** | |
|---|---|
| Length of transect in this type: 40 feet | |
| **Plant Species** | **Cover** |
| ELEPAL | 2 = 6-10% |
| TYPLAT | + = < 1% |
| HORJUB | 1 = 1-5% |
| SCIACU | 1 = 1-5% |
| ALOARU | 1 = 1-5% |
| | |
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| | |
| | |
| | |
| | |
| | |
| Total Vegetative Cover: | 20% |

| Vegetation Type L: **DISTURBED - WETLAND** | |
|---|---|
| Length of transect in this type: 85 feet | |
| **Plant Species** | **Cover** |
| HORJUB | 2 = 6-10% |
| TRIALB/TRIREP | 4 = 21-50% |
| CIRARV | + = < 1% |
| FESPRA | 1 = 1-5% |
| ALOARU | 2 = 6-10% |
| RUMCRI | + = < 1% |
| POAPRA | + = < 1% |
| TYPANG AND TYPLAT (EACH) | + = < 1% |
| POPDEL (SEEDLINGS), SYSALT (EACH) | + = < 1% |
| BROTEC | + = < 1% |
| MELOFF, TAROFF, LATSER (EACH) | + = < 1% |
| | |
| Total Vegetative Cover: | 70% |

## MDT WETLAND MONITORING – VEGETATION TRANSECT

Site: **DH Ranch** Date: **July 10, 2008** Examiner: **McEldowney**
Transect Number: **1** Approximate Transect Length: **645 feet** Compass Direction from Start: **260˚** Note: **E to W**

| Vegetation Type M: **SCIACU/Mixed graminoids** | |
|---|---|
| Length of transect in this type: 72 feet | |
| **Plant Species** | **Cover** |
| HORJUB | 2 = 6-10% |
| SCIACU | 1 = 1-5% |
| ELEPAL | 3 = 11-20% |
| TYPLAT | 2 = 6-10% |
| TYPANG | 1 = 1-5% |
| ALOARU | 3 = 11-20% |
| AGRREP | 1 = 1-5% |
| POPDEL (SEEDLINGS) | + = < 1% |
| SALEXI (SEEDLING) | + = < 1% |
| Unidentified grass - reddish (no spike) (PANVIR?) | 1 = 1-5% |
| | |
| Total Vegetative Cover: | 60% |

| Vegetation Type N: **DISTRUBED - UPLAND** | |
|---|---|
| Length of transect in this type: 45 feet | |
| **Plant Species** | **Cover** |
| SYSALT | 3 = 11-20% |
| CHEALB | 2 = 6-10% |
| BROINE | 1 = 1-5% |
| TRADUB | + = < 1% |
| LEPPER | 1 = 1-5% |
| CONARV | 3 = 11-20% |
| CIRARV | + = < 1% |
| MALNEG | + = < 1% |
| MELOFF | 1 = 1-5% |
| BROTEC, TRIAES | + = < 1% |
| ELEANG | 2 = 6-10% |
| Total Vegetative Cover: | 80% |

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

| Vegetation Type P: | |
|---|---|
| Length of transect in this type: feet | |
| **Plant Species** | **Cover** |
| | |
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| | |
| | |
| 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: _____

## BIRD SURVEY – FIELD DATA SHEET

Site: **DH Ranch** Date: **7/10/08**
Survey Time: **8 am** to **5 pm**

| Bird Species | # | Behavior | Habitat | Bird Species | # | Behavior | Habitat |
|---|---|---|---|---|---|---|---|
| Golden Eagle | 1 | L | MA | | | | |
| Bald Eagle | 1 | FO | | | | | |
| Killdeer | 15 | F | MF | | | | |
| Barn Swallow | 2 | F | MA | | | | |
| Red Wing Blackbird | 5 | F | MA | | | | |
| Blue-winged Teal | 3 | F | MA OW | | | | |
| American Robin | 1 | F | SS | | | | |
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**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: **7/10/08 - sunny, 80 deg F, calm**

Notes: **Golden eagle obeserved on a soil 'pedestal' in the largest pond area in the NE part of the site when arriving at the site. Golden eagles have been observed on these pedestals in the past.**

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

| | |
|---|---|
| Project / Site: **DH Ranch MDT Mitigation Site**<br>Applicant / Owner: **MDT/George Duke**<br>Investigator: **PBS&J (RRM)** | Date: **July 10, 2008**<br>County: **Carbon**<br>State: **MT** |

| | |
|---|---|
| Do Normal Circumstances exist on the site? **Yes**<br>Is the site significantly disturbed (Atypical Situation)? **Yes**<br>Is the area a potential Problem Area? **No**<br>(If needed, explain on reverse side) | Community ID: **Emergent**<br>Transect ID: _____<br>Plot ID: **SP1** |

## VEGETATION

| Dominant Species | Stratum | Indicator | Dominant Species | Stratum | Indicator |
|---|---|---|---|---|---|
| 1. *Scirpus maritimus* | Herb | OBL | 11. | | |
| 2. *Sporobolus airoides* | Herb | FAC- | 12. | | |
| 3. *Hordeum jubatum* | Herb | FAC+ | 13. | | |
| 4. *Scirpus microcarpus* | Herb | OBL | 14. | | |
| 5. *Chenopodium sp.* | Herb | | 15. | | |
| 6. | | | 16. | | |
| 7. | | | 17. | | |
| 8. | | | 18. | | |
| 9. | | | 19. | | |
| 10. | | | 20. | | |

| | |
|---|---|
| Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-): **3** / **5** = **60**% | FAC Neutral: **3** / **4** = **74**% |

Remarks: **Wetland mitigation site constructed in 2007. Palustrine emergent.**

## HYDROLOGY

| | |
|---|---|
| **Yes** Recorded Data (Describe in Remarks):<br>**N/A** Stream, Lake, or Tide Gauge<br>**Yes** Aerial Photographs<br>**N/A** Other<br><br>**No** No Recorded Data | Wetland Hydrology Indicators<br>Primary Indicators:<br>**YES** Inundated<br>**YES** Saturated in Upper 12 Inches<br>**NO** Water Marks<br>**NO** Drift Lines<br>**NO** Sediment Deposits<br>**YES** Drainage Patterns in Wetland<br>Secondary Indicators (2 or more required):<br>**YES** Oxidized Root Channels in Upper 12 inches<br>**NO** Water-Stained Leaves<br>**NO** Local Soil Survey Data<br>**YES** FAC-Neutral Test<br>**NO** Other (Explain in Remarks) |
| Field Observations:<br>Depth of Surface Water = **1** (in.)<br>Depth to Free Water in Pit = **0** (in.)<br>Depth to Saturated Soil = **0** (in.) | |

Remarks: **Site is saturated to the surface.**

## SOILS

Map Unit Name (Series and Phase): **Heldt silty clay loam, saline, 0- 6% slopes**
Map Symbol: **Hw** Drainage Class: **Well** Mapped Hydric Inclusion? **No**
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. |
|---|---|---|---|---|---|
| 16 | A | 5PB 5/1 | 7.5 YR 4/6 | Many Prominent | Silty Clay |
| | | / | / | 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
**YES** 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: **Soil is saturated to the surface, is gleyed and has abundant, prominent mottles.**

## WETLAND DETERMINATION

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

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

Remarks: **The wetland mitigation site was created in 2007. It is a palustrine emergent wetland that is saturated to the surface and has gleyed soils with mottling.**

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

| | |
|---|---|
| Project / Site: **DH Ranch MDT Mitigation Site**<br>Applicant / Owner: **MDT/George Duke**<br>Investigator: **PBS&J (RRM)** | Date: **July 10, 2008**<br>County: **Carbon**<br>State: **MT** |

| | |
|---|---|
| Do Normal Circumstances exist on the site? **Yes**<br>Is the site significantly disturbed (Atypical Situation)? **Yes**<br>Is the area a potential Problem Area? **No**<br>(If needed, explain on reverse side) | Community ID: **Emergent**<br>Transect ID: ____<br>Plot ID: **SP2** |

## VEGETATION

| Dominant Species | Stratum | Indicator | Dominant Species | Stratum | Indicator |
|---|---|---|---|---|---|
| 1. *Kochia scoparia* | Herb | FAC | 6. | | |
| 2. *Chenopodium album* | Herb | FAC | 7. | | |
| 3. *Unidentified forb* | Herb | | 8. | | |
| 4. | | | 9. | | |
| 5. | | | 10. | | |

| | |
|---|---|
| Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-): **2** / **2** = **100**% | FAC Neutral: **0** / **2** = **0**% |

Remarks: **Wetland mitigation site constructed in 2007. This sample point is located approximately 10 ft east of sample point 1 and was disturbed during construction of the site. Bare ground is prevalent (~94%).**

## HYDROLOGY

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

Remarks: **Despite having mottles in the soil (e.g., oxidized rhizospheres) there is no compelling evidence of wetland hydrology. This sample point is just and inch or two higher in elevation than sample point 1 which was saturated to the surface. This area may eventually develop wetland hydrology.**

## SOILS

Map Unit Name (Series and Phase): **Heldt silty clay loam, saline, 0- 6% slopes**
Map Symbol: **Hw** Drainage Class: **Well** Mapped Hydric Inclusion? **No**
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. |
|---|---|---|---|---|---|
| 16 | A | 10 YR 4/1 | 5 YR 4/6<br>/ | Few<br>Distinct | Silty Clay |
| | | /<br> | /<br>/ | N/A<br>N/A | |
| | | /<br> | /<br>/ | N/A<br>N/A | |
| | | /<br> | /<br>/ | N/A<br>N/A | |
| | | /<br> | /<br>/ | N/A<br>N/A | |

Hydric Soil Indicators:

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

Remarks: **Soil is moist ~3 inches below the soil surface.**

## WETLAND DETERMINATION

| | |
|---|---|
| Hydrophytic Vegetation Present? **YES**<br>Wetland Hydrology Present? **NO**<br>Hydric Soils Present? **YES** | Is this Sampling Point within a Wetland? **NO** |

Remarks: **Site was disturbed during the construction of the mitigation site. However, despite being within 10 feet of sample point 1, which was also a disturbed but has all three wetland parameters, the site only has weedy hydrophytic (FAC) vegetation, is mainly bare ground, does not have compelling evidence of wetland hydrology, and therefore is considered to be an upland. As the mitigation site develops this area may evolve into a wetland, but it is not there yet.**

# MDT MONTANA WETLAND ASSESSMENT FORM (revised March 2008)

**1. Project Name:** DH Ranch Wetland Mitigation Site **2. MDT Project #:** _____ **3. Control #:** _____

**3. Evaluation Date:** 7/10/2008 **4. Evaluator(s):** RRM (PBS&J) **5. Wetland/Site #(s):** DH Ranch

**6. Wetland Location(s):** Township 4 S, Range 23 E, Section 1; Township ___ N, Range ___ E, Section _____

**Approximate Stationing or Roadposts:** _____

**Watershed:** 13 - Upper Yellowstone **County:** Carbon _ _ _____

**7. Evaluating Agency:** PBS&J

**Purpose of Evaluation:**

- ☐ **Wetland potentially affected by MDT project**
- ☐ **Mitigation wetlands; pre-construction**
- ☒ **Mitigation wetlands; post-construction**
- ☐ **Other** _____

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

**9. Assessment Area (AA) Size (acre):** _____ (visually estimated)
(see manual for determining AA) 17.44 (measured, e.g. GPS)

**10. CLASSIFICATION OF WETLAND AND AQUATIC HABITATS IN AA** (See manual for definitions.)

| HGM Class (Brinson) | Class (Cowardin) | Modifier (Cowardin) | Water Regime | % OF AA |
|---|---|---|---|---|
| Depressional | Unconsolidated Bottom | Excavated | Permanent / Perennial | 40 |
| Depressional | Emergent Wetland | Excavated | Permanent / Perennial | 58 |
| Depressional | Scrub-Shrub Wetland | Impounded | Seasonal / Intermittent | 2 |
| | | | | |
| | | | | |
| | | | | |

**Comments:** MDT Mitigation wetland.

**11. ESTIMATED RELATIVE ABUNDANCE** (of similarly classified sites within the same Major Montana Watershed Basin; see manual.)
abundant

**12. GENERAL CONDITION OF AA**

**i. Disturbance:** Use matrix below to select the appropriate response; see manual for Montana listed noxious weed and aquatic nuisance vegetation species lists.

| Conditions within AA | Predominant Conditions Adjacent to (within 500 feet of) AA | | |
|---|---|---|---|
| | Managed in predominantly natural state; is not grazed, hayed, logged, or otherwise converted; does not contain roads or buildings; and noxious weed or ANVS cover is ≤15%. | Land not cultivated, but may be moderately grazed or hayed or selectively logged; or has been subject to minor clearing; contains few roads or buildings; noxious weed or ANVS cover is ≤30%. | Land cultivated or heavily grazed or logged; subject to substantial fill placement, grading, clearing, or hydrological alteration; high road or building density; or noxious weed or ANVS cover is >30%. |
| AA occurs and is managed in predominantly natural state; is not grazed, hayed, logged, or otherwise converted; does not contain roads or occupied buildings; and noxious weed or ANVS cover is ≤15%. | --- | low disturbance | --- |
| AA not cultivated, but may be moderately grazed or hayed or selectively logged; or has been subject to relatively minor clearing, fill placement, or hydrological alteration; contains few roads or buildings; noxious weed or ANVS cover is ≤30%. | --- | --- | --- |
| AA cultivated or heavily grazed or logged; subject to relatively substantial fill placement, grading, clearing, or hydrological alteration; high road or building density; or noxious weed or ANVS cover is >30%. | --- | --- | --- |

**Comments** (types of disturbance, intensity, season, etc.)**:** Wetland mitigaiton site constructed in 2007.

**ii. Prominent noxious, aquatic nuisance, and other exotic vegetation species:** Some Canada thistle and musk thistle.

**iii. Provide brief descriptive summary of AA and surrounding land use/habitat:** AA is a marsh on a terrace of the Clark's Fork of the Yellowstone River. Surrounding land to the west, north and south sides are grazed and/or hayed. To the east is a ranch road and a steep hillside comprised of native vegetation. Primary source of water is irrigation return flow that is directed onto the site.

**13. STRUCTURAL DIVERSITY** (Based on number of "Cowardin" ***vegetated*** classes present [do not include unvegetated classes]; see #10 above.)

| Existing # of "Cowardin" Vegetated Classes in AA | Initial Rating | Is current management preventing (passive) existence of additional vegetated classes? | | Modified Rating |
|---|---|---|---|---|
| ≥3 (or 2 if one is forested) classes | --- | NA | NA | NA |
| 2 (or 1 if forested) classes | mod | NA | NA | NA |
| 1 class, but not a monoculture | --- | ←NO | YES→ | --- |
| 1 class, monoculture (1 species comprises ≥90% of total cover) | --- | NA | NA | NA |

**Comments:** Emergent with a small amount of scrub-shrub.

Wetland/Site #(s): DH Ranch

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

**i. AA is Documented (D) or Suspected (S) to contain:** Check box based on definitions in manual.

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

**ii. Rating:** Based on the strongest habitat chosen in 14A(i) above, select the corresponding functional point and rating.

| Highest Habitat Level | Doc/Primary | Sus/Primary | Doc/Secondary | Sus/Secondary | Doc/Incidental | Sus/Incidental | None |
|---|---|---|---|---|---|---|---|
| Functional Point/Rating | --- | --- | --- | --- | --- | --- | 0L |

**Sources for documented use** (e.g. observations, records): In Carbon County the USFWS lists the lynx, wolf and black-footed ferret as potentially occurring. None of the these species are expected to use the site. .

**14B. HABITAT FOR PLANTS OR ANIMALS RATED S1, S2, OR S3 BY THE MONTANA NATURAL HERITAGE PROGRAM**
Do not include species listed in 14A above.

**i. AA is Documented (D) or Suspected (S) to contain:** Check box based on definitions in manual.

Primary or critical habitat (**list species**) ☐ D ☐ S _____
Secondary habitat (**list species**) ☒ D ☐ S Sandhill Crane (S2N), black-tailed prairie dogs (S3)
Incidental habitat (**list species**) ☐ D ☒ S Bald Eagle (S3), Peregrine Falcon
No usable habitat ☐ S

**ii. Rating:** Based on the strongest habitat chosen in 14A(i) above, select the corresponding functional point and rating.

| Highest Habitat Level | Doc/Primary | Sus/Primary | Doc/Secondary | Sus/Secondary | Doc/Incidental | Sus/Incidental | None |
|---|---|---|---|---|---|---|---|
| S1 Species Functional Point/Rating | --- | --- | --- | --- | --- | --- | --- |
| S2 and S3 Species Functional Point/Rating | --- | --- | .6M | --- | --- | --- | --- |

**Sources for documented use** (e.g. observations, records): Sandhill Crane tracks observed onsite. Bald Eagles observed in the vicinity. Suitable habitat for Peregrine Falcons exists just east of the site.

**14C. GENERAL WILDLIFE HABITAT RATING**

**i. Evidence of Overall Wildlife Use in the AA:** Check substantial, moderate, or low based on supporting evidence.

☐ ***Substantial:*** Based on any of the following [check].
- ☐ 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
- ☐ interview with local biologist with knowledge of the AA

☐ ***Minimal:*** Based on any of the following [check].
- ☐ few or no wildlife observations during peak use periods
- ☐ little to no wildlife sign
- ☐ sparse adjacent upland food sources
- ☐ interview with local biologist with knowledge of AA

☒ ***Moderate:*** Based on any of the following [check].
- ☒ 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
- ☐ interview with local biologist with knowledge of the AA

**ii. Wildlife Habitat Features:** Working from top to bottom, check appropriate AA attributes in matrix to arrive at rating. Structural diversity is from #13. For class cover to be considered evenly distributed, the most and least prevalent **vegetated** classes must be within 20% of each other in terms of their percent composition of the AA (see #10). Abbreviations for surface water durations are as follows: P/P = permanent/perennial; S/I = seasonal/intermittent; T/E = temporary/ephemeral; and A = absent [see manual for further definitions of these terms].

| **Structural Diversity** (see #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 #12i) | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | E | --- | --- | --- | --- | --- | --- | --- |
| ☐ **Moderate Disturbance** at AA (see #12i) | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ☐ **High Disturbance** at AA (see #12i) | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |

**iii. Rating:** Use the conclusions from i and ii above and the matrix below to select the functional point and rating.

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

**Comments:** _____

Wetland/Site #(s): DH Ranch

**14D. GENERAL FISH HABITAT** ☒ **NA** (proceed to 14E)

If the AA is not used by fish, fish use is not restorable due to habitat constraints, or is not desired from a management perspective [such as fish entrapped in a canal], then check the NA box and proceed to 14E.

Assess this function if the AA is used by fish or the existing situation is "correctable" such that the AA could be used by fish [i.e., fish use is precluded by perched culvert or other barrier].

**Type of Fishery:** ☐ Cold Water (**CW**) ☐ Warm Water (**WW**) **Use the CW or WW guidelines in the manual to complete the matrix.**

**i. Habitat Quality and Known / Suspected Fish Species in AA:** Use matrix to select the functional point and rating.

| **Duration of Surface Water in AA** | ☐ **Permanent / Perennial** | | | | | | ☐ **Seasonal / Intermittent** | | | | | | ☐ **Temporary / Ephemeral** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Aquatic Hiding / Resting / Escape Cover** | ☐ **Optimal** | | ☐ **Adequate** | | ☐ **Poor** | | ☐ **Optimal** | | ☐ **Adequate** | | ☐ **Poor** | | ☐ **Optimal** | | ☐ **Adequate** | | ☐ **Poor** | |
| **Thermal Cover: optimal / suboptimal** | **O** | **S** | **O** | **S** | **O** | **S** | **O** | **S** | **O** | **S** | **O** | **S** | **O** | **S** | **O** | **S** | **O** | **S** |
| **FWP Tier I** fish species | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **FWP Tier II** or **Native Game** fish species | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **FWP Tier III** or **Introduced Game** fish | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **FWP Non-Game Tier IV** or **No** fish species | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |

**Sources used for identifying fish spp. potentially found in AA:** _____

**ii. Modified Rating:** NOTE: Modified score cannot exceed 1.0 or be less than 0.1.

*a) Is fish use of the AA significantly reduced by a culvert, dike, or other man-made structure or activity,* ***or*** *is the waterbody included on the current final MDEQ list of waterbodies in need of TMDL development with listed "Probable Impaired Uses" including cold or warm water fishery or aquatic life support,* ***or*** *do aquatic nuisance plant or animal species (see* ***Appendix E****) occur in fish habitat?* ☐ **YES**, reduce score in **i** by 0.1 = __ or ☐ **N0**

*b) Does the AA contain a documented spawning area or other critical habitat feature (i.e., sanctuary pool, upwelling area; specify in comments) for native fish or introduced game fish?* ☐ **YES**, add to score in **i** or **iia** 0.1 = __ or ☐ **N0**

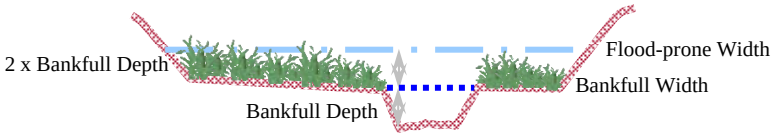
**iii. Final Score and Rating:** _ **Comments:** _____

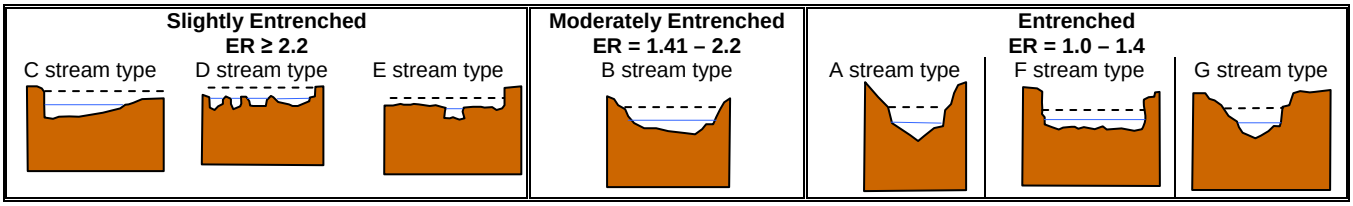
**14E. FLOOD ATTENUATION** ☒ **NA** (proceed to 14F)

Applies only to wetlands that are subject to flooding via in-channel or overbank flow.
If wetlands in AA are not flooded from in-channel or overbank flow, check the NA box and proceed to 14F.

**Entrenchment Ratio (ER) Estimation** (see manual for additional guidance). Entrenchment ratio = (flood-prone width) / (bankfull width).
Flood-prone width = estimated horizontal projection of where 2 X maximum bankfull depth elevation intersects the floodplain on each side of the stream.

_____ / _____ = _____
flood prone width / bankfull width = entrenchment ratio




**i. Rating:** Working from top to bottom, use the matrix below to select the functional point and rating.

| **Estimated or Calculated Entrenchment** (Rosgen 1994, 1996) | ☐ Slightly Entrenched C, D, E stream types | | | ☐ Moderately Entrenched B stream type | | | ☐ Entrenched A, F, G stream types | | |
|---|---|---|---|---|---|---|---|---|---|
| **Percent of Flooded Wetland Classified as Forested and/or Scrub/Shrub** | ☐ 75% | ☐ 25-75% | ☐ <25% | ☐ 75% | ☐ 25-75% | ☐ <25% | ☐ 75% | ☐ 25-75% | ☐ <25% |
| AA contains **no outlet or restricted outlet** | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| AA contains **unrestricted outlet** | --- | --- | --- | --- | --- | --- | --- | --- | --- |

**ii. Are ≥10 acres of wetland in the AA subject to flooding AND are man-made features which may be significantly damaged by floods located within 0.5 mile downstream of the AA?** ☐ YES ☐ NO **Comments:** _____

Wetland/Site #(s): DH Ranch

**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, then check the NA box and proceed to 14G.

**i. Rating:** Working from top to bottom, use the matrix below to select the functional point and rating. Abbreviations for surface water durations are as follows: P/P = permanent/perennial; S/I = seasonal/intermittent; and T/E = temporary/ephemeral [see manual for further definitions of these terms].

| **Estimated Maximum Acre Feet of Water Contained in Wetlands within the AA that are Subject to Periodic Flooding or Ponding** | ☒ **>5 acre feet** | | | ☐ **1.1 to 5 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** | 1H | --- | --- | --- | --- | --- | --- | --- | --- |
| 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 wetland with potential to receive 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 the NA box and proceed to 14H.

**i. Rating:** Working from top to bottom, use the matrix below to select the functional point and rating.

| **Sediment, Nutrient, and Toxicant Input Levels within AA** | **AA receives or surrounding land use has potential to deliver sediments, nutrients, or compounds at levels such that other functions are not substantially impaired. Minor sedimentation, sources of nutrients or toxicants, or signs of eutrophication present.** | | | | **Waterbody is 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 / Ponding in AA** | ☐ **Yes** | ☐ **No** | ☒ **Yes** | ☐ **No** | ☐ **Yes** | ☐ **No** | ☐ **Yes** | ☐ **No** |
| AA contains **no or restricted outlet** | --- | --- | .7M | --- | --- | --- | --- | --- |
| AA contains **unrestricted outlet** | --- | --- | --- | --- | --- | --- | --- | --- |

**Comments:** _____

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

Applies only if AA occurs on or within the banks of a river, stream, or other natural or man-made drainage, or on the shoreline of a standing water body which is subject to wave action.
If 14H does not apply, check the NA box and proceed to 14I.

| **% Cover of Wetland Streambank or Shoreline by Species with Stability Ratings of ≥6** (see Appendix F). | **Duration of Surface Water Adjacent to Rooted Vegetation** | | |
|---|---|---|---|
| | ☒ **Permanent / Perennial** | ☐ **Seasonal / Intermittent** | ☐ **Temporary / Ephemeral** |
| ☐ **≥ 65%** | --- | --- | --- |
| ☐ **35-64%** | --- | --- | --- |
| ☒ **< 35%** | .3L | --- | --- |

**Comments:** _____

**14I. PRODUCTION EXPORT / FOOD CHAIN SUPPORT**

**i. Level of Biological Activity:** Synthesis of wildlife and fish habitat rates (select).

| **General Fish Habitat Rating (14Diii)** | **General Wildlife Habitat Rating (14Ciii)** | | |
|---|---|---|---|
| | ☒ **E/H** | ☐ **M** | ☐ **L** |
| ☐ **E/H** | --- | --- | --- |
| ☐ **M** | --- | --- | --- |
| ☐ **L** | --- | --- | --- |
| ☒ **NA** | H | --- | --- |

**ii. Rating:** Working from top to bottom, use the matrix below to select the functional point and rating. Factor A = acreage of vegetated wetland component in the AA; Factor B = level of biological activity rating from above (14Ii); Factor C = whether or not the AA contains a surface or subsurface outlet; the final three rows pertain to the duration of surface water in the AA, where P/P, S/I, and T/E were previously defined, and A = "absent" [see manual for further definitions of these terms].

| **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** | **Yes** | **No** | **Yes** | **No** | **Yes** | **No** | **Yes** | **No** | **Yes** | **No** | **Yes** | **No** | **Yes** | **No** | **Yes** | **No** | **Yes** | **No** |
| **P/P** | 1H | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S/I** | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **T/E/A** | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |

Wetland/Site #(s): DH Ranch

**14I. PRODUCTION EXPORT / FOOD CHAIN SUPPORT** (continued)

**iii. Modified Rating:** Note: Modified score cannot exceed 1.0 or be less than 0.1.

***Vegetated Upland Buffer:*** Area with ≥ 30% plant cover, ≤ 15% noxious weed or ANVS cover, AND that is not subjected to periodic mechanical mowing or clearing (unless for weed control).
*Is there an average ≥ 50-foot wide vegetated upland buffer around ≥ 75% of the AA's perimeter?* ☒ **YES**, add 0.1 to score in **ii** = ___ ☐ **NO**

**iv. Final Score and Rating:** 1H **Comments:** _____

**14J. GROUNDWATER DISCHARGE / RECHARGE**
Check the appropriate indicators in i and ii below.

**i. Discharge Indicators**
- ☐ The AA is a slope wetland.
- ☐ Springs or seeps are known or observed.
- ☐ Vegetation growing during dormant season/drought.
- ☐ Wetland occurs at the toe of a natural slope.
- ☐ Seeps are present at the wetland edge.
- ☐ AA permanently flooded during drought periods.
- ☐ Wetland contains an outlet, but no inlet.
- ☐ Shallow water table and the site is saturated to the surface.
- ☐ Other: _____

**ii. Recharge Indicators**
- ☐ Permeable substrate present without underlying impeding layer.
- ☐ Wetland contains inlet but no outlet.
- ☐ Stream is a known 'losing' stream. Discharge volume decreases.
- ☐ Other: _____

**iii. Rating:** Use the information from i and ii above and the table below to select the functional point and rating.

| Criteria | Duration of Saturation at AA Wetlands ***FROM GROUNDWATER DISCHARGE*** or ***WITH WATER THAT IS RECHARGING THE GROUNDWATER SYSTEM*** | | | |
|---|---|---|---|---|
| | ☐ **P/P** | ☐ **S/I** | ☐ **T** | ☒ **None** |
| ☒ **Groundwater Discharge or Recharge** | --- | --- | --- | .1L |
| ☐ **Insufficient Data/Information** | --- | | | |

**Comments:** Site is supported by irrigation return flow. There is no evidence of a groundwater discharge component. The soils are clayey so groundwater recharge is unlikely.

**14K. UNIQUENESS**

**i. Rating:** Working from top to bottom, use the matrix below to select the functional point and rating.

| 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** (#11) | ☐ Rare | ☐ Common | ☐ Abundant | ☐ Rare | ☐ Common | ☒ Abundant | ☐ Rare | ☐ Common | ☒ Abundant |
| ☒ **Low Disturbance** at AA (#12i) | --- | --- | --- | --- | --- | .5M | --- | --- | --- |
| ☐ **Moderate Disturbance** at AA (#12i) | --- | --- | --- | --- | --- | --- | --- | --- | .2L |
| ☐ **High Disturbance** at AA (#12i) | --- | --- | --- | --- | --- | --- | --- | --- | --- |

**Comments:** Site contains the Alkali sacaton southern grasslands community type, which is rated as S2 in Montana.

**14L. RECREATION / EDUCATION POTENTIAL** ☐ NA (proceed to Overall Summary and Rating page)
Affords 'bonus' points if AA provides a recreational or educational opportunity.

**i. Is the AA a known or potential recreational or educational site?** ☒ **YES**, go to ii. ☐ **NO**, check the NA box.

**ii. Check categories that apply to the AA:** ☒ Educational/Scientific Study ☐ Consumptive Recreational ☐ Non-consumptive recreational ☐ Other: _____

**iii. Rating:** Use the matrix below to select the functional point and rating.

| Known or Potential Recreational or Educational Area | Known | Potential |
|---|---|---|
| **Public ownership or public easement with general public access (no permission required)** | --- | --- |
| **Private ownership with general public access (no permission required)** | --- | --- |
| **Private or public ownership without general public access, or requiring permission for public access** | --- | .05L |

**Comments:** _____

**15. GENERAL SITE NOTES:** _____

Wetland/Site #(s): DH Ranch

| Function & Value Variables | Rating – Actual Functional Points | Possible Functional Points | Functional Units: Actual Points x Estimated AA Acreage | Indicate the Four Most Prominent Functions with an Asterisk |
|---|---|---|---|---|
| A. Listed / Proposed T&E Species Habitat | low 0.00 | 1.00 | | |
| B. MT Natural Heritage Program Species Habitat | mod 0.60 | 1.00 | | |
| C. General Wildlife Habitat | high 0.90 | 1.00 | | * |
| D. General Fish Habitat | | NA | | |
| E. Flood Attenuation | | NA | | |
| F. Short and Long Term Surface Water Storage | high 1.00 | 1.00 | | * |
| G. Sediment / Nutrient / Toxicant Removal | mod 0.70 | 1.00 | | * |
| H. Sediment / Shoreline Stabilization | low 0.30 | 1.00 | | |
| I. Production Export / Food Chain Support | high 1.00 | 1.00 | | * |
| J. Groundwater Discharge / Recharge | low 0.10 | 1.00 | | |
| K. Uniqueness | mod 0.50 | 1.00 | | |
| L. Recreation / Education Potential (bonus point) | low 0.05 | | | |
| **Total Points** | **5.15** | **9** | **89.82 Total Functional Units** | |
| **Percent of Possible Score 57%** (round to nearest whole number) | | | | |

**Category I Wetland:** (must satisfy **one** of the following criteria; otherwise go 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 possible score > 80% (round to nearest whole #).

**Category II Wetland:** (Criteria for Category I not satisfied **and** meets any **one** of the following criteria; otherwise go to Category IV)
- ☐ Score of 1 functional point for MT Natural Heritage Program Species Habitat; **or**
- ☒ Score of .9 or 1 functional point for General Wildlife Habitat; **or**
- ☐ Score of .9 or 1 functional point for General Fish 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 possible score > 65% (round to nearest whole #).

☐ **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 go to Category III)
- ☐ "Low" rating for Uniqueness; **and**
- ☐ Vegetated wetland component < 1 acre (do not include upland vegetated buffer); **and**
- ☐ Percent of possible score < 35% (round to nearest whole #).

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

☐ **I** ☒ **II** ☐ **III** ☐ **IV**

# Appendix C

## 2008 REPRESENTATIVE PHOTOGRAPHS

***MDT Wetland Mitigation Monitoring***
***DH Ranch***
***Edgar, Montana***

# DH RANCH WETLAND MITIGATION SITE 2008

**Photo Point A – *Photo 1*** **Location:** North Side
**Compass bearing:** 188 degrees

**Photo Point A – *Photo 2*** **Location:** North Side
**Compass bearing:** 207 degrees

**Photo Point A – *Photo 3*** **Location:** North Side
**Compass bearing:** 221 degrees

**Photo Point A – *Photo 4*** **Location:** North
**Compass bearing:** 256 degrees

**Photo Point B – *Photo1*** **Location:** Northeast corner
**Compass bearing:** 179 degrees

**Photo Point B – *Photo 2*** **Location:** Northeast corner
**Compass bearing:** 203 degrees

## DH RANCH WETLAND MITIGATION SITE 2008

**Photo Point B – *Photo3*** **Location:** Northeast corner
**Compass bearing:** 238 degrees

**Photo Point B – *Photo 4*** **Location:** Northeast corner
**Compass bearing:** 264 degrees

**Photo Point C – *Photo 1*** **Location:** Southwest corner
**Compass bearing:** 212 degrees

**Photo Point C – *Photo 2*** **Location:** Southwest corner
**Compass bearing:** 239 degrees

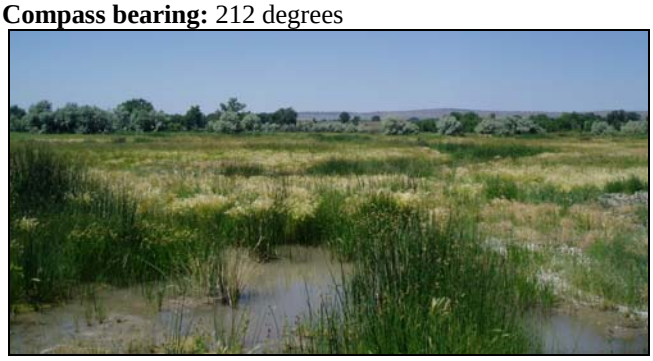


**Photo Point C – *Photo 3*** **Location:** Southwest corner
**Compass bearing:** 272 degrees

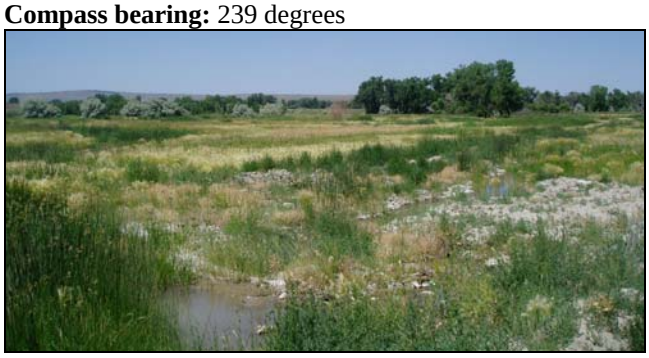


**Photo Point C – *Photo 4*** **Location:** Southwest corner
**Compass bearing:** 304 degrees

**Photo Point C – *Photo 5*** **Location:** Southwest corner
**Compass bearing:** 334 degrees

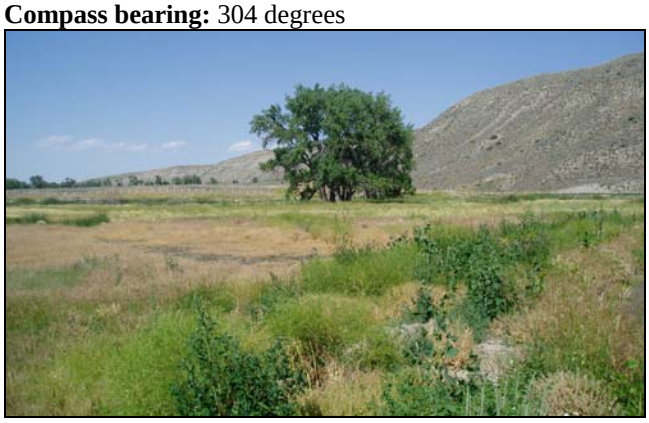


**Photo Point D – *Photo 1*** **Location:** West side
**Compass bearing:** 42 degrees.

**Photo Point D – *Photo 2*** **Location:** West side
**Compass bearing:** 75 degrees

**Photo Point D – *Photo 3*** **Location:** West side
**Compass bearing:** 104 degrees

**Photo Point D – *Photo 4*** **Location:** West side
**Compass bearing:** 142 degrees

**Photo Point D – *Photo 5*** **Location:** West side
**Compass bearing:** 165 degrees

**Photo Point D – *Photo 6*** **Location:** West side
**Compass bearing:** 337 degrees

**Photo Point D – *Photo 7*** **Location:** West side
**Compass bearing:** 354 degrees

**Photo Point E – *Photo 1*** **Location:** Central area
**Compass bearing:** 36 degrees

**Photo Point E – *Photo 2*** **Location:** Central area
**Compass bearing:** 66 degrees

**Photo Point E – *Photo 3*** **Location:** Central area
**Compass bearing:** 97 degrees

**Photo Point E – *Photo 4*** **Location:** Central area
**Compass bearing:** 153 degrees

**Photo Point E – *Photo 5*** **Location:** Central area
**Compass bearing:** 182 degrees

**Photo Point E – *Photo 6*** **Location:** Central area
**Compass bearing:** 221 degrees

## DH RANCH WETLAND MITIGATION SITE 2008

**Transect 1 – *Photo 1*** Looking west from east end.
**Compass bearing:** 260 degrees

**Transect 1 – *Photo 2*** Looking east from west end.
**Compass bearing:** 80 degrees

**Wetland Sample Point 1:** Looking west on east side of site. Shovel at sample point.

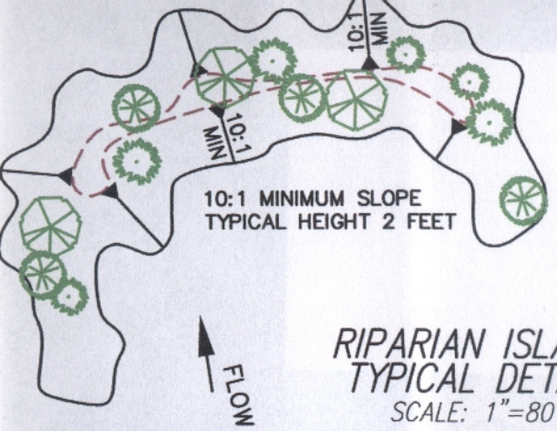
**Wetland Sample Point 2:** Looking north on east side of site. Shovel at sample point.

Macro invertebrate sampling location in NE corner of site.

# Appendix D

## MITIGATION DESIGN PLAN SHEET

*MDT Wetland Mitigation Monitoring*
*DH Ranch*
*Edgar, Montana*




## RIPARIAN ISLAND TYPICAL DETAIL

SCALE: 1"=80'

## REVEGETATION ZONES (23.45 ac.)

| | |
|---|---|
| WETLAND PEM | 15.90 ac. |
| WETLAND PEM DEPRESSION | *2.25 ac. |
| WETLAND SALINE PEM | 6.75 ac. |
| RIPARIAN ISLAND SCRUB-SHRUB | *1.65 ac. |
| RIPARIAN BUFFER SCRUB-SHRUB SALINE | 0.80 ac. |

* SUB AREAS OF WETLAND PEM

RANCH ACCESS ROAD IMPROVED TO ACT AS LOW HEAD IMPOUNDMENT AND CONTINUED RANCH ACCESS

PROJECT BOUNDARY

BUFFER SWALE NARROWS BECOMES OVERFLOW DRAINAGE DITCH

INTERCEPTOR DITCH

INTERCEPTOR DITCH

NORTH

0 50 150 300

## REVEGETATION PLAN

SCALE: 1"=150'

NOTES:

1> AERIAL PHOTO BACKGROUND – MDT Flight on 6/17/2005

2> FINISHED DESIGN CONTOUR INTERVAL = 1 foot

REVEGETATION PLAN & PROPOSED GRADING

DRAWING NO. FIGURE 5

REVISION

DH RANCH & Montana Department of Transportation

WETLAND MITIGATION PROJECT

Sec 1 TAN R23E CARBON COUNTY, MT

DHDESIGN.dwg

SCALE: AS NOTED

PROJECT NO. 251A

DRAWN bz

CHECK --

DATE 10/05/05

| REV NO. | REVISION DESCRIPTION | BY | REVISION DATE |
|---|---|---|---|

ADC SERVICES INC.
water resource consulting
Phone 406.222.7600 – Fax 406.222.7677

# Appendix E

## GPS PROTOCOL

***MDT Wetland Mitigation Monitoring***
***DH Ranch***
***Edgar, Montana***

# GPS MAPPING AND AERIAL PHOTO REFERENCING PROCEDURE

From 2001 through 2006, PBS&J mapped the vegetation community boundaries, photograph points, and other sampling locations in the field using the resource-grade Trimble GEO III GPS (Global Positioning System) unit. The data were collected with a minimum of three positions per feature using Course/Acquisition code. The collected data were then transferred to a personal computer (PC) and differentially corrected to the nearest operating Community Base Station. The corrected data were then exported to ACAD drawings in Montana State Plain Coordinates NAD 83 international feet. The Trimble GEO III GPS unit was also used for some sites in 2007.

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

In 2007 and 2008 sites were mapped using the resource-grade Magellan MobileMapper Office GPS unit. The Magellan GPS unit has a comparable accuracy level to the Trimble Geo III unit.

Each year, MDT photographs each mitigation site from the air. These aerial photographs are not geo-referenced, but serve as a visual aid to map wetland development and vegetation communities, and to show approximate locations for various monitoring activities (i.e. photograph points, transects, or macroinvertebrate sampling). Reference points that are observable on the aerial photo (i.e. road, stream channel, or fence) were also marked with the GPS unit in order to better position the aerial photograph. This positioning did not remove any of the distortion inherent to all photos. All mapped features and community boundaries were reviewed by the wetland biologist, to increase the figure's accuracy.

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

## 2008 MACROINVERTEBRATE SAMPLING PROTOCOL AND DATA

***MDT Wetland Mitigation Monitoring***
***DH Ranch***
***Edgar, Montana***

# AQUATIC INVERTEBRATE SAMPLING PROTOCOL

**Equipment List**

- D-frame sampling net with 1 mm mesh.
- 1-liter, wide-mouth, plastic sample jars provided by Rhithron Associates, Inc. (Quart sized, wide-mouthed canning jars can be substituted.)
- 95% ethanol (alternatively isopropyl alcohol).
- Pre-printed sample labels (printed on rite-in-the-rain paper); two labels per sample.
- Pencil.
- Clear packaging tape.
- 3-5 gallon plastic pail.
- Large tea strainer or framed screen.
- Cooler with ice for storing sample.

**Site Selection**

Select a site that is accessible with hip waders or rubber boots. If the substrate is too soft, place a wide board down to walk on. Choose a site that is representative of the overall condition of the wetland. Annual sampling should occur at the same site within the wetland.

**Sampling Procedure**

Wetland invertebrates (macroinvertebrates) inhabit the substrate, the water column, the stems and leaves of aquatic vegetation, and the water surface. At the given location, each habitat type is sampled and combined into a single 1-liter sample jar. Pre-cautions are made to minimize disturbing the sample site in order to maximize the number of animals collected.

Fill the pail with approximately 1 gallon of wetland water. Ideally, sample the water column from near-shore outward to a depth of 3 feet. Sample the water column using a long sweep of the net, keeping the net at about half the depth of the water. Sample the water surface with a long sweep of the net. Aquatic vegetation is sampled by pulling the net beneath the water surface, for at least a meter in distance. The substrate is sampled by pulling the net along the bottom, bumping it against the substrate several times as you pull. Be sure to place some muck, mud, and/or vegetation into the jar. After sampling a habitat, rinse the net in the bucket and look for insects, crustaceans, and other aquatic invertebrates. It is not necessary to sample habitats in any specific order, but all habitats, if present, are to be sampled. Habitats can be sampled more than once.

Fill about 1 cup of ethanol into the sample jar. Sieve the contents of the bucket through the straining device and pour or carefully scrape the contents of the strainer into the sample jar. Top off the jar with enough ethanol to cover all the material and leave as little headroom as possible. Alternatively, sampled materials can be lifted out of the net and put directly into the jar. Be sure to include some muck, mud, and/or vegetation into the jar. Each macroinvertebrate sampling site should have only one sampling jar.

Using pencil, complete two labels with the required information: project name, project number, date, collector's name, and habitats sampled. Do not complete the label with ink as it will dissolve in ethanol. For wetlands with at least two macroinvertebrate sampling sites, number the site consecutively followed by the total number of sites (e.g. Sample 2 of 3 sites). Place one label into the jar and seal the jar. Dry the jar off, if necessary, and tape the second label to the outside of the jar.

Photograph each macroinvertebrate sampling site.

**Sample Handling/Delivery**

In the field, keep sample jars cool by placing in a cooler with a small amount of ice.
Deliver samples to the PBS&J office in Missoula, where they will be inventoried and delivered to Rhithron Associates, Inc.

**MDT Mitigated Wetland Monitoring Project: Aquatic Invertebrate Monitoring**
**Summary 2001 – 2008**

Prepared for Post, Buckley, Schuh, and Jernigan (PBS&J)
Prepared by W. Bollman, Rhithron Associates, Inc.

## INTRODUCTION

This report summarizes data generated from eight years of mitigated wetland monitoring from sites throughout the State of Montana. Over all years of sampling, a total of 210 invertebrate samples have been collected. Table 1 lists the currently monitored sites at which aquatic invertebrates were collected in 2008, and summarizes the sampling history of each.

## METHODS

### Sample processing

Aquatic invertebrate samples were collected at mitigated wetland sites in the summer months of 2001, 2002, 2003, 2004, 2005, 2006, 2007, and 2008 by personnel of PBS&J (Table 1). Sampling procedures were based on the protocols developed by the Montana Department of Environmental Quality (MDEQ) for wetland sampling. 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.

Standard sorting protocols were applied to achieve representative subsamples of a minimum of 100 organisms. Caton sub-sampling devices (Caton 1991), divided into 30 grids, each approximately 5 cm by 6 cm, were used. Grid contents were examined under stereoscopic microscopes using 10x-30x magnification. All aquatic invertebrates from each selected grid were sorted from the substrate, and placed in 95% ethanol for subsequent identification. Grid selection, examination, and sorting continued until at least 100 organisms were sorted. A large/rare search was conducted to collect any taxa not found in the subsampling procedure.

Organisms were individually examined using 10x – 80x stereoscopic dissecting scopes (Leica S8E and S6E) and identified to the lowest practical taxonomic levels using appropriate published taxonomic references. Identification, counts, life stages, and information about the condition of specimens were recorded on bench sheets. To obtain accuracy in richness measures, organisms that could not be identified to the target level specified in MDEQ protocols were designated as “not unique” if other specimens from the same group could be taken to target levels. Organisms designated as “unique” were those that could be definitively distinguished from other organisms in the sample. Identified organisms were preserved in 95% ethanol in labeled vials, and archived at the Rhithron laboratory. Midges were morphotyped using 10x – 80x stereoscopic dissecting microscopes (Leica S8E and S6E) and representative specimens were slide mounted and examined at 200x – 1000x magnification using an Olympus BX 51 compound microscope. Slide mounted organisms were also archived at the Rhithron laboratory.

### Assessment

The method employed to assess these wetlands is based on an index incorporating a battery of 12 bioassessment metrics or attributes (Table 2) 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 the 12 metrics were developed specifically for this project, since mitigated wetlands were not included in original criteria development.

Scoring criteria for wetland metrics were developed by generally following the tactic used by Stribling et al. (1995). Boxplots were generated using a statistical software package (Statistica™), and distributions, median values, ranges, and quartiles for each metric were examined. For the wetland sites, “good” 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 good, 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, which is expressed as a percentage of the maximum possible score (60). 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. Data from a total of 167 samples were used to develop criteria.

Six sites in this study supported aquatic fauna characteristic of lotic habitats rather than lentic wetland habitats; these sites were excluded from mitigated wetland scoring criteria development, and were evaluated with a metric battery specific to flowing water habitats. In 2008, the lotic sites were Camp Creek (2 sites), Cloud Ranch stream, Jack Creek – McKee Spring, and Jocko Spring Creek (2 sites). Invertebrate assemblages at these sites were generally characteristic of montane or foothill stream conditions and were assessed using the tested metric battery developed for montane streams of Western Montana (MVFP index: Bollman 1998).

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. However, the nature of the action needed is not determined solely by the index score or impairment classification, 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 – wetlands**

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 (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.

Summary metric values and scores for the 2008 samples are given in Tables 4a-4c and 5. Thermal preference of invertebrate assemblages was calculated using Brandt 2001.

**Bioassessment metrics – lotic habitats**

For sites supporting rheophilic invertebrate assemblages, bioassessment was based on a metric battery and scoring criteria developed for montane regions of Montana (MVFP index: Bollman 1998). The six metrics constituting the bioassessment index used for MVFP sites in this study were selected because, both individually and as an integrated metric battery, they are robust at distinguishing impaired sites from relatively unimpaired sites (Bollman 1998). They have been demonstrated to be more variable with anthropogenic disturbance than with natural environmental gradients (Bollman 1998). Each of the six metrics, and their expected responses to various stressors is described below.

1. Ephemeroptera (mayfly) taxa richness. The number of mayfly taxa declines as water quality diminishes. Impairments to water quality which have been demonstrated to adversely affect the ability of mayflies to flourish include elevated water temperatures, heavy metal contamination, increased turbidity, low or high pH, elevated specific conductance and toxic chemicals. Few mayfly species are able to tolerate certain disturbances to instream habitat, such as excessive sediment deposition.

2. Plecoptera (stonefly) taxa richness. Stoneflies are particularly susceptible to impairments that affect a stream on a reach-level scale, such as loss of riparian canopy, streambank instability, channelization, and alteration of morphological features such as pool frequency and function, riffle development and sinuosity. Just as all benthic organisms, they are also susceptible to smaller scale habitat loss, such as by sediment deposition, loss of interstitial spaces between substrate particles, or unstable substrate.

3. Trichoptera (caddisfly) taxa richness. Caddisfly taxa richness has been shown to decline when sediment deposition affects habitat. In addition, the presence of certain case-building caddisflies can indicate good retention of woody debris and lack of scouring flow conditions.

4. Number of sensitive taxa. Sensitive taxa are generally the first to disappear as anthropogenic disturbances increase. The list of sensitive taxa used here includes organisms sensitive to a wide range of disturbances, including warmer water temperatures, organic or nutrient pollution, toxic pollution, sediment deposition, substrate instability and others. Unimpaired streams of western Montana typically support at least four sensitive taxa (Bollman 1998).

5. Percent filter feeders. Filter-feeding organisms are a diverse group; they capture small particles of organic matter, or organically enriched sediment material, from the water column by means of a variety of adaptations, such as silken nets or hairy appendages. In forested montane streams, filterers are expected to occur in insignificant numbers. Their abundance increases when canopy cover is lost and when water temperatures increase and the accompanying growth of filamentous algae occurs. Some filtering organisms, specifically the Arctopsychid caddisflies (*Arctopsyche* spp. and *Parapsyche* spp.) build silken nets with large mesh sizes that capture small organisms such as chironomids and early-instar mayflies. Here they are considered predators, and, in this study, their abundance does not contribute to the percent filter feeders metric.

6. Percent tolerant taxa. Tolerant taxa are ubiquitous in stream sites, but when disturbance increases, their abundance increases proportionately. The list of taxa used here includes organisms tolerant of a wide range of disturbances, including warmer water temperatures, organic or nutrient pollution, toxic pollution, sediment deposition, substrate instability and others.

**Table 1.** Montana Department of Transportation Mitigated Wetlands Monitoring Project sites: sampling history. Only those sites sampled in 2008 are included. An asterisk indicates lotic sites.

| Site Identifier | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|---|---|
| Roundup | + | + | + | + | + | + | + | + |
| Hoskins Landing MS-1 | | + | + | + | + | + | + | + |
| Peterson Ranch Pond 2 | | + | | + | + | + | + | + |
| Peterson Ranch Pond 4 | | + | + | + | + | + | + | + |
| Perry Ranch | | + | | | + | | | + |
| Camp Creek MS-1* | | + | + | + | + | + | + | + |
| Camp Creek MS-2* | | | | | | + | + | + |
| Cloud Ranch Pond | | | | + | + | | + | + |
| Cloud Ranch Stream* | | | | + | | | + | + |
| Jack Creek – Pond | | | | + | + | + | + | + |
| Jack Creek – McKee* | | | | | | | + | + |
| Norem | | | | + | + | + | + | + |
| Rock Creek Ranch | | | | | + | + | + | + |
| Wagner Marsh | | | | | + | + | + | + |
| Alkali Lake 1 | | | | | | + | + | + |
| West Fork of Charley Creek | | | | | | | + | + |
| Woodson Pond MI 1 | | | | | | | + | + |
| Woodson Stream MI 2* | | | | | | | + | + |
| Little Muddy Creek | | | | | | | + | + |
| Selkirk Ranch | | | | | | | + | + |
| DH Ranch | | | | | | | + | + |
| Jocko Spring Creek MS-1 | | | | | | | | + |
| Jocko Spring Creek MS-2 | | | | | | | | + |
| Sportsman's Campground Site #1 | | | | | | | | + |
| Sportsman's Campground Site #2 | | | | | | | | + |
| Sportsman's Campground Site #3 | | | | | | | | + |
| Lonepine #1 | | | | | | | | + |
| Lonepine #2 | | | | | | | | + |

**Table 2.** Aquatic invertebrate metrics employed for wetland (lentic) invertebrate assemblages in the MDT mitigated wetlands study, 2001 – 2008.

| 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 for lentic (4a – 4c) and lotic (5) sites and project specific taxa listing(s) and metrics report(s) are provided on the following pages.)*

**Table 4a.** Metric values and scores for wetland (lentic) sites in the MDT mitigated wetland study – 2008 sampling.

| METRIC | Roundup | Hoskins Landing MS 1 | Peterson Ranch Pond 2 | Peterson Ranch Pond 4 | Perry Ranch | Cloud Ranch Pond | Jack Creek Pond | Norem |
|---|---|---|---|---|---|---|---|---|
| Total taxa | 9 | 18 | 13 | 25 | 11 | 27 | 21 | 14 |
| POET | 0 | 2 | 1 | 3 | 0 | 5 | 2 | 0 |
| Chironomidae taxa | 4 | 5 | 3 | 6 | 5 | 14 | 7 | 6 |
| Crustacea + Mollusca | 3 | 6 | 3 | 5 | 2 | 4 | 6 | 2 |
| % Chironomidae | 80.37% | 17.00% | 3.70% | 13.21% | 88.79% | 49.53% | 42.86% | 34.69% |
| Orthocladiinae/Chir | 0.63 | 0.18 | 1.50 | 0.21 | 0.82 | 0.66 | 0.40 | 0.53 |
| % Amphipoda | 0.00% | 8.00% | 0.00% | 0.00% | 0.00% | 6.54% | 15.24% | 0.00% |
| % Crustacea + % Mollusca | 15.89% | 48.00% | 86.11% | 43.40% | 6.54% | 10.28% | 30.48% | 26.53% |
| HBI | 8.01 | 7.62 | 7.85 | 7.40 | 7.37 | 5.94 | 8.17 | 7.61 |
| % Dominant taxon | 50.47% | 27.00% | 84.26% | 25.47% | 62.62% | 13.08% | 19.05% | 26.53% |
| % Collector-Gatherers | 31.78% | 54.00% | 87.96% | 20.75% | 20.56% | 56.07% | 65.71% | 44.90% |
| % Filterers | 2.80% | 10.00% | 0.00% | 1.89% | 0.00% | 3.74% | 1.90% | 0.00% |
| | | | | | | | | |
| Total taxa | 1 | 3 | 1 | 5 | 1 | 5 | 5 | 1 |
| POET | 1 | 1 | 1 | 3 | 1 | 5 | 1 | 1 |
| Chironomidae taxa | 3 | 3 | 3 | 3 | 3 | 5 | 5 | 3 |
| Crustacea + Mollusca | 1 | 5 | 1 | 3 | 1 | 3 | 5 | 1 |
| % Chironomidae | 1 | 5 | 5 | 5 | 1 | 1 | 1 | 3 |
| Orthocladiinae/Chir | 5 | 1 | 5 | 3 | 5 | 5 | 3 | 5 |
| % Amphipoda | 5 | 3 | 5 | 5 | 5 | 3 | 3 | 5 |
| % Crustacea + % Mollusca | 5 | 3 | 1 | 3 | 5 | 5 | 5 | 5 |
| HBI | 1 | 1 | 1 | 3 | 3 | 5 | 1 | 1 |
| % Dominant taxon | 1 | 5 | 1 | 5 | 1 | 5 | 5 | 5 |
| % Collector-Gatherers | 1 | 3 | 5 | 1 | 1 | 3 | 3 | 1 |
| % Filterers | 3 | 1 | 3 | 3 | 3 | 3 | 3 | 3 |
| | | | | | | | | |
| **Total Score** | **28** | **34** | **32** | **42** | **30** | **48** | **40** | **34** |
| **Percent of Maximum Score** | **46.67%** | **56.67%** | **53.33%** | **70.00%** | **50.00%** | **80.00%** | **66.67%** | **56.67%** |
| **Impairment Classification** | **poor** | **sub-optimal** | **sub-optimal** | **good** | **poor** | **good** | **sub-optimal** | **sub-optimal** |

**Table 4b.** Metric values and scores for wetland (lentic) sites in the MDT mitigated wetland study – 2008 sampling.

| METRIC | Rock Creek Ranch | Wagner Marsh | Alkali Lake | West Fork of Charley Creek | Woodson Pond | Woodson Stream | Little Muddy Creek | Selkirk Ranch |
|---|---|---|---|---|---|---|---|---|
| Total taxa | 23 | 11 | 10 | 9 | 13 | 7 | 14 | 17 |
| POET | 1 | 4 | 0 | 0 | 1 | 3 | 1 | 1 |
| Chironomidae taxa | 5 | 2 | 2 | 1 | 7 | 0 | 2 | 8 |
| Crustacea + Mollusca | 5 | 2 | 3 | 3 | 2 | 2 | 3 | 5 |
| % Chironomidae | 28.97% | 2.83% | 5.41% | 0.91% | 60.00% | 0.00% | 55.00% | 23.38% |
| Orthocladiinae/Chir | 0.97 | 0.00 | 0.00 | 0.00 | 0.52 | 0 | 0.64 | 0.33 |
| % Amphipoda | 0.00% | 0.00% | 0.00% | 67.27% | 0.00% | 7.69% | 0.00% | 5.19% |
| % Crustacea + % Mollusca | 28.97% | 39.62% | 32.43% | 70.91% | 25.45% | 15.38% | 17.00% | 48.05% |
| HBI | 6.91 | 7.45 | 8.57 | 8.19 | 8.14 | 4.62 | 6.97 | 7.76 |
| % Dominant taxon | 22.43% | 48.11% | 48.65% | 67.27% | 25.45% | 30.77% | 35.00% | 32.47% |
| % Collector-Gatherers | 30.84% | 52.83% | 21.62% | 68.18% | 86.36% | 23.08% | 29.00% | 16.88% |
| % Filterers | 1.87% | 0.00% | 0.00% | 0.00% | 0.00% | 30.77% | 0.00% | 32.47% |
| | | | | | | | | |
| Total taxa | 5 | 1 | 1 | 1 | 1 | 1 | 1 | 3 |
| POET | 1 | 5 | 1 | 1 | 1 | 3 | 1 | 1 |
| Chironomidae taxa | 3 | 1 | 1 | 1 | 5 | 1 | 1 | 5 |
| Crustacea + Mollusca | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 3 |
| % Chironomidae | 3 | 5 | 5 | 5 | 1 | 5 | 1 | 3 |
| Orthocladiinae/Chir | 5 | 1 | 1 | 1 | 5 | Not Scored | 5 | 3 |
| % Amphipoda | 5 | 5 | 5 | 1 | 5 | 3 | 5 | 3 |
| % Crustacea + % Mollusca | 5 | 3 | 5 | 1 | 5 | 5 | 5 | 3 |
| HBI | 3 | 3 | 1 | 1 | 1 | 5 | 3 | 1 |
| % Dominant taxon | 5 | 3 | 3 | 1 | 5 | 5 | 3 | 5 |
| % Collector-Gatherers | 1 | 3 | 1 | 3 | 5 | 1 | 1 | 1 |
| % Filterers | 3 | 3 | 3 | 3 | 3 | 1 | 3 | 1 |
| | | | | | | | | |
| **Total Score** | **42** | **34** | **28** | **20** | **38** | **31** | **30** | **32** |
| **Percent of Maximum Score** | **70.00%** | **56.67%** | **46.67%** | **33.33%** | **63.33%** | **56.36%** | **50.00%** | **53.33%** |
| **Impairment Classification** | **good** | **sub-optimal** | **poor** | **poor** | **sub-optimal** | **sub-optimal** | **poor** | **sub-optimal** |

**Table 4c.** Metric values and scores for wetland (lentic) sites in the MDT mitigated wetland study – 2008 sampling.

| METRIC | DH Ranch | Sportsman's Campground Site # 1 | Sportsman's Campground Site # 2 | Sportsman's Campground Site # 3 | Lonepine # 1 | Lonepine # 2 |
|---|---|---|---|---|---|---|
| Total taxa | 15 | 16 | 9 | 12 | 18 | 4 |
| POET | 1 | 1 | 0 | 0 | 2 | 0 |
| Chironomidae taxa | 6 | 6 | 3 | 7 | 12 | 3 |
| Crustacea + Mollusca | 2 | 5 | 3 | 4 | 1 | 1 |
| % Chironomidae | 52.29% | 10.91% | 41.18% | 69.09% | 81.82% | 57.14% |
| Orthocladiinae/Chir | 0.09 | 0.17 | 0.00 | 0.25 | 0.13 | 0.00 |
| % Amphipoda | 0.00% | 24.55% | 5.88% | 27.27% | 0.00% | 0.00% |
| % Crustacea + % Mollusca | 30.28% | 83.64% | 23.53% | 29.09% | 7.27% | 42.86% |
| HBI | 7.33 | 7.55 | 8.76 | 7.55 | 7.60 | 8.14 |
| % Dominant taxon | 33.03% | 56.36% | 29.41% | 25.45% | 25.45% | 42.86% |
| % Collector-Gatherers | 49.54% | 20.91% | 11.76% | 57.27% | 55.45% | 28.57% |
| % Filterers | 0.92% | 63.64% | 11.76% | 25.45% | 22.73% | 42.86% |
| | | | | | | |
| Total taxa | 3 | 3 | 1 | 1 | 3 | 1 |
| POET | 1 | 1 | 1 | 1 | 1 | 1 |
| Chironomidae taxa | 3 | 3 | 3 | 5 | 5 | 3 |
| Crustacea + Mollusca | 1 | 3 | 1 | 3 | 1 | 1 |
| % Chironomidae | 1 | 5 | 3 | 1 | 1 | 1 |
| Orthocladiinae/Chir | 1 | 1 | 1 | 3 | 1 | 1 |
| % Amphipoda | 5 | 1 | 3 | 1 | 5 | 5 |
| % Crustacea + % Mollusca | 5 | 1 | 5 | 5 | 5 | 3 |
| HBI | 3 | 3 | 1 | 3 | 3 | 1 |
| % Dominant taxon | 5 | 1 | 5 | 5 | 5 | 3 |
| % Collector-Gatherers | 3 | 1 | 1 | 3 | 3 | 1 |
| % Filterers | 3 | 1 | 1 | 1 | 1 | 1 |
| | | | | | | |
| **Total Score** | **34** | **24** | **26** | **32** | **34** | **22** |
| **Percent of Maximum Score** | **56.67%** | **40.00%** | **43.33%** | **53.33%** | **56.67%** | **36.67%** |
| **Impairment Classification** | **sub-optimal** | **poor** | **poor** | **sub-optimal** | **sub-optimal** | **poor** |

**Table 5.** Metric values and scores for stream (lotic) sites in the MDT mitigated wetland study – 2008 sampling.

| METRIC | Camp Creek MS-1 | Camp Creek MS-2 | Cloud Ranch Stream | Jack Creek – McKee Spring | Jocko Spring Creek MS-1 | Jocko Spring Creek MS-2 |
|---|---|---|---|---|---|---|
| **E Richness** | 7 | 5 | 4 | 1 | 0 | 1 |
| **P Richness** | 2 | 2 | 0 | 0 | 0 | 1 |
| **T Richness** | 4 | 6 | 5 | 3 | 2 | 5 |
| **Pollution Sensitive Richness** | 0 | 1 | 0 | 0 | 0 | 0 |
| **Filterer Percent** | 29.00% | 37.00% | 5.00% | 40.00% | 15.00% | 11.00% |
| **Pollution Tolerant Percent** | 5.00% | 3.00% | 28.00% | 1.00% | 62.00% | 15.00% |
| | | | | | | |
| **E Richness** | 3 | 2 | 2 | 0 | 0 | 0 |
| **P Richness** | 2 | 2 | 0 | 0 | 0 | 1 |
| **T Richness** | 2 | 3 | 3 | 2 | 1 | 3 |
| **Pollution Sensitive Richness** | 0 | 1 | 0 | 0 | 0 | 0 |
| **Filterer Percent** | 1 | 0 | 3 | 0 | 1 | 1 |
| **Pollution Tolerant Percent** | 3 | 3 | 0 | 3 | 0 | 1 |
| | | | | | | |
| **Total score** | **11** | **11** | **8** | **5** | **2** | **6** |
| **Percent of maximum score** | **61%** | **61%** | **44%** | **28%** | **11%** | **33%** |
| **Impairment classification** | **slight** | **slight** | **moderate** | **moderate** | **severe** | **moderate** |

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Caton, L. W. 1991. Improving subsampling methods for the EPA's "Rapid Bioassessment" benthic protocols. Bulletin of the North American Benthological Society, 8(3): 317-319.

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:** MDT08PBSJ
**RAI No.:** MDT08PBSJ005

**RAI No.:** MDT08PBSJ005 **Sta. Name:** DH Ranch
**Client ID:**
**Date Coll.:** 7/10/2008 **No. Jars:** 1 **STORET ID:**

| Taxonomic Name | Count | PRA | Unique | Stage | Qualifier | BI | Function |
|---|---|---|---|---|---|---|---|
| **Non-Insect** | | | | | | | |
| Lymnaeidae | | | | | | | |
| Lymnaeidae | 5 | 4.59% | No | Immature | | 6 | SC |
| *Stagnicola* sp. | 7 | 6.42% | Yes | Unknown | | 6 | SC |
| Physidae | | | | | | | |
| Physidae | 21 | 19.27% | Yes | Unknown | | 8 | SC |
| **Odonata** | | | | | | | |
| Libellulidae | | | | | | | |
| Libellulidae | 2 | 1.83% | Yes | Larva | Early Instar | 9 | PR |
| **Heteroptera** | | | | | | | |
| Corixidae | | | | | | | |
| Corixidae | 1 | 0.92% | Yes | Larva | | 10 | PH |
| Notonectidae | | | | | | | |
| Notonectidae | 4 | 3.67% | Yes | Larva | | 10 | PR |
| **Coleoptera** | | | | | | | |
| Dytiscidae | | | | | | | |
| Dytiscidae | 4 | 3.67% | Yes | Larva | | 5 | PR |
| Hydrophilidae | | | | | | | |
| *Berosus* sp. | 1 | 0.92% | Yes | Larva | | 5 | PR |
| **Diptera** | | | | | | | |
| Ceratopogonidae | | | | | | | |
| Ceratopogoninae | 3 | 2.75% | Yes | Larva | | 6 | PR |
| Dolichopodidae | | | | | | | |
| Dolichopodidae | 4 | 3.67% | Yes | Larva | | 4 | PR |
| **Chironomidae** | | | | | | | |
| Chironomidae | | | | | | | |
| *Apedilum* sp. | 36 | 33.03% | Yes | Larva | | 11 | CG |
| Chironomidae | 3 | 2.75% | No | Pupa | | 10 | CG |
| *Dicrotendipes* sp. | 10 | 9.17% | Yes | Larva | | 8 | CG |
| *Procladius* sp. | 2 | 1.83% | Yes | Larva | | 9 | PR |
| *Psectrocladius* sp. | 2 | 1.83% | Yes | Larva | | 8 | CG |
| *Pseudosmittia* sp. | 3 | 2.75% | Yes | Larva | | 6 | CG |
| *Tanytarsus* sp. | 1 | 0.92% | Yes | Larva | | 6 | CF |
| **Sample Count** | **109** | | | | | | |

# Metrics Report

**Project ID:** MDT08PBSJ
**RAI No.:** MDT08PBSJ005
**Sta. Name:** DH Ranch
**Client ID:**
**STORET ID:**
**Coll. Date:** 7/10/2008

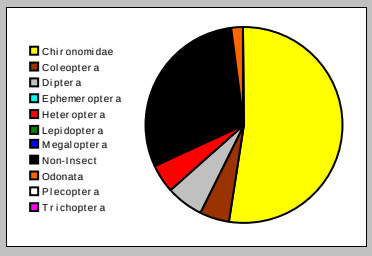
## Abundance Measures

**Sample Count:** 109
**Sample Abundance:** 1,090.00 10.00% of sample used

**Coll. Procedure:**
**Sample Notes:**

## Taxonomic Composition

| Category | R | A | PRA |
|---|---|---|---|
| Non-Insect | 2 | 33 | 30.28% |
| Odonata | 1 | 2 | 1.83% |
| Ephemeroptera | | | |
| Plecoptera | | | |
| Heteroptera | 2 | 5 | 4.59% |
| Megaloptera | | | |
| Trichoptera | | | |
| Lepidoptera | | | |
| Coleoptera | 2 | 5 | 4.59% |
| Diptera | 2 | 7 | 6.42% |
| Chironomidae | 6 | 57 | 52.29% |

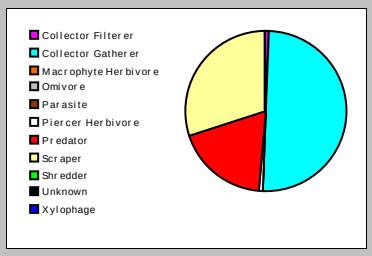



## Dominant Taxa

| Category | A | PRA |
|---|---|---|
| Apedilum | 36 | 33.03% |
| Physidae | 21 | 19.27% |
| Dicrotendipes | 10 | 9.17% |
| Stagnicola | 7 | 6.42% |
| Lymnaeidae | 5 | 4.59% |
| Notonectidae | 4 | 3.67% |
| Dytiscidae | 4 | 3.67% |
| Dolichopodidae | 4 | 3.67% |
| Pseudosmittia | 3 | 2.75% |
| Chironomidae | 3 | 2.75% |
| Ceratopogoninae | 3 | 2.75% |
| Psectrocladius | 2 | 1.83% |
| Procladius | 2 | 1.83% |
| Libellulidae | 2 | 1.83% |
| Tanytarsus | 1 | 0.92% |

## Functional Composition

| Category | R | A | PRA |
|---|---|---|---|
| Predator | 7 | 20 | 18.35% |
| Parasite | | | |
| Collector Gatherer | 4 | 54 | 49.54% |
| Collector Filterer | 1 | 1 | 0.92% |
| Macrophyte Herbivore | | | |
| Piercer Herbivore | 1 | 1 | 0.92% |
| Xylophage | | | |
| Scraper | 2 | 33 | 30.28% |
| Shredder | | | |
| Omivore | | | |
| Unknown | | | |




## Metric Values and Scores

| Metric | Value | BIBI | MTP | MTV | MTM |
|---|---|---|---|---|---|
| *Composition* | | | | | |
| Taxa Richness | 15 | 1 | 1 | | 0 |
| Non-Insect Percent | 30.28% | | | | |
| E Richness | 0 | 1 | | 0 | |
| P Richness | 0 | 1 | | 0 | |
| T Richness | 0 | 1 | | 0 | |
| EPT Richness | 0 | | 0 | | 0 |
| EPT Percent | 0.00% | | 0 | | 0 |
| Oligochaeta+Hirudinea Percent | | | | | |
| Baetidae/Ephemeroptera | 0.000 | | | | |
| Hydropsychidae/Trichoptera | 0.000 | | | | |
| *Dominance* | | | | | |
| Dominant Taxon Percent | 33.03% | | 2 | | 2 |
| Dominant Taxa (2) Percent | 52.29% | | | | |
| Dominant Taxa (3) Percent | 61.47% | 3 | | | |
| Dominant Taxa (10) Percent | 88.99% | | | | |
| *Diversity* | | | | | |
| Shannon H (loge) | 2.071 | | | | |
| Shannon H (log2) | 2.988 | | 2 | | |
| Margalef D | 3.034 | | | | |
| Simpson D | 0.185 | | | | |
| Evenness | 0.097 | | | | |
| *Function* | | | | | |
| Predator Richness | 7 | | 3 | | |
| Predator Percent | 18.35% | 3 | | | |
| Filterer Richness | 1 | | | | |
| Filterer Percent | 0.92% | | | 3 | |
| Collector Percent | 50.46% | | 3 | | 3 |
| Scraper+Shredder Percent | 30.28% | | 3 | | 1 |
| Scraper/Filterer | 33.000 | | | | |
| Scraper/Scraper+Filterer | 0.971 | | | | |
| *Habit* | | | | | |
| Burrower Richness | 2 | | | | |
| Burrower Percent | 11.93% | | | | |
| Swimmer Richness | 2 | | | | |
| Swimmer Percent | 1.83% | | | | |
| Clinger Richness | 1 | 1 | | | |
| Clinger Percent | 0.92% | | | | |
| *Characteristics* | | | | | |
| Cold Stenotherm Richness | 0 | | | | |
| Cold Stenotherm Percent | 0.00% | | | | |
| Hemoglobin Bearer Richness | 4 | | | | |
| Hemoglobin Bearer Percent | 47.71% | | | | |
| Air Breather Richness | 3 | | | | |
| Air Breather Percent | 8.26% | | | | |
| *Voltinism* | | | | | |
| Univoltine Richness | 6 | | | | |
| Semivoltine Richness | 3 | 3 | | | |
| Multivoltine Percent | 52.29% | | 2 | | |
| *Tolerance* | | | | | |
| Sediment Tolerant Richness | 1 | | | | |
| Sediment Tolerant Percent | 11.01% | | | | |
| Sediment Sensitive Richness | 0 | | | | |
| Sediment Sensitive Percent | 0.00% | | | | |
| Metals Tolerance Index | 3.852 | | | | |
| Pollution Sensitive Richness | 0 | 1 | | 0 | |
| Pollution Tolerant Percent | 53.21% | 1 | | 0 | |
| Hilsenhoff Biotic Index | 7.329 | | 0 | | 0 |
| Intolerant Percent | 0.00% | | | | |
| Supertolerant Percent | 41.28% | | | | |
| CTQa | 101.455 | | | | |

## Bioassessment Indices

| BioIndex | Description | Score | Pct | Rating |
|---|---|---|---|---|
| BIBI | B-IBI (Karr et al.) | 16 | 32.00% | |
| MTP | Montana DEQ Plains (Bukantis 1998) | 16 | 53.33% | Moderate |
| MTV | Montana Revised Valleys/Foothills (Bollman 1998) | 3 | 16.67% | Severe |
| MTM | Montana DEQ Mountains (Bukantis 1998) | 6 | 28.57% | Moderate |