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**MONTANA DEPARTMENT OF TRANSPORTATION  
WETLAND MITIGATION MONITORING REPORT: YEAR 2007**

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*Camp Creek  
Sula, Montana*



Prepared for:

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

Prepared by:

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

December 2007

PBS&J Project No: B43088.00 - 0104



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## 1.0 INTRODUCTION

This report documents the sixth year (2007) of monitoring at the Camp Creek mitigation site. The Camp Creek project was developed to mitigate stream and wetland impacts associated with the Montana Department of Transportation (MDT) constructed Sula-North and South project, and to possibly function as a mitigation reserve to be applied against future MDT projects in the Bitterroot Valley. Camp Creek is located in Ravalli County, MDT Watershed # 3, in the Lower Clark Fork region. The mitigation site is located approximately three miles south of Sula, Montana (**Figure 1**). Elevations of the site range from 4,600 ft at the north boundary to 4,730 ft at the south boundary.

The approximate site boundary is illustrated on **Figure 2** in **Appendix A**, and the original site plans are included in **Appendix D**. The project is located within the Sula Basin and along the historic Camp Creek floodplain. Camp Creek flows across the valley bottom, until eventually draining into the East Fork of the Bitterroot River. Seasonal flooding and perennial creek flow provide the primary hydrology source within the new channel/floodplain margins. Local groundwater systems serve as a secondary hydrology source, flowing through the deep alluvial substrate contained within the Sula Basin. Two smaller creeks drain into Camp Creek within the project limits: Andrews and Praine creeks.

Construction at the Camp Creek mitigation site was completed during the spring of 2002. The overall goals of this project were restoration of Camp Creek channel bottom, associated wetland functional restoration/enhancement and creation, and enhancement of heavily grazed and cleared riparian vegetation. Construction diagrams are presented in **Appendix D**. Project details for each of the three main goals are included in the following list:

### Functional Restoration

- Return Camp Creek to its historic channel and establish new channel.
- Restore hydrology and vegetation, recreating high value wetland habitat along Camp Creek riparian corridor.
- Fill existing ditches.

### Enhancement

- Riparian shrub and tree plantings throughout the created floodplain margins.
- Drier upland species planting in areas of created upland slopes.

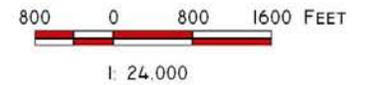
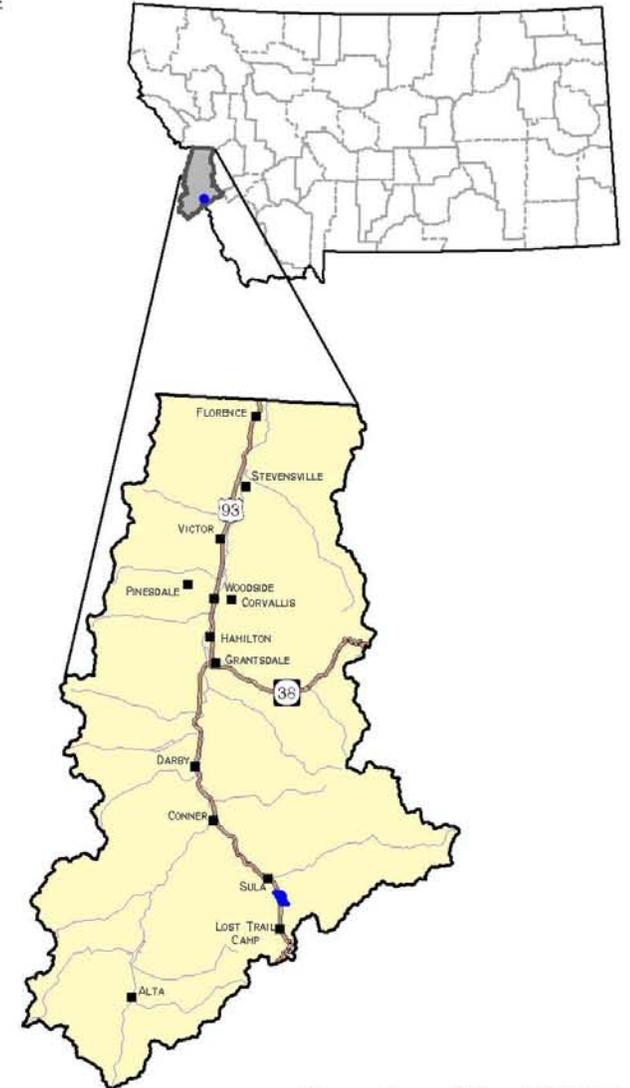
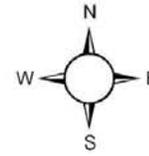
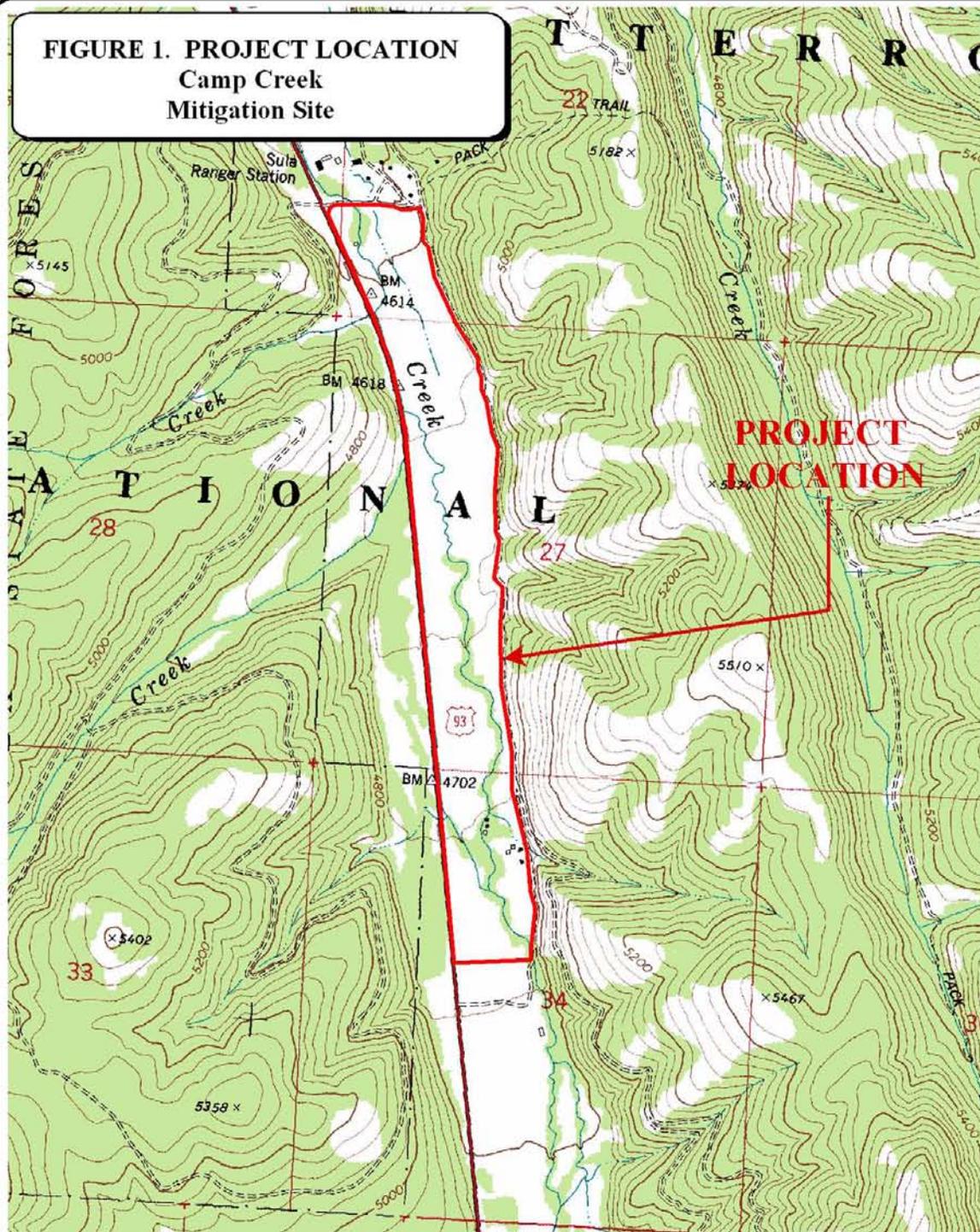
### Creation

- Creation of emergent/scrub shrub wetlands along the floodplain margins of the new channel.

The site was designed to mitigate for specific wetland functions impacted by MDT roadway projects, including: storm water retention, roadway runoff filtration, sediment and nutrient retention, water quality, groundwater recharge, and wildlife habitat.

The credit allocation method for this site was worked out between MDT and COE in early 2006, and is functional unit-based, whereby wetland acreage for each AA is multiplied by the total score for that AA to arrive at an overall functional unit score. This is done both pre-project and post-project. The difference between these two numbers (the functional unit “gain”) is then

**FIGURE 1. PROJECT LOCATION**  
**Camp Creek**  
**Mitigation Site**



PROJECT #: 130091.038  
 DATE: DEC 2002  
 LOCATION:  
 PROJECT MANAGER: B. DUTTON  
 DRAWN BY: B. NOECKER



1120 CEDAR PO BOX 8254 MISSOULA, MT 59807

divided by the post-project score to arrive at an approximate credit acreage for that AA. Credit acreages from each AA are summed to arrive at a total for the site.

The Camp Creek site is typically monitored once per year to document wetland and other biological attributes. The monitoring area is illustrated in **Figure 2** in **Appendix A**.

## 2.0 METHODS

### 2.1 Monitoring Dates and Activities

The site was visited on August 10th (mid-season) of 2007. Monitoring activities were conducted on the MDT-owned portion of the site, as well as within the fenced portion of the adjacent (upstream) Grasser property, which is also considered part of the mitigation site. The mid-season visit was conducted to document vegetation, soil, and hydrologic conditions used to map jurisdictional wetlands. All 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 aquatic habitat boundary mapping; vegetation community mapping; vegetation transect; soils data; hydrology data; bird and general wildlife use; photograph points; macroinvertebrate sampling; GPS data points; functional assessment; (non-engineering) examination of topographic features; and stream cross section data at two established transects.

### 2.2 Hydrology

Wetland hydrology indicators were recorded during the mid-season visit using procedures outlined in the COE 1987 Wetland Delineation Manual (Environmental Laboratory 1987). Hydrology data were recorded on COE Routine Wetland Delineation Data Forms (**Appendix B**). Additional hydrologic data were recorded on the Wetland Mitigation Site Monitoring Form (**Appendix B**). No groundwater monitoring wells were installed at the site.

Two cross section locations were established and surveyed across Camp Creek on the MDT-owned parcel: one upstream and one downstream of the Praine Creek confluence with Camp Creek. These are designated “XS 3-A” and “XS 4A” on **Figure 2** in **Appendix A**. The cross sections are used to monitor potential lateral and vertical channel migration over time.

### 2.3 Vegetation

General dominant species-based vegetation community types (e.g., *Carex/Phalaris*) were delineated on an aerial photograph during the mid-season visit. Standardized community mapping was not employed as many of these systems are geared towards climax vegetation and do not reflect yearly changes. Estimated percent cover of the dominant species in each community type was listed on the Wetland Mitigation Site Monitoring Form (**Appendix B**).

A 10-foot wide belt transect was sampled during the mid-season monitoring event to represent the range of current vegetation conditions. Percent cover was estimated for each vegetative

species within each successive vegetative community encountered within the “belt” using the following values: T (few plants); P (1-5%), 1 (5-15%); 2 (15-25%); 3 (25-35%); 4 (35-45%); 5 (45-55%) and so on to 9 (85-95%). The transect location is illustrated on **Figure 2** in **Appendix A**. The transect is used to evaluate changes over time, especially the establishment and increase of hydrophytic vegetation. Transect endpoint locations were recorded with the GPS unit in 2002. A photo was taken from both ends of the transect looking along the transect path.

A comprehensive plant species list for the site was compiled and is updated as new species are encountered. Revegetation enhancements were implemented in the spring of 2002. Survival rates for planted species were recorded during the mid-season monitoring visit.

## 2.4 Soils

Soils were evaluated during the mid-season site visit using the 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 Forms (**Appendix B**). The most current terminology used by NRCS was used to describe hydric soils (USDA 1998).

## 2.5 Wetland Delineation

Wetland delineation was conducted during the mid-season visit according to the 1987 COE Wetland Delineation Manual. Wetland and upland areas within the monitoring area were investigated for the presence of wetland hydrology, hydrophytic vegetation and hydric soils. The information was recorded on COE Routine Wetland Delineation Data Forms (**Appendix B**). The wetland/upland boundary was originally delineated on the air photo and recorded with a resource grade GPS unit using the procedures outlined in **Appendix E**. Modifications to these boundaries in 2007 were accomplished by hand-mapping onto the 2007 aerial photograph. The wetland/upland boundary in combination with the wetland/open water boundary was used to calculate the final wetland acreage. Pre-project wetlands are shown on **Figure 4** in **Appendix A**.

## 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 during the mid-season visit. Indirect use indicators, including tracks; scat; burrows; eggshells; skins; bones; etc., were also recorded. These 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 species list for the entire site was compiled. Observations from past years will ultimately be compared with new data.

## 2.7 Birds

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

association. Bird observations were recorded on the **Wetland Mitigation Site Monitoring Form (Appendix B)**.

## **2.8 Macroinvertebrates**

Two macroinvertebrate samples were collected during the mid-season site visit along Camp Creek (**Figure 2** in **Appendix A**). Collection occurred using the Macroinvertebrate Sampling Protocol (**Appendix F**). Samples were preserved as outlined in the sampling procedure and sent to Rhithron Associates, Inc. in Missoula, Montana for analysis (**Appendix F**).

## **2.9 Functional Assessment**

A functional assessment form was completed using the 1999 MDT Montana Wetland Assessment Method (Berglund 1999) (**Appendix B**). Field data necessary for this assessment were collected during the mid-season visit. Turnstone Biological completed a baseline functional assessment in 2001.

## **2.10 Photographs**

The July 14, 2007 aerial photograph was used for **Figures 2** and **3 (Appendix A)**. Photographs were taken illustrating current land uses surrounding the site, the upland buffer, the monitored area and the vegetation transects (**Appendix C**). Each photograph point location was recorded with a resource grade GPS in 2002 and mapped on **Figure 2 (Appendix A)**. All photographs were taken using a digital camera.

## **2.11 GPS Data**

During the 2002 monitoring season, point data were collected with a resource grade GPS unit at the vegetation transect beginning and ending locations and at all photograph locations. Wetland boundaries were also recorded with a resource grade GPS unit in 2002, but were modified via hand mapping onto aerial photographs in 2007. Procedures used for GPS mapping and aerial photograph referencing are included in **Appendix E**.

## **2.12 Maintenance Needs**

Observations were made of existing structures and of erosion/sediment problems to identify maintenance needs. This did not constitute an engineering-level structural inspection, but rather a cursory examination. Current or future potential problems were documented on the Wetland Mitigation Site Monitoring Form (**Appendix B**).

## 3.0 RESULTS

### 3.1 Hydrology

The main source of hydrology for this site is Camp Creek, a perennial stream draining out of the south end of the Bitterroot Range. Seasonal flooding of Camp Creek occurs during spring runoff. Secondary sources of hydrology include runoff from ephemeral drainages east of the site and the persistent movement of groundwater through coarse alluvium materials located throughout the valley bottom. The mitigation site is located within the historic Camp Creek floodplain. The site consists of a constructed main channel, streambanks and floodplain terraces. Depression wetlands are present, supported by seasonal overland flooding of Camp Creek and by groundwater flows. Where it enters Grasser's parcel south of the MDT-owned parcel, the creek once was diverted into a channel running along the edge of Hwy 93. Several ditches designed to drain the wetland meadow complex were filled and closed during construction activities. Removal of drain ditches allows for groundwater systems to recharge and provide possible higher storage functions. Average high water levels were recorded at 222 cfs (Turnstone Biological 2001). Lower water flows are on average 10 cfs.

Precipitation was below "normal" in the general project area from January through August 2007, based on data from the Sula 3 ENE weather station. Precipitation during this period totaled 9.8 inches, which is 86% of the 11.36-inch mean for the January- August period between 1955 and 2007. Stream flow was sub-normal in 2006 and, although 2007 flow data were not available at the time of this writing due to a stream gauge malfunction, flow was also assumed sub-normal in 2007 based on precipitation data (**Chart 1** presents a graphical comparison of 2002-2006 spring/summer mean streamflow data). Additionally, Ravalli County was assigned a "severe drought" status by the Montana Department of Natural Resources and Conservation in August 2007.

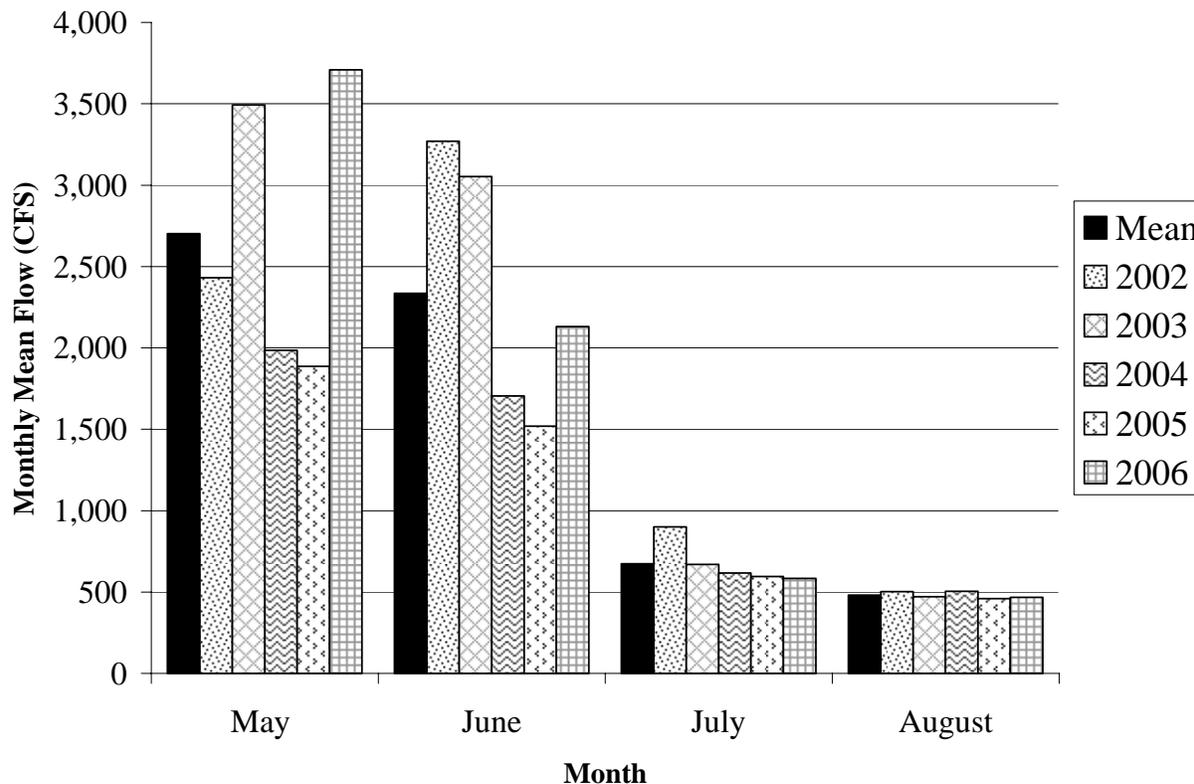
Rock channel bottom occurred across approximately 2.15 acres or 5% of the current 46-acre mitigation site (**Figure 3** in **Appendix A**). Depths of the creek varied, ranging from 0.5 ft in the straight segments to 2 - 3 ft deep around the bends and meanders.

Cross section results are presented in **Figure 5** in **Appendix G**. These cross sections represent, in essence, post-project "baseline" (2002), as well as 2003, 2004, 2005, 2006, and 2007 channel conditions. Cross section results measured during the 2007 monitoring show that some adjustments have taken place.

Cross Section 3-A is located below the Praine Creek confluence. During 2007 runoff, this cross-section changed shape. The right bank was stable, remaining in the same location as in 2006. The channel bottom in the middle showed a slight increase in gravel deposition. Changes were observed along the left bank and channel with additional movement towards the west.

Cross Section 4-A is located above the Praine Creek confluence. This cross section also changed during the 2007 runoff. The left bank remained in a similar location and the channel bottom remained similar in depth as observed in 2006. The right bank continued to cut and moved towards the east. Cross section monitoring will continue to ascertain stability and facilitate development of corrective measures, if necessary.

**Chart 1: Mean monthly flows for May – August from 2002-2006 as compared to the long-term mean monthly flows (1937-2006) on the Bitterroot River near Darby, MT.**



A shallow flood channel was excavated during fall 2005 between the creek and existing swales to enhance the connectivity of these two systems during high water events. This channel functioned during 2007, supplementing/restoring hydrologic connectivity between the creek and the emergent complex.

### 3.2 Vegetation

Eighty-eight plant species were identified at the site (**Table 1**). The majority of these species are herbaceous, found in wetland meadow complexes with minor tree or shrub coverage. Several remnant shrub patches exist along dry oxbows of historic Camp Creek. With the reintroduction of hydrology into the old channels, these shrub patches are now receiving water again and should flourish over time. Several mature black cottonwood (*Populus trichocarpa*) stands are also located amongst shrub patches. Large areas of wet meadows exist within the areas of lower topography. These wet meadows are seasonally inundated and groundwater-fed.

Three wetland types and three upland community types were identified and mapped at the mitigation site (**Figure 3** in **Appendix A**). The three wetland community types include Type 2: *Carex/Phalaris*, Type 3: *Agrostis/Deschampsia* and Type 6: *Populus/Salix*. The three upland community types include Type 1: *Agropyron/Trifolium*, Type 5: *Agropyron/Centaurea* and Type 7: *Phalaris /Centaurea*. Plant species observed within each of these communities are listed on the attached monitoring form (**Appendix B**).

Wetland types 2 & 6 were present before construction of the main channel. Pre-construction wetland delineation mapped the majority of the site as emergent wetlands. Type 2 is a remnant wetland with heavy past alterations due to livestock grazing and historic clearing of riparian vegetation. Type 2 is the wettest community and occurs as emergent wetland in saturated to shallow water conditions. Type 6 consists of several shrubs such as willow (*Salix*), alder (*Alnus*) and birch (*Betula*) along the old dry oxbows and depressions. Higher on the banks, just above the streambed, mature cottonwoods are present along the old terraces.

The remaining wetland type was created during the channel reconstruction, and includes the geotextile fabric wrapped streambanks and floodplain areas. Community Type 4: *Salix/Agropyron*, mapped during the 2002 monitoring, was included within the Type 3: *Agrostis/Deschampsia* community during 2003-2007 monitoring. Community type classification for Type 4 was based on the dominant grass species and willow sprigging used during construction efforts. During the 2003 monitoring the Type 4 grasses had changed from wheatgrass (*Agropyron*) to redbud (*Agrostis alba*) and tufted hairgrass (*Deschampsia cespitosa*). During the 2004-2007 monitoring these wetter type species have continued to increase in cover and now dominate the floodplain areas.

Revegetation efforts were implemented along the streambanks and floodplain margins during 2002 construction. These included planting of 10-cubic gallon shrubs, trees and sprigging of willows. Species planted for riparian enhancement included cottonwood, willows, dogwood (*Cornus stolonifera*) and aspen (*Populus tremuloides*). Survival data includes specific details on each species and were recorded on the **Monitoring Form (Appendix B)**.

Adjacent upland vegetation communities are mainly dominated by rangeland and/or aggressive invasive species. Type 1 consists of several spoil piles created for upland vegetation enhancement. These areas were planted with a mix of 5-cubic gallon plantings and weed matting. Upland plantings included Douglas fir (*Pseudotsuga menziesii*), lodgepole pine (*Pinus contorta*) ponderosa pine (*Pinus ponderosa*), serviceberry (*Amelanchier alnifolia*), shrubby potentilla (*Potentilla fruticosa*), snowberry (*Symphoricarpos albus*) and woods rose (*Rosa woodsii*). Dominant species included pasture grasses and mostly weedy disturbance species such as quackgrass (*Agropyron repens*), pennycress (*Thlaspi arvensis*), dandelion (*Taraxacum officinale*), and tumble mustard (*Sisymbrium altissimum*). During monitoring, plantings did not contribute enough coverage to be considered significant in determining them as dominant in the community type.

Type 5 consists of upland areas historically grazed, dominated with pasture grasses such as quackgrass, meadow foxtail (*Alopecurus pratensis*) and smooth brome (*Bromus inermis*). Type 5 also has a high distribution of spotted knapweed (*Centaurea maculosa*), located in the transition zone between wetland bottoms and open forest slopes.

Noxious weed locations observed during the 2007 field visit were mapped and are illustrated on **Figure 3**. These were individual noxious weed locations or small patches not mapped as a community type. These include the following species: Canada thistle (*Cirsium arvense*), yellow toadflax (*Linaria vulgaris*), and spotted knapweed. Weed species distributions illustrated on **Figure 3** were also captured in the community types which provide

**Table 1: 2002 - 2007 vegetation species list for the Camp Creek Wetland Mitigation Site.**

Scientific Name <sup>1</sup>	Common Name	Region 9 (Northwest) Wetland Indicator
<i>Achillea millefolium</i>	common yarrow	FACU
<i>Agropyron repens</i>	quackgrass	FACU
<i>Agrostis alba</i>	redtop	FAC+
<i>Alnus incana</i>	thin leaved alder	FACW
<i>Alopecurus pratensis</i>	meadow foxtail	FACW
<i>Amelanchier alnifolia</i>	service-berry	FACU
<i>Aster integrifolius</i>	thickstem aster	--
<i>Betula occidentalis</i>	water birch	FACW
<i>Bromus inermis</i>	smooth brome	--
<i>Bromus tectorum</i>	cheatgrass	--
<i>Calamagrostis canadensis</i>	bluejoint reedgrass	FACW+
<i>Carex aquatilis</i>	water sedge	OBL
<i>Carex bebbii</i>	Bebb's sedge	OBL
<i>Carex nebrascensis</i>	Nebraska sedge	OBL
<i>Carex crawfordii</i>	Crawford's sedge	FAC
<i>Carex lanuginose</i>	wooly sedge	OBL
<i>Carex praegracilis</i>	clustered field sedge	FACW
<i>Carex utriculata</i>	beaked sedge	OBL
<i>Centaurea maculosa</i>	spotted knapweed	--
<i>Cercocarpus ledifolius</i>	mountain-mahogany	--
<i>Chenopodium album</i>	white goosefoot	FAC
<i>Chrysanthemum leucanthemum</i>	oxeye daisy	--
<i>Cirsium arvense</i>	Canada thistle	FACU+
<i>Cirsium vulgare</i>	bull thistle	FACU
<i>Cornus stolonifera</i>	red-osier dogwood	FACW
<i>Crataegus douglasii</i>	Douglas hawthorn	FAC
<i>Crepis tectorum</i>	annual hawksbeard	--
<i>Cynoglossum officinale</i>	hound's tongue	FACU
<i>Danthonia spp.</i>	oatgrass	--
<i>Deschampsia cespitosa</i>	tufted hairgrass	FACW
<i>Epilobium ciliatum</i>	hairy willow-herb	FACW+
<i>Epilobium paniculatum</i>	willow-herb	--
<i>Equisetum arvense</i>	field horsetail	FAC
<i>Equisetum laevigatum</i>	smooth scouring-rush	FACW
<i>Festuca pratensis</i>	meadow fescue	FACU+
<i>Geum macrophyllum</i>	big leafed avens	OBL
<i>Glyceria elata</i>	tall mannagrass	FACW+
<i>Glyceria grandis</i>	American mannagrass	OBL
<i>Gnaphalium palustre</i>	cudweed	FAC+
<i>Juncus balticus</i>	Baltic rush	FACW
<i>Juncus bufonius</i>	toad rush	FACW
<i>Juncus confusus</i>	Colorado rush	FAC
<i>Juncus ensifolius</i>	three-stamen rush	FACW
<i>Lactuca serriola</i>	prickly lettuce	FAC-
<i>Lepidium perfoliatum</i>	clasping pepper-grass	FACU+
<i>Linaria vulgaris</i>	butter and eggs	--
<i>Lonicera involucrate</i>	honeysuckle	FAC+
<i>Lupinus wyethii</i>	Wyeth's lupine	NI
<i>Lychnis alba</i>	white campion	--

<sup>1</sup> **Bolded** species indicate those documented in the analysis area for the first time in 2007.

**Table 1 (continued): 2002 - 2007 vegetation species list for the Camp Creek Wetland Mitigation Site.**

Scientific Name <sup>1</sup>	Common Name	Region 9 (Northwest) Wetland Indicator
<i>Matricaria matricarioides</i>	pineapple-weed	FACU
<i>Melilotus officinalis</i>	yellow sweet clover	FACU
<i>Mentha arvensis</i>	field mint	FAC
<i>Mimulus guttatus</i>	monkey-flower	OBL
<i>Phalaris arundinacea</i>	reed canarygrass	FACW
<i>Phleum pretense</i>	timothy	FACU
<i>Pinus ponderosa</i>	ponderosa pine	--
<i>Plantago major</i>	plantain	FACU+
<i>Poa pratensis</i>	Kentucky bluegrass	FACU+
<i>Polygonum amphibium</i>	water smartweed	OBL
<i>Populus tremuloides</i>	quaking aspen	FAC+
<i>Populus trichocarpa</i>	cottonwood	FAC
<i>Potentilla fruticosa</i>	shrubby cinquefoil	FAC-
<i>Potentilla gracilis</i>	northwest cinquefoil	FAC
<i>Pseudotsuga menziesii</i>	Douglas fir	FACU
<i>Ranunculus aquatilis</i> var. <i>hispidulus</i>	white-water buttercup	OBL
<i>Ranunculus repens</i>	buttercup	FACW
<i>Rosa woodsii</i>	woods rose	FACU
<i>Rubus idaeus</i>	wild raspberry	FACU
<i>Rumex crispus</i>	curly dock	FACW
<i>Salix bebbiana</i>	Bebb's willow	FACW
<i>Salix boothii</i>	Booth's willow	OBL
<i>Salix drummondiana</i>	Drummond willow	FACW
<i>Salix exigua</i>	sandbar willow	OBL
<i>Salix geyeriana</i>	Geyer willow	FACW+
<i>Salix lutea</i>	yellow willow	OBL
<i>Scirpus microcarpus</i>	small-fruit bulrush	OBL
<i>Senecio vulgaris</i>	common groundsel	FACU
<i>Sium suave</i>	water parsnip	OBL
<i>Sisymbrium altissimum</i>	tall tumble mustard	FACU-
<i>Smilacina stellata</i>	starry false-solomon's-seal	FAC-
<i>Solidago canadensis</i>	Canada goldenrod	FACU
<i>Symphoricarpos albus</i>	snowberry	FACU
<i>Tanacetum vulgare</i>	common tansy	NI
<i>Taraxacum officinale</i>	common dandelion	FACU
<i>Thlaspi arvensis</i>	pennycress	NI
<i>Trifolium pretense</i>	red clover	FACU
<i>Verbascum thapsus</i>	common mullein	--
<i>Veronica Americana</i>	American speedwell	OBL

<sup>1</sup> **Bolded** species indicate those documented in the analysis area for the first time in 2007.

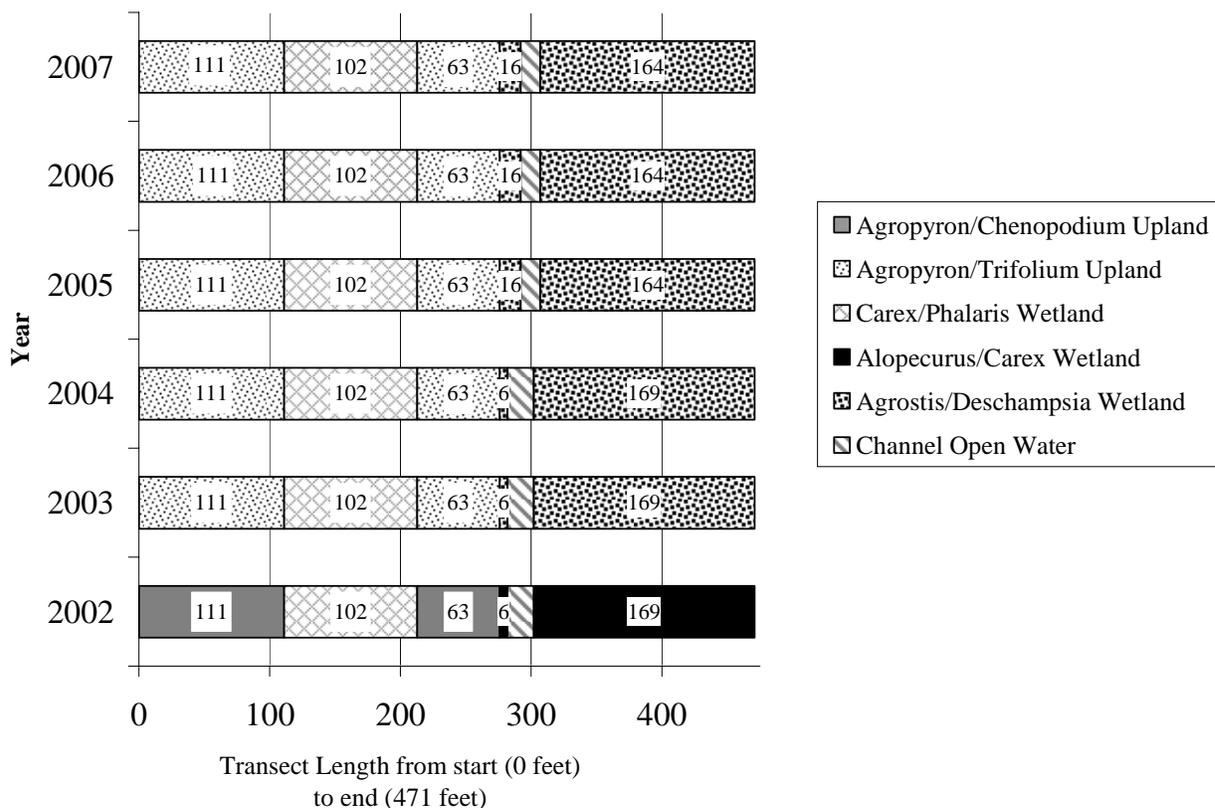
detailed information regarding cover values for each species. Several other noxious weed species were recorded only at the community level and therefore not mapped as an individual plant or patch presented on **Figure 3**. These included oxeye daisy (*Chrysanthemum leucanthemum*) and hound's-tongue (*Cynoglossum officinale*). Other observed weedy or non-native species included bull thistle (*Cirsium vulgare*), common dandelion, lambsquarters (*Chenopodium album*), clasping pepper-grass (*Lepidium perfoliatum*), pennycress, tumbleweed and quackgrass.

Vegetation transect results are detailed in the attached **Monitoring** and **COE Forms (Appendix B)** and are summarized in **Table 2** and **Charts 2** and **3**. The previous year's transect data is included to compare changes between monitoring years.

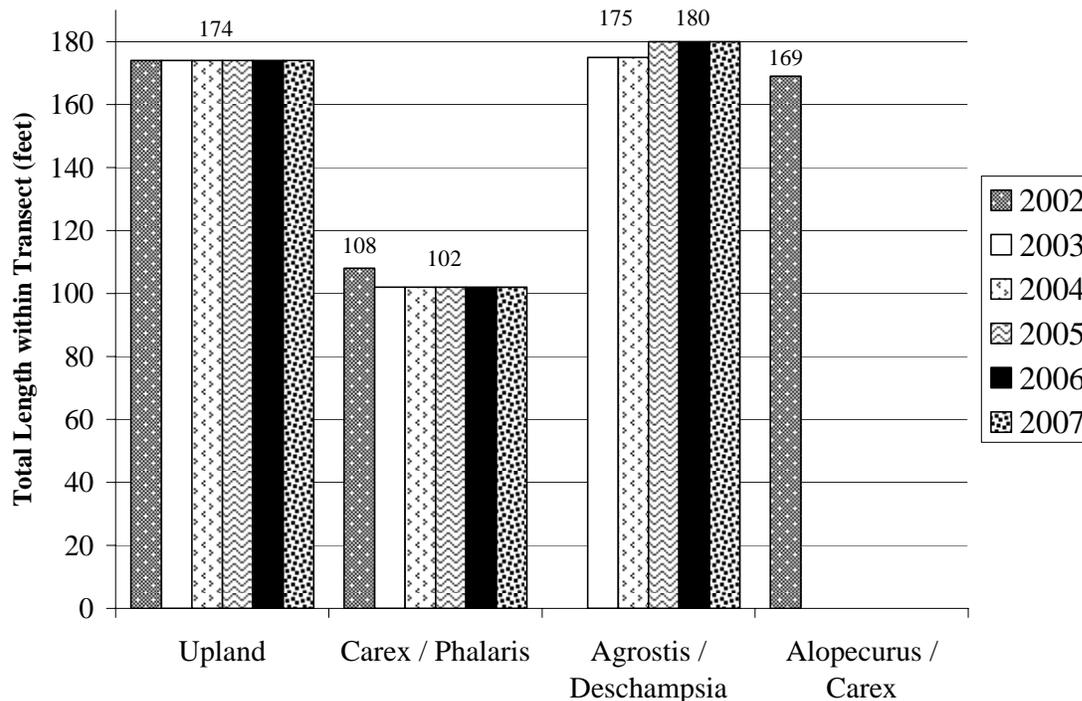
**Table 2: Transect 1 data summary.**

Monitoring Year	2002	2003	2004	2005	2006	2007
Transect Length (feet)	471	471	471	471	471	471
# Vegetation Community Transitions along Transect	4	4	4	4	4	4
# Vegetation Communities along Transect	3	3	3	3	3	3
# Hydrophytic Vegetation Communities along Transect	2	2	2	2	2	2
Total Vegetative Species	28	27	30	31	31	37
Total Hydrophytic Species	15	16	17	17	17	17
Total Upland Species	13	11	13	14	14	20
Estimated % Total Vegetative Cover	85	95	86	84	84	88
% Transect Length Comprised of Hydrophytic Vegetation Communities	59	59	59	60	60	60
% Transect Length Comprised of Upland Vegetation Communities	37	37	37	36	36	36
% Transect Length Comprised of Unvegetated Open Water	4	4	4	4	4	4
% Transect Length Comprised of Bare Substrate	0	0	0	0	0	0

**Chart 2: Transect maps showing vegetation types from the start of transect (0 feet) to the end of transect (471 feet) for each year monitored.**



**Chart 3: Length of vegetation communities within Transect 1 for each year monitored.**



### 3.3 Soils

The soils located at the Camp Creek site are mapped as Gallatin-shallow muck complex, gently sloping (SCS 1951). Soil characteristics at each wetland determination point were compared with those of the Gallatin-shallow muck complex and generally matched this classification. Wetland soils observed during monitoring and documented on the COE Forms were mostly peat, loams, sandy loams, or sands with very low chromas (1 or 2) (**Appendix B**). Mottles or oxidized rhizospheres (redoximorphic features) were not present any of the profiles. Soil profiles in the wetlands meadow mostly consisted of deep A-horizons of peat or loamy materials with a sandy/gravelly layer underneath, saturated at approximately 8 inch depths. Several profiles had large cobbles, gravels and stones below a 6-8 inch A- horizon with matrix colors of 10YR 2/1. Created upland slopes were constructed with fill materials removed from channel excavation. Upland soil pits consisted of a mixture of large cobbles and loamy soil, with matrix colors of 10YR 2/2.

### 3.4 Wetland Delineation

Delineated wetland boundaries are illustrated on **Figure 3** in **Appendix A**. Completed COE Forms are included in **Appendix B**. Soils, vegetation, and hydrology are discussed in preceding sections. Approximately 47.23 wetland acres and 1.5 open water channel acres occurred within the current monitoring area prior to project implementation. Pre-project wetland locations are shown on **Figure 4** in **Appendix A**. Monitoring in 2007 identified the delineation results provided in **Table 3**, which were identical to 2006 results.

**Table 3: Wetland conditions within Camp Creek Wetland Mitigation Site.**

Condition	2007 MDT Property (acre)	2007 Grasser Property (acre)	2006 MDT Property (acre)	2006 Grasser Property (acre)	2005 MDT Property (acre)	2005 Grasser Property (acre)	2000 Baseline MDT Property (acre)	2000 Baseline Grasser Property (acre)
Wetland Area	34.84	6.93	34.84	6.93	35.13	6.93	42.61	4.62
Open Water Area	0.95	1.20	0.95	1.20	0.95	1.20	0.75	0.75
Subtotal	35.79	8.13	35.79	8.13	36.08	8.13	43.36	5.37
<b>Total Aquatic Habitat</b>	<b>43.92</b>		<b>43.92</b>		<b>44.21</b>		<b>48.73</b>	

Overall, the project has gained 0.65 stream acre and “lost” an estimated 5.46 wetland acres in comparison to baseline conditions. Cumulatively, approximately 41.77 wetland acres and 2.15 open water acres now occur within the monitoring area (**Figure 3 in Appendix A**), for a total of 43.92 acres of aquatic habitat. Prior to construction, the site contained approximately 47.23 acres of wetlands and 1.5 open water channel acres within the current monitoring limits. Open water channels were located in the extreme south end of the Grasser property and the in the northwest corner of the MDT property. The overall cumulative change in aquatic habitat at the site since construction has been approximately  $43.92 - 48.73 = (-4.81)$  acres.

During the initial 2002 monitoring, an immediate net decrease in wetland acres was observed at this mitigation site. This could have been attributable to the dry year, changes in irrigation practices, construction-related disturbance (haul routes, drive-through areas, staging areas, etc.), slight differences in pre- and post-construction delineation approaches, or a combination of all factors.

Final plan designs were based on a preliminary 2000 wetland delineation. The preliminary 2000 baseline wetland delineation was smaller in acres than the baseline delineation ultimately agreed upon (post-construction) by the Corps. Consequently, some areas ultimately depicted as wetlands in the final delineation were heavily disturbed during construction efforts and were also designated as areas to deposit fill materials. Additionally, some upland areas were not created as specified in the construction plans, but were larger or in different locations. Several areas mapped during the pre-project delineation as uplands became spoil piles two to three times larger than the original size of the mapped upland.

Historic irrigation practices, although unquantified, provided substantial wetland hydrology to the current MDT property. The diversion from Camp Creek onto the property was virtually uncontrolled, and water flood irrigated the site whenever the water was high enough to do so; particularly in the spring/early summer. Similarly, substantial flood irrigation was conducted on the Grasser property prior to mitigation implementation; however, most of this irrigation has now ceased due to landowner management priorities, etc. These changes in onsite and adjacent irrigation practices have had a substantive and unplanned impact on site hydrology.

Construction of a shallow flood channel during fall 2005 between the creek and existing swales appears to have assisted in stabilizing the hydrologic regime in these areas, as wetland acreage has remained consistent in 2006 and 2007.

Wetland crediting is discussed in Section 3.11.

### 3.5 Wildlife

Wildlife species or evidence of wildlife, observed on the site during 2002, 2003, 2004, 2005, 2006 and 2007 monitoring efforts are listed in **Table 4**. Specific evidence observed, as well as activity codes pertaining to birds, is provided on the completed **Monitoring Form** in **Appendix B**.

This site provides habitat for a variety of wildlife species, although this was not necessarily reflected in the 2007 monitoring data. One mammal, three fish and five bird species were noted at the mitigation site during the 2007 site visits.

The constructed channel offers habitat for several fish species, including westslope cutthroat, hybrid cutthroat x rainbow trout, brook trout and brown trout. Pre-project and post-project surveys along Camp Creek on the MDT parcel were conducted by Montana Fish Wildlife and Parks during 1999, 2003, 2004, 2005, 2006 and 2007 (**Chart 4**). The 2007 survey documented 297 westslope cutthroat X rainbow trout ranging in size from 3 to 9+ inches (MFWP 2007).

### 3.6 Macroinvertebrates

Complete results from the macroinvertebrate sampling locations are presented in **Appendix F**. Sampling points were located along one area of the creek (**Figure 2** in **Appendix A**). Macroinvertebrate sampling results were summarized by Rhithron Associates, Inc. in the italicized section below and illustrated in **Chart 5** (Bollman 2007):

*The sampled sites at Camp Creek supported rheophilic taxa characteristic of rapid flow conditions and cool-to-cold water temperatures. Scores indicated in the chart were derived by means of a metric battery and scoring criteria developed for montane regions of Montana (MVFP index: Bollman 1998)*

**Site 1.** *MVFP index scores rebounded in 2007 from the low score of 2006. At least 6 mayfly taxa were supported at the site, and the biotic index value was only slightly elevated compared to expectations. Water quality was probably good here. Moderate diversity of instream habitats is suggested by the richness of this invertebrate fauna. Fine sediment deposition may have slightly influenced the availability of cobble habitats. Thermal preference of the invertebrate fauna was calculated at 16.4°C. Slight impairment is indicated.*

**Site 2.** *MVFP index scores also rebounded at this site. The mayfly fauna and biotic index value suggest good water quality. Instream habitats were probably diverse and intact, since taxa richness was high. Sediment deposition appears to have had minimal influence on colonization of stony substrates. Thermal preference of the fauna at this site was calculated to be 15.4°C. Slight impairment is indicated.*

**Table 4: Fish and wildlife species observed at the Camp Creek Mitigation Site during 2002 to 2007.**

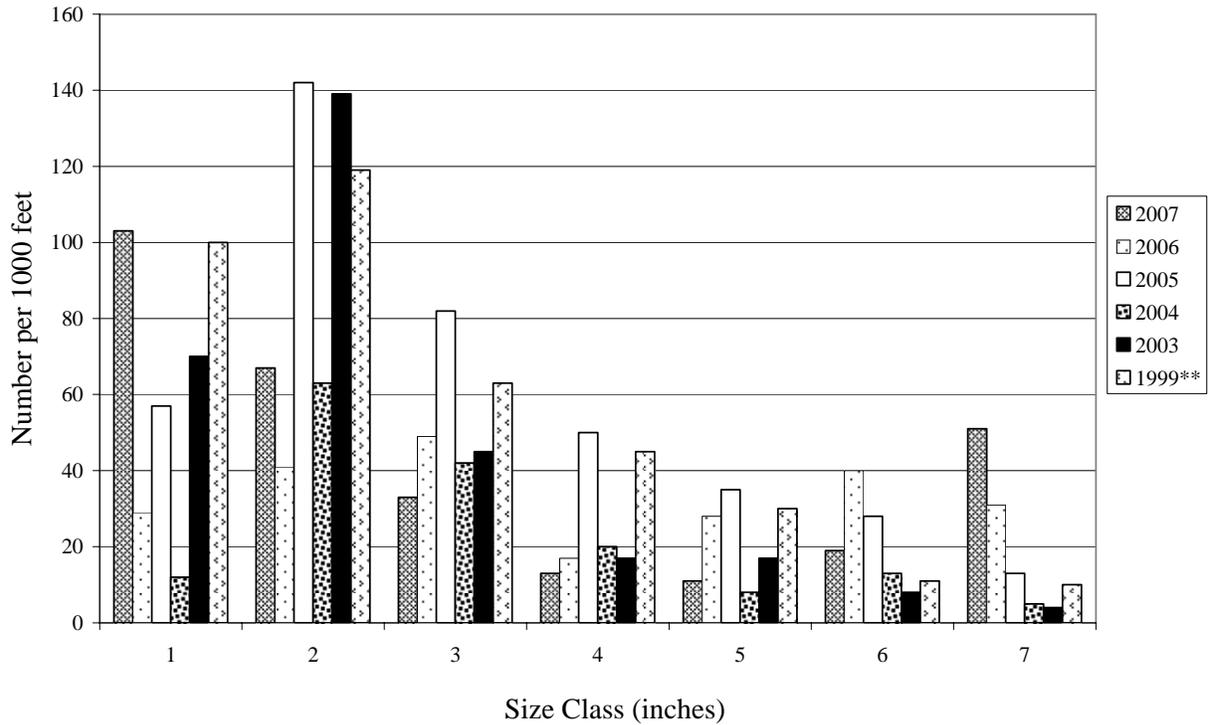
<b>FISH</b>	
<b>Brook Trout (<i>Salvelinus fontinalis</i>)<sup>1</sup></b> Westslope Cutthroat Trout ( <i>Oncorhynchus clarki lewisi</i> ) <sup>1</sup>	<b>Cutthroat X Rainbow Trout</b> ( <i>Oncorhynchus clarkii X mykiss</i> ) <sup>1</sup> Brown Trout ( <i>Salmo trutta</i> ) <sup>1</sup>
<b>AMPHIBIAN</b>	
Spotted Frog ( <i>Rana iuteiventris</i> )	
<b>REPTILE</b>	
None	
<b>BIRD</b>	
American Crow ( <i>Corvus brachyrhynchos</i> ) American Dipper ( <i>Cinclus mexicanus</i> ) <b>American Goldfinch (<i>Carduelis tristis</i>)</b> American Kestrel ( <i>Falco sparverius</i> ) <sup>2</sup> American Robin ( <i>Turdus migratorius</i> ) Bald Eagle ( <i>Haliaeetus leucocephalus</i> ) <sup>2</sup> Black-billed Magpie ( <i>Pica pica</i> ) Blue Grouse ( <i>Dendragapus obscurus</i> ) <sup>2</sup> Brewer's Blackbird ( <i>Euphagus cyanocephalus</i> ) <b>Brown-headed Cowbird (<i>Molothrus ater</i>)</b> Canada Goose ( <i>Branta canadensis</i> ) Cedar Waxwing ( <i>Bombycilla cedrorum</i> )	Common Merganser ( <i>Mergus merganser</i> ) <sup>2</sup> Common Raven ( <i>Corvus corax</i> ) Common Snipe ( <i>Gallinago gallinago</i> ) <sup>2</sup> European Starling ( <i>Sturnus vulgaris</i> ) Grasshopper Sparrow ( <i>Ammodramus savannarum</i> ) <b>Killdeer (<i>Charadrius vociferus</i>)</b> Mallard ( <i>Anas platyrhynchos</i> ) Mountain Bluebird ( <i>Sialia currucoides</i> ) <sup>2</sup> Northern Harrier ( <i>Circus cyaneus</i> ) <sup>2</sup> <b>Red-tail Hawk (<i>Buteo jamaicensis</i>)</b> Spotted Sandpiper ( <i>Actitis macularia</i> ) <sup>2</sup>
<b>MAMMAL</b>	
Bobcat ( <i>Felis rufus</i> ) Coyote ( <i>Canis latrans</i> ) Deer Mouse ( <i>Peromyscus maniculatus</i> ) <sup>2</sup> Elk ( <i>Cervus elaphus</i> ) Meadow Vole ( <i>Microtus pennsylvanicus</i> ) <sup>2</sup>	Moose ( <i>Alces alces</i> ) Mule Deer ( <i>Odocoileus hemionus</i> ) <sup>2</sup> Red Fox ( <i>Vulpes vulpes</i> ) <sup>2</sup> Richardson's Ground Squirrel ( <i>Spermophilus richardsonii</i> ) <sup>2</sup> White-tailed Deer ( <i>Odocoileus virginianus</i> )

<sup>1</sup> Survey conducted by Montana Fish, Wildlife & Parks.

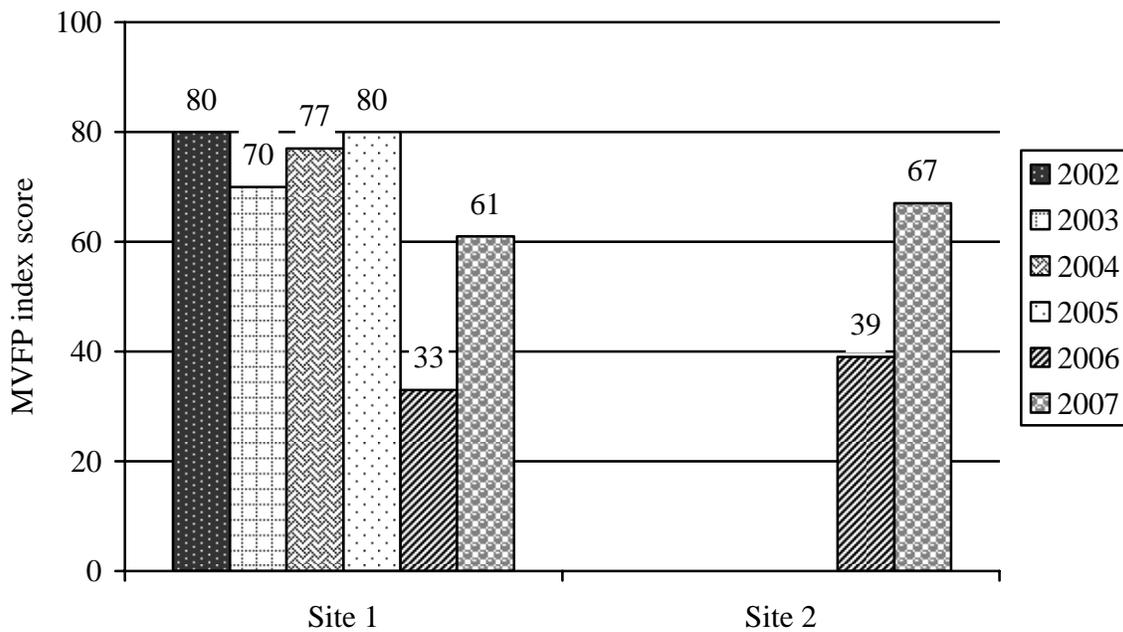
<sup>2</sup> Observed by MDT

**Bolded species** were observed during 2007 monitoring. All other species were observed during one or more of the previous monitoring years, but not during 2007.

**Chart 4: Westslope cutthroat trout X Rainbow trout survey for Camp Creek (MFWP 2007).**



**Chart 5: Bioassessment scores for Camp Creek Wetland Mitigation Site.**



### 3.7 Functional Assessment

The 2007 Functional Assessment Forms are included in **Appendix B**. Per Corps of Engineers direction (Steinle pers. comm.), separate functional assessments were completed for the Grasser and MDT parcels. The MDT parcel was assessed in its entirety as one contiguous AA due to the construction of the flood channel between the creek and the emergent complex, restoring hydrologic connectivity between these two areas. Results are presented in **Table 5**.

The AA on the MDT parcel rated as Category I (high value) in 2007 based on point totals. This overall rating was primarily due to high ratings for Montana Natural Heritage Program (MTNHP) species habitat, general fish / aquatic species, surface water storage, sediment / nutrient / toxicant removal, sediment / shoreline stabilization, production export / food chain support, groundwater discharge/recharge, and recreation/education ratings (public ownership with excellent access). Remaining parameters generally rated as moderate.

In 2006, Montana Fish, Wildlife & Parks (MFWP) decided to classify westslope cutthroat trout captured during surveys as westslope cutthroat / rainbow trout hybrids because they could not be told apart in the field (Clancy 2006). These were the same species that had been captured during 2003-2005 surveys. As such, a “suspected primary habitat”, rather than a “documented primary habitat” MTNHP species habitat ranking for westslope cutthroat trout was conservatively assigned.

In 2007, functional scores increased slightly for general fish/aquatic species due to the increased shading along the streambank from the developing shrub communities. Over time, the willow sprigs and plantings have continued to develop into larger, more robust shrubs that offer additional shade from overhanging branches. Enhancement of both wetland and upland vegetation should increase wildlife use throughout the site.

The AA on the Grasser parcel is subject to a higher degree of disturbance (it is not within a conservation easement), and rated as a Category II (moderate value) during 2007. This AA received high ratings for general fish/aquatic species, MNHP species habitat (again due to west-slope cutthroat trout), sediment / shoreline stabilization, production export / food chain support, and groundwater discharge/recharge. All other parameters rated low to moderate. In 2007, the functional score increased slightly for general fish/aquatic species and sediment/shoreline stabilization due to the increase in shading and species with deep binding roots along the streambank over previous years. The willows and woody plantings along the creek within the Grasser parcel continue to develop in size, which increased the shading and rooting along the streambank.

Pre-project (2001) and post-project (2007) wetland assessment scores are presented in **Table 5**. Turnstone Biological conducted the initial functional assessments for the Camp Creek Mitigation Site, and separated the site into three assessment areas: emergent (Type I), scrub-shrub emergent (Type II), and rock bottom with narrow mixed wetland fringe (Type III) wetland classifications.

Overall, ratings have increased substantially on the MDT parcel for MTNHP species habitat (west-slope cutthroat trout), general wildlife habitat, general fish habitat, surface water storage,

**Table 5: Summary of 2001 (baseline) and 2007 wetland function/value ratings and functional points <sup>1</sup> at Camp Creek Wetland Mitigation Site.**

Function and Value Parameters From the 1999 MDT Montana Wetland Assessment Method	2001 Type I, MDT Property	2001 Type III, MDT Property	2001 Type I, Grasser Property	2001 Type II, Grasser Property	2001 Type III, Grasser Property	2007 Grasser Property	2007 MDT Property
Listed/Proposed T&E Species Habitat	Mod (0.8)	Mod (0.8)	Mod (0.8)	Mod (0.8)	Mod (0.8)	Mod (0.8)	Mod (0.8)
MTNHP Species Habitat	Low (0.1)	Low (0.1)	Low (0.1)	Low (0.1)	Low (0.1)	High (0.8)	High (0.8)
General Wildlife Habitat	Low (0.3)	Mod (0.5)	Low (0.3)	Mod (0.5)	Mod (0.5)	Mod (0.7)	Mod (0.7)
General Fish/Aquatic Habitat	Low (0.1)	Mod (0.5)	Low (0.1)	Low (0.1)	Mod (0.5)	High (0.9)	High (0.9)
Flood Attenuation	Mod (0.6)	Mod (0.4)	Mod (0.6)	Mod (0.5)	Mod (0.4)	Mod (0.4)	Mod (0.6)
Short and Long Term Surface Water Storage	Low (0.3)	High (0.8)	Low (0.3)	Low (0.3)	High (0.8)	Mod (0.6)	High (1.0)
Sediment, Nutrient, Toxicant Removal	Mod (0.7)	Mod (0.6)	Mod (0.7)	Mod (0.7)	Mod (0.6)	Mod (0.6)	High (0.9)
Sediment/Shoreline Stabilization	Low (0.2)	Low (0.3)	Low (0.2)	Mod (0.6)	Low (0.3)	High (1.0)	High (1.0)
Production Export/Food Chain Support	Mod (0.7)	High (0.9)	Mod (0.7)	Mod (0.7)	High (0.9)	High (0.9)	High (0.9)
Groundwater Discharge/Recharge	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)
Uniqueness	Low (0.1)	Low (0.2)	Low (0.1)	Low (0.3)	Low (0.2)	Low (0.2)	Mod (0.4)
Recreation/Education Potential	Low (0.2)	Low (0.1)	Low (0.2)	Low (0.3)	Low (0.1)	Low (0.3)	High (1.0)
Actual Points/Possible Points	5.1 / 12	6.2 / 12	5.1 / 12	5.9 / 12	6.2 / 12	8.20 / 12	10.0 / 12
% of Possible Score Achieved	42%	52%	42%	49%	52%	68%	83%
Overall Category	III	III	III	III	III	II	I
<b>Total Acreage of Assessed Wetlands and Open Water within Easement</b>	<b>42.3</b>	<b>1.06<sup>2</sup></b>	<b>3.51<sup>2</sup></b>	<b>0.50<sup>2</sup></b>	<b>1.36<sup>2</sup></b>	<b>8.13</b>	<b>35.79</b>
<b>Functional Units (fu) (acreage x actual points)</b>	<b>215.73</b>	<b>6.57</b>	<b>17.90</b>	<b>2.95</b>	<b>8.43</b>	<b>66.66</b>	<b>357.90</b>
<b>Functional Unit Gain to Date by Ownership (fu)</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>37.38<sup>3</sup></b>	<b>135.60<sup>3</sup></b>
<b>Total Functional Unit Gain to Date (fu)</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>172.98</b>	

<sup>1</sup> see completed functional assessment forms in **Appendix B** for further detail.

<sup>2</sup> Baseline acreages adjusted per subsequent study; see Section 2.5.

<sup>3</sup> Baseline Functional Units used to determine the 2007 Functional Unit Gain included the combined totals for the 2001 MDT (222.30 fu) and Grasser (29.28 fu) properties.

sediment/shoreline stabilization, production export/food chain support, uniqueness, and recreation/education potential. Ratings have increased in the Grasser parcel for MTNHP species habitat (west-slope cutthroat trout), general fish habitat, surface water storage, and sediment/shoreline stabilization

Approximately 172.98 functional units (score x wetland acreage) have been gained thus far at the Camp Creek mitigation site, despite the decrease in wetland acres between pre-project and post-project assessments on the MDT parcel. Approximately 135.60 functional units have been gained at the MDT parcel, and 37.38 have been gained on the Grasser parcel. Refer to Table 5 for details.

### 3.8 Photographs

Representative photographs taken in 2007 from established photo-points and transect ends are provided in **Appendix C**.

### 3.9 Revegetation

Upon completion of the new channel and floodplain construction, revegetation efforts were conducted in 2002 to enhance riparian and upland habitat. The streambanks were seeded with a grass mix designed by an MDT botanist and 20,480 willow cuttings were sprigged through the fabric work. Floodplain areas were planted with a mixture of native shrubs & trees associated with local riparian corridors. These included aspen, alder, black cottonwood, dogwood and willows. Upland slopes were planted with Douglas fir, lodgepole pine, ponderosa pine, serviceberry, shrubby potentilla, snowberry, and woods rose.

Species survival data is presented in **Appendix B**. The belt transect used for vegetation monitoring was also used as the survival transect. A second survival transect was added to the south of the vegetation transect across the created and planted upland berms. A third survival transect was added in 2003 to assess the channel and floodplain vegetation enhancements.

Survival rates within the upland areas were similar to those observed during 2004 to 2006 monitoring. In 2003, a majority of the survival rates ranged from 70% to 100%. Survival data recorded in 2004-2007 showed most upland species had a survival rate below 50%. These included such species as woods rose, ponderosa pine, snowberry, shrubby potentilla and red-osier dogwood. Almost all the Douglas-fir observed had died after initial planting.

In 2007, the wetter species planted along the streambank and floodplain margins had a survival rate ranging from 60% to 90%. These included alder, aspen, cottonwood and willows. The willow sprigs are spreading out along the banks, continuing to increase in size and density each growing season. Several other wetter planted shrubs had increased in overall stature and exhibited vigorous growth.

These survival rates are based on a low number of total observations along the transects and might misrepresent the true survival rate. The current survival rates are based on the “original”

occurrences recorded in the transects during 2002 monitoring, following 2002 planting. The 2002 planting specifications are presented in **Appendix G**.

### **3.10 Maintenance Needs/Recommendations**

The excavated channel between the creek and the large emergent complex on the MDT parcel was examined during 2007 monitoring, and is functioning according to design.

Several Category 1 noxious weeds are present on both MDT and Grasser parcels including Canada thistle, hound's-tongue, oxeye daisy, spotted knapweed and yellow toadflax. Weed control and re-vegetation of disturbed sites is needed to prevent further weed spread, reduce the risk of new weeds invading, reduce wind and water erosion and reduce sediment input to surface waters. Survival of plantings will continue to be monitored, and supplemental planting may need to be implemented if success of current plantings is low.

The MDT parcel has the least amount of invasive species and distribution is primarily limited to upland areas not affected during construction efforts. Control measures for these areas were implemented and observed during the 2007 monitoring. Even though the uplands areas were sprayed, some knapweed still persists. Additional spraying is recommended for areas missed during the initial control activities. Noxious weeds were mapped in more detail during the 2007 monitoring and locations illustrated on **Figure 3**. Areas that were small patches weeds and/or that didn't require classification as a community type were illustrated on the figure. Several community types are still present that are dominated by weed species. These areas were mostly on Grasser's parcel and were not individually mapped as completed in the MDT parcels for this site.

Individual mapping includes larger patches of knapweed and also additional patches of smaller noxious weeds including thistle and yellow toadflax. These smaller areas were located in either the wet meadow or adjacent to the floodplain beyond the areas sprayed during the 2007 and will likely require hand spraying. Planted upland areas within the MDT parcel which were observed to have a low survival rates should be replanted with appropriate native plant stock, and irrigated.

The Grasser parcel supports the majority of the noxious weed species with extensive distribution along the floodplain corridor. A weed management plan for this site should be developed and implemented to control the spread of noxious weeds. Areas of invading spotted knapweed, Canada thistle and yellow toadflax located along floodplain margins should be controlled and reseeded or planted with appropriate wetland species to help control further spread of invasive species. No weed control activity was observed on the Grasser parcel.

### **3.11 Current Credit Summary**

Approximately 172.98 functional units (score x wetland acreage) have been gained thus far at the Camp Creek mitigation site. Approximately 135.60 functional units have been gained at the MDT parcel, and 37.38 have been gained on the Grasser parcel.

The credit allocation method for this site was worked out between MDT and COE in early 2006, and is functional unit-based, whereby wetland acreage for each AA is multiplied by the total score for that AA to arrive at an overall functional unit score. This is done both pre-project and post-project. The difference between these two numbers (the functional unit “gain”) is then divided by the post-project score to arrive at an approximate credit acreage for that AA. Credit acreages from each AA are summed to arrive at a total for the site. This approach is illustrated below in **Table 6**. Using this approach, a current maximum of approximately 18.11 credit acres is assignable to the Camp Creek site as of 2007.

**Table 6: 2007 functional unit-based credit for the Camp Creek Wetland Mitigation Project.**

Property	2007 Wetland & Channel Acreage	2007 Score	2007 Functional Units	Baseline Functional Units	Functional Unit “Gain”	“Gain” Divided by Current Score (potential credit acres)
MDT	35.79	10	357.90	222.30	135.60	13.56
Grasser	8.13	8.2	66.66	29.28	37.38	4.55
<b>Total</b>	<b>43.92</b>	<b>--</b>	<b>424.56</b>	<b>251.58</b>	<b>172.98</b>	<b>18.11</b>

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## **Appendix A**

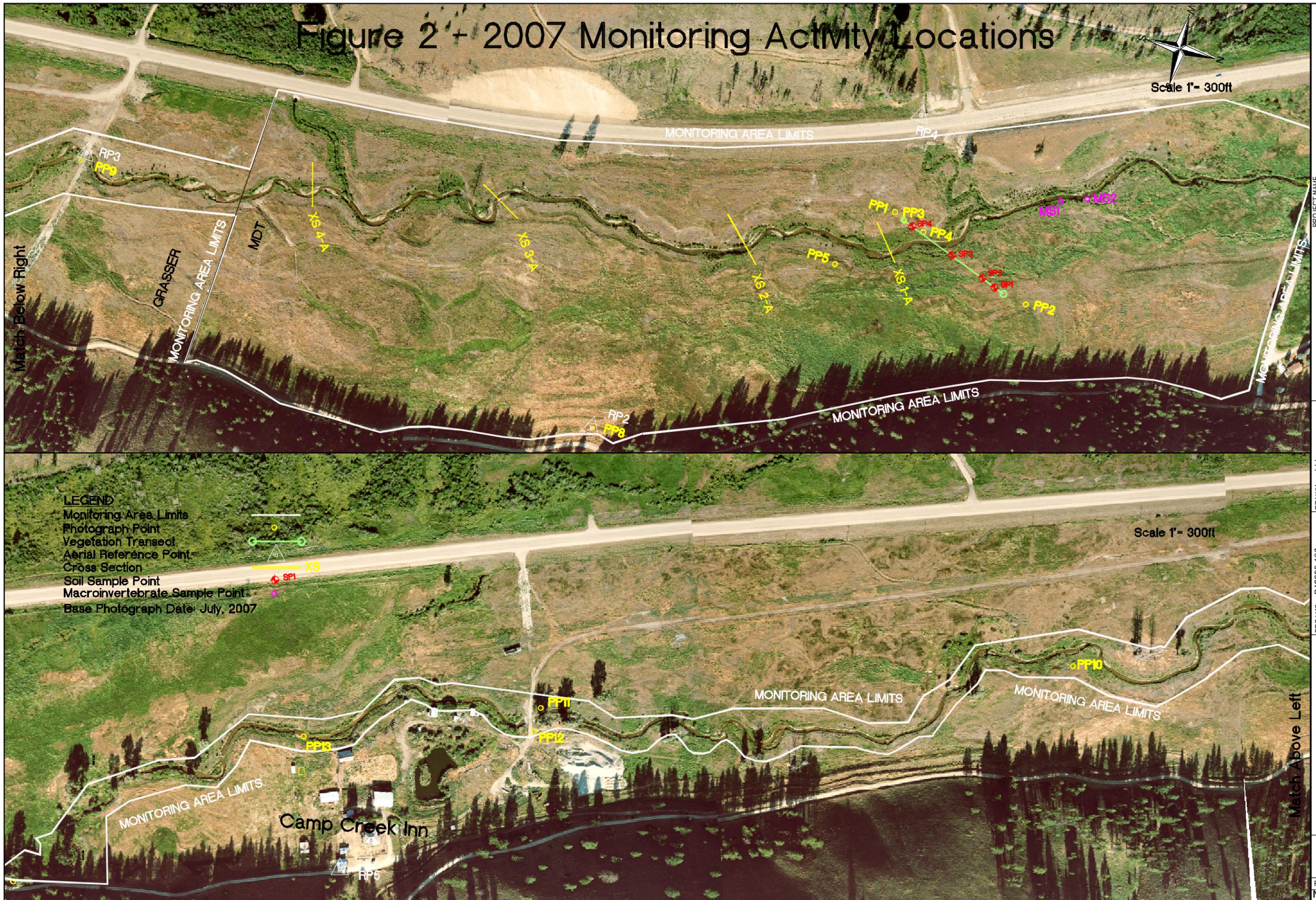
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### **FIGURES 2, 3, & 4**

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*MDT Wetland Mitigation Monitoring  
Camp Creek  
Sula, Montana*

# Figure 2 + 2007 Monitoring Activity Locations



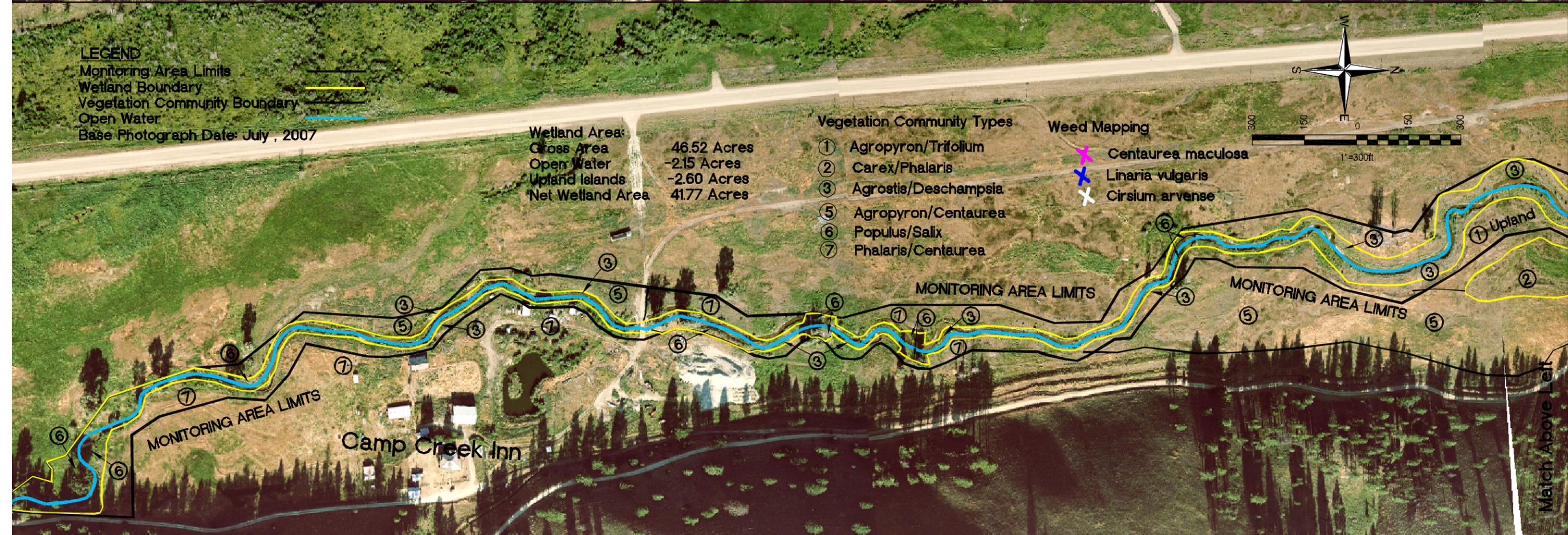
Scale 1" = 300ft

Scale 1" = 300ft

**LEGEND**  
 Monitoring Area Limits  
 Photograph Point  
 Vegetation Transect  
 Aerial Reference Point  
 Cross Section  
 Soil Sample Point  
 Macroinvertebrate Sample Point  
 Base Photograph Date: July, 2007

PROJECT NAME	MDT Camp Creek Wetland Mitigation
DRAWING TITLE	2007 Monitoring Activity Locations
DRAWN: LLL	PROJ MGR: J. Berglund
PROJ NO: B43088.106	CHECKED: G.H. APPVD: J.B.
LOCATION: Sula, MT	FILE NAME: L:\330054.106\Camp Creek\dwg\Task106_2007.dwg
SCALE: 1"=300'	
1120 Cedar	
Missoula, MT 59802	
<b>PBSJ</b>	
FIGURE	2 OF 3
REV -	Nov/13/2007

# Figure 3 - 2007 Mapped Site Features



PROJECT NAME: MDT Camp Creek Wetland Mitigation  
 DRAWING TITLE: 2007 Mapped Site Features

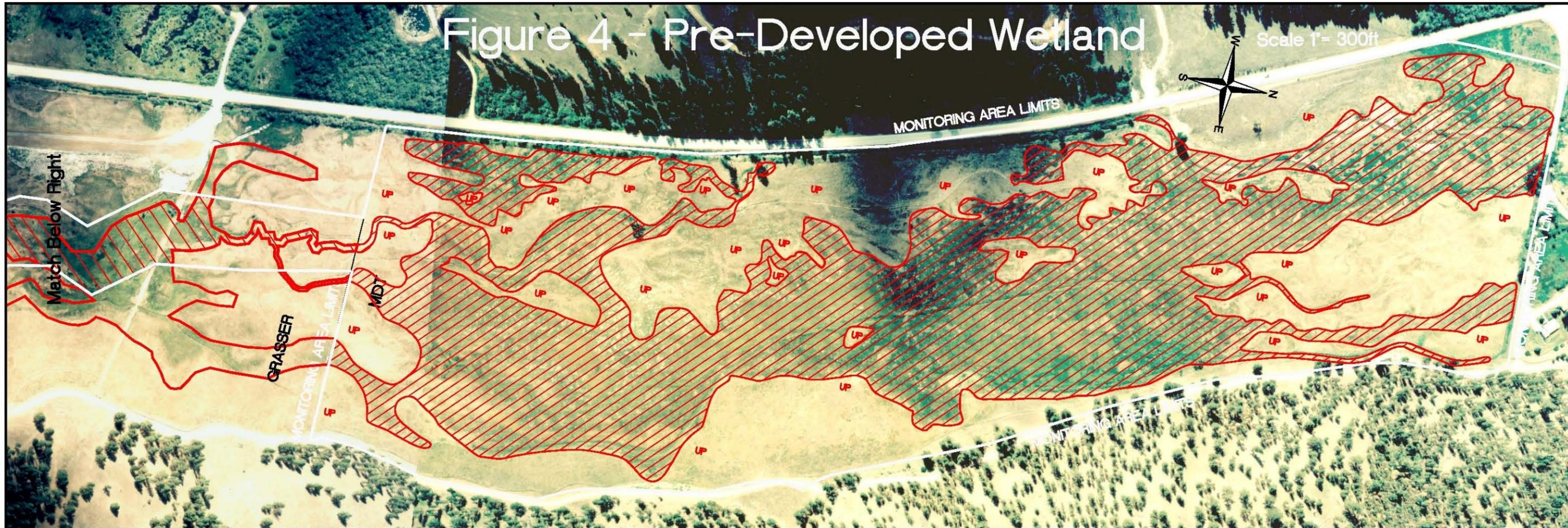
PROJ NO: B43054.106  
 LOCATION: Sula, MT  
 SCALE: 1"=300'  
 FILE NAME: L:\330054.106\Camp Creek\dwg\Task106\_2007.dwg

DRAWN: LLL/RAA  
 PROJ MGR: J. Berglund  
 CHECKED: G.H/APPVD: J.B.

1120 Cedar  
 Missoula, MT 59802



# Figure 4 - Pre-Developed Wetland



PROJECT NAME	MDT Camp Creek Wetland Mitigation		
DRAWING TITLE	Pre-Developed Wetland		
PROJ NO:	B43054.00 0106	DRAWN:	R.A.
FILE NAME:	TASK106BASE	CHECKED:	J.B.
SCALE:	1"=300ft	APPVD:	J.B.
LOCATION:	Sulzb, Mt.	PROJ MGR:	J.B.
LAND & WATER CONSULTING, INC.		P.O. BOX 8254	
Missoula, MT 59807			
FIGURE	F4		
REV			
DATE:	6-13-05		

## **Appendix B**

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**2007 WETLAND MITIGATION SITE MONITORING FORM**

**2007 BIRD SURVEY FORM**

**2007 COE WETLAND DELINEATION FORMS**

**2007 FUNCTIONAL ASSESSMENT FORM**

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*MDT Wetland Mitigation Monitoring*

*Camp Creek*

*Sula, Montana*

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

Project Name: Camp Creek Project Number: B43088.00 - 0104 Assessment Date: 08/10/07  
 Location: Sula Valley MDT District: Lower Clark Fork Milepost: \_\_\_\_\_  
 Legal description: T 1 N R 19 W Section 27 & 34 Time of Day: Morning to early afternoon  
 Weather Conditions: Smoky & high 80's Person(s) conducting the assessment: Greg Howard  
 Initial Evaluation Date: 09/05/02 Visit #: 6 Monitoring Year: 2007  
 Size of evaluation area: 200 acres Land use surrounding wetland: Residential, agriculture (livestock grazing & pasture), & national forest.

**HYDROLOGY**

**Surface Water** Source: Camp Creek

Inundation: Present \_\_\_\_\_ Absent X Average depths: - ft Range of depths: \_\_\_\_\_ - \_\_\_\_\_ ft

Assessment area under inundation: \_\_\_\_\_ %

Depth at emergent vegetation-open water boundary: \_\_\_\_\_ ft

If assessment area is not inundated are the soils saturated w/in 12" of surface: Yes X No

Other evidence of hydrology on site (drift lines, erosion, stained vegetation etc.): Hydrology on this site comes from Camp Creek. Areas of surface inundation observed within lower topography and undisturbed wetland meadows.

**Groundwater**

Monitoring wells: Present \_\_\_\_\_ Absent: X

Record depth of water below ground surface

Well #	Depth	Well #	Depth	Well #	Depth

**Additional Activities Checklist:**

X Map emergent vegetation-open water boundary on air photo

X Observe extent of surface water during each site visit and look for evidence of past surface water elevations (drift lines, erosion, vegetation staining etc.)

\_\_\_\_\_ GPS survey groundwater monitoring wells locations if present

**COMMENTS/PROBLEMS:** Vegetation cover along floodplain and creek margin dominated by wetland species. The planted shrubs and trees showing new growth for 2007 season. Vegetation community types remained similar to 2006 monitoring. Weed control observed throughout MDT parcel. Weed control application sporadic with many live and flowering spotted knapweed still observed. Grasser parcel remained similar to 2006 with heavy coverage of spotted knapweed and other undesirable species within floodplain margins.

## VEGETATION COMMUNITIES

Community No.: 1 Community Title (main species): Agropyron / Trifolium (Created upland)

Dominant Species	% Cover	Dominant Species	% Cover
<i>Agropyron repens</i>	50	Planted Species	10
<i>Thlaspi arvensis</i>	P	<i>Trifolium pratense</i>	P
<i>Sisymbrium altissimum</i>	10	<i>Centaurea maculosa</i>	30
<i>Lychnis alba</i>	P	<i>Alopecurus pratensis</i>	P
<i>Agrostis alba</i>	P		

**COMMENTS/PROBLEMS:** Created uplands, planted with several drier species: *Pinus ponderosa*, *Pseudotsuga menziesii*, *Symphoricarpos albus*, *Rosa woodsii*, *Potentilla fruticosa*, and *Amelanchier alnifolia*. Community No. 1 with similar condition as found in 2006 monitoring.

Community No.: 2 Community Title (main species): Carex / Phalaris (Undisturbed wetland)

Dominant Species	% Cover	Dominant Species	% Cover
<i>Carex aquatilis</i>	P	<i>Alopecurus pratensis</i>	P
<i>Phalaris arundinacea</i>	20	<i>Phleum pratense</i>	P
<i>Carex utriculata</i>	20	<i>Agrostis alba</i>	P
<i>Carex nebrascensis</i>	30	<i>Sisymbrium altissimum</i>	10
<i>Geum macrophyllum</i>	20	<i>Cirsium arvense</i>	P
<i>Linaria vulgaris</i>	T		

**COMMENTS/PROBLEMS:** Open wetland meadow with extensive sedges, intermixed with a few drier grass species and pockets of undesirable species including yellow toadflax and Canadian thistle.

Community No.: 3 Community Title (main species): Agrostis / Deschampsia (Floodplain / Streambank)

Dominant Species	% Cover	Dominant Species	% Cover
<i>Alopecurus pratensis</i>	P	<i>Carex nebrascensis</i>	P
<i>Populus trichocarpa</i> - Planted	10	<i>Phalaris arundinacea</i>	10
<i>Populus tremuloides</i> - Planted	10	<i>Phleum pratense</i>	T
<i>Mimulus guttatus</i>	T	<i>Salix</i> – sprigged	20
<i>Agrostis alba</i>	30	<i>Alnus incana</i>	10
<i>Deschampsia cespitosa</i>	20	<i>Carex crawfordii</i>	10
<i>Glyceria grandis</i>	10	<i>Carex stipata</i>	P

**COMMENTS/PROBLEMS:** Vegetation communities along streambank and floodplain had similar conditions as observed during 2006. Saturated soils recorded along much of the floodplain margin. Shrub and tree plantings continue to show new and vigorous growth each year. Heights of several planted shrubs and trees ranging from 4 - 5 ft. tall.

### Additional Activities Checklist:

X Record and map vegetative communities on air photo

## VEGETATION COMMUNITIES (continued)

Community No.: 4 Community Title (main species): Surface flow within channel

Dominant Species	% Cover	Dominant Species	% Cover
<i>Ranunculus aquatilis</i> var. <i>hispidulus</i>	10		

**COMMENTS/PROBLEMS:** Vegetation Community No. 4 combined with No. 3. Aquatic vegetation invading areas of slower moving water along creek. Volunteer *Populus trichocarpa* seedlings along cobble banks.

Community No.: 5 Community Title (main species): Agropyron / Centaurea

Dominant Species	% Cover	Dominant Species	% Cover
<i>Centaurea maculosa</i>	20	<i>Agropyron repens</i>	20
<i>Sisymbrium altissimum</i>	P	<i>Linaria vulgaris</i>	P
<i>Bromus inermis</i>	10	<i>Potentilla gracilis</i>	P
<i>Bromus tectorum</i>	10		
<i>Alopecurus pratensis</i>	P		

**COMMENTS/PROBLEMS:** Upland slopes observed on both the east and west sides of site. Weed control observed within the C.T, but many live plants still present during monitoring.

Community No.: 6 Community Title (main species): Populus / Salix

Dominant Species	% Cover	Dominant Species	% Cover
<i>Populus trichocarpa</i>	30	<i>Rosa woodsii</i>	10
<i>Salix bebbiana</i>	P	<i>Symphoricarpos albus</i>	P
<i>Alnus incana</i>	P	<i>Salix drummondiana</i>	P
<i>Salix geyeriana</i>	10	<i>Salix exigua</i>	P
<i>Cornus stolonifera</i>	T		

**COMMENTS/PROBLEMS:** Mature cottonwood and shrub communities found along the old channel.

Community No.: 7 Community Title (main species): Centaurea / Phalaris

Dominant Species	% Cover	Dominant Species	% Cover
<i>Phalaris arundinacea</i>	40	<i>Chrysanthemum leucanthemum</i>	10
<i>Centaurea maculosa</i>	40	<i>Trifolium pratense</i>	P
<i>Verbascum thapsus</i>	T	<i>Rumex crispus</i>	T
<i>Bromus inermis</i>	P	Plantings	10
<i>Agropyron repens</i>	10	<i>Linaria vulgaris</i>	P
<i>Taraxacum officinale</i>	T		

**COMMENTS/PROBLEMS:** Vegetation type found along the upland fringes of constructed floodplain on Grasser-owned parcels. Community No. 7 dominated by both reed canarygrass and spotted knapweed. No weed control observed within these areas.

## COMPREHENSIVE VEGETATION LIST

Species	Vegetation Community Number(s)	Species	Vegetation Community Number(s)
<i>Achillea millefolium</i>	1,5	<i>Lepidium perfoliatum</i>	1
<i>Agropyron repens</i>	1,3,5,7	<i>Linaria vulgaris</i>	1,2,5,7
<i>Agrostis alba</i>	2,3	<i>Lonicera involucrata</i>	6
<i>Alnus incana</i>	3,6	<i>Lupinus wyethii</i>	1
<i>Alopecurus pratensis</i>	2,3,5	<i>Lychnis alba</i>	1
<i>Amelanchier alnifolia</i>	1	<i>Matricaria matricarioides</i>	1
<i>Aster integrifolius</i>	1	<i>Melilotus officinalis</i>	1,5
<i>Betula occidentalis</i>	3	<i>Mentha arvensis</i>	2,3
<i>Bromus inermis</i>	5,7	<i>Mimulus guttatus</i>	3
<i>Bromus tectorum</i>	1,5	<i>Phalaris arundinacea</i>	2,3,7
<i>Calamagrostis canadensis</i>	2	<i>Phleum pratense</i>	2,3
<i>Carex aquatilis</i>	2	<i>Pinus ponderosa</i>	1
<i>Carex bebbii</i>	2	<i>Plantago major</i>	1,3
<i>Carex crawfordii</i>	3	<i>Poa pratensis</i>	1,5
<i>Carex lanuginosa</i>	2,3	<i>Polygonum amphibium</i>	2
<i>Carex nebrascensis</i>	2,3	<i>Populus tremuloides</i>	3,4
<i>Carex praegracilis</i>	2	<i>Populus trichocarpa</i>	3,6
<i>Carex stipata</i>	3	<i>Potentilla fruticosa</i>	1
<i>Carex utriculata</i>	2	<i>Potentilla gracilis</i>	1,5
<i>Centaurea maculosa</i>	1,5,7	<i>Pseudotsuga menziesii</i>	1
<i>Cercocarpus ledifolius</i>	1	<i>Ranunculus aquatilis var. hispidulus</i>	4
<i>Chenopodium album</i>	1,3	<i>Ranunculus repens</i>	2
<i>Chrysanthemum leucanthemum</i>	1,5,7	<i>Rosa woodsii</i>	1,6
<i>Cirsium arvense</i>	1,2	<i>Rubus idaeus</i>	6
<i>Cirsium vulgare</i>	1,2	<i>Rumex crispus</i>	1,2,3,7
<i>Cornus stolonifera</i>	3,6	<i>Salix bebbiana</i>	3,6
<i>Crataegus douglasii</i>	1	<i>Salix boothii</i>	3
<i>Crepis tectorum</i>	1	<i>Salix drummondiana</i>	3,4,6
<i>Cynoglossum officinale</i>	1	<i>Salix exigua</i>	2,3,4,6
<i>Danthonia spp.</i>	1	<i>Salix geeyeriana</i>	3,4,6
<i>Deschampsia cespitosa</i>	2,3	<i>Salix lutea</i>	3
<i>Epilobium ciliatum</i>	2,3	<i>Scirpus microcarpus</i>	3,4
<i>Epilobium paniculatum</i>	2,3	<i>Senecio vulgaris</i>	1
<i>Equisetum arvense</i>	2,3	<i>Sium suave</i>	3
<i>Equisetum laevigatum</i>	2,3	<i>Sisymbrium altissimum</i>	1,2,5
<i>Festuca pratensis</i>	1	<i>Smilacina stellata</i>	2
<i>Geum macrophyllum</i>	2,3	<i>Solidago canadensis</i>	2,3
<i>Glyceria elata</i>	2	<i>Symphoricarpos albus</i>	1,5,6
<i>Glyceria grandis</i>	3	<i>Tanacetum vulgare</i>	2,3
<i>Gnaphalium palustre</i>	1	<i>Taraxacum officinale</i>	1,2,3,4,5,7
<i>Juncus balticus</i>	2	<i>Thlaspi arvensis</i>	1,3,5
<i>Juncus bufonius</i>	2,3	<i>Trifolium pratense</i>	1,7
<i>Juncus confusus</i>	3	<i>Verbascum thapsus</i>	1,3,5,7
<i>Juncus ensifolius</i>	2,3	<i>Veronica americana</i>	2
<i>Lactuca serriola</i>	1		

**COMMENTS/PROBLEMS:** No new species identified during 2007 monitoring.



**WILDLIFE**

**BIRDS**

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

**MAMMALS AND HERPTILES**

Species	Number Observed	Indirect indication of use			
		Tracks	Scat	Burrows	Other
Deer		X	X		
Coyote		X	X		
Spotted Frog	several				

**Additional Activities Checklist:**

X Macroinvertebrate sampling (if required)

**COMMENTS/PROBLEMS:** Small animal burrows observed. Site conditions were extremely smoky and hot; few birds and /or wildlife species observed. Macroinvertebrate samples collected at two locations along Camp Creek.

## PHOTOGRAPHS

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

Checklist:

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

Location	Frame #	Photograph Description	Compass Reading
1	R1 16	Looking north at transect end.	0°
1	R1 17	Looking south, uplands w/plantings.	180°
1	R1 18	Looking west, Hwy 93 and created uplands.	270°
1	R1 19	Looking northwest, upland and floodplain.	315°
2	R1 20	Looking southwest at start of vegetation transect.	225°
3	R1 21-22	Looking north along transect line.	0°
4	R1 23	Looking northwest, downstream along channel.	315°
4	R1 24	Looking south, upstream along channel.	180°
4	R1 25	Looking north, curve in creek, fabric failure.	0°
5	R1 26-31	Looking south to north, panoramic of channel & floodplain.	180° – 0°
6	R1 32	Looking east along survival transect.	45°
7	R1 34-35	Looking south, lower section, creek leaving MDT parcel.	180°
8	R2 1-5	Looking east, panoramic from west side.	180° – 0°
9	R2 6-8	Looking north, main channel entering culvert.	270° – 0°
9	R2 9-12	Looking south, main channel entering culvert.	135° – 225°
10	R2 13-14	Looking south, channel and floodplain.	180° – 225°
10	R2 15	Looking north, channel and floodplain.	0°
11	R2 16-19	Looking north, channel and floodplain, upper culvert.	0° – 315°
12	R2 20	Looking south, channel and floodplain, Grasser parcel.	180° – 225°
13	R2 21	Looking south, channel & floodplain.	180°
14	R2 22	Looking north, creek entering Grasser parcel.	225°

### COMMENTS/PROBLEMS:

## GPS SURVEYING

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

Checklist:

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

**COMMENTS/PROBLEMS:** GPS surveying completed during first year monitoring.

**WETLAND DELINEATION**  
(Attach Corps of Engineers delineation forms)

At each site conduct the items on the checklist below:

- Delineate wetlands according to the 1987 Army Corps manual.
- Delineate wetland-upland boundary on the air photo
- Survey wetland-upland boundary with a resource grade GPS survey

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

**FUNCTIONAL ASSESSMENT**

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

**COMMENTS/PROBLEMS:** Functional assessments similar to 2006 monitoring. No dramatic changes or difference between monitoring periods, similar conditions exist.

**MAINTENANCE**

Were man-made nesting structures installed at this site? YES \_\_\_ NO X

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

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

Were man-made structures built or installed to impound water or control water flow into or out of the wetland?

YES X NO \_\_\_

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

If no, describe the problems below.

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

**MDT WETLAND MONITORING – VEGETATION TRANSECT**

Site: Camp Creek Date: 08/01/07 Examiner: Greg Howard Transect # 1

Approx. transect length: 471 ft Compass Direction from Start (Upland): 225°

<b>Vegetation type 1:</b>		Agropyron / Trifolium (Community No. 1)	
Length of transect in this type:	111	feet	
Species:		Cover:	
Agropyron repens		60	
Thlaspi arvensis		T	
Potentilla fruticosa		P	
Agrostis alba		10	
Achillea millefolium		T	
Alopecurus pratensis		10	
Matricaria matricarioides		T	
Sisymbrium altissimum		T	
Phalaris arundinacea		T	
Centaurea maculosa		10	
Total Vegetative Cover:		95%	

<b>Vegetation type 2:</b>		Carex / Phalaris (Community No. 2)	
Length of transect in this type:	102	feet	
Species:		Cover:	
Carex nebrascensis		20	
Carex utriculata		T	
Phalaris arundinacea		40	
Geum macrophyllum		P	
Cirsium arvense		P	
Centaurea maculosa		P	
Agrostis alba		P	
Salix exigua		P	
Juncus ensifolius		T	
Cirsium vulgare		10	
Chrysanthemum leucanthemum		T	
Total Vegetative Cover:		80%	

<b>Vegetation type 3:</b>		Agropyron / Trifolium (Community No. 1)	
Length of transect in this type:	63	feet	
Species:		Cover:	
Carex nebrascensis		P	
Chrysanthemum leucanthemum		T	
Epilobium ciliatum		P	
Agropyron repens		T	
Festuca pratensis		30	
Phalaris arundinacea		P	
Sisymbrium altissimum		T	
Cirsium arvense		P	
Centaurea maculosa		P	
Verbascum thapsus		T	
Deschampsia cespitosa		20	
Poa pratensis		10	
Linaria vulgaris		P	
Chrysanthemum leucanthemum		T	
Total Vegetative Cover:		75%	

<b>Vegetation type 4:</b>		Agrostis / Deschampsia (Community No. 3)	
Length of transect in this type:	16	feet	
Species:		Cover:	
Carex utriculata		T	
Epilobium ciliatum		P	
Agrostis alba		10	
Mentha arvensis		T	
Carex stipata		P	
Juncus ensifolius		P	
Trifolium pratense		20	
Carex nebrascensis		T	
Deschampsia cespitosa		20	
Plantings (Populus tremuloides & Populus trichocarpa)		10	
Willow Sprigs (Salix drummondiana & Salix bebbiana)		20	
Phalaris arundinacea		P	
Chrysanthemum leucanthemum		P	
Alnus incana		P	
Total Vegetative Cover:		95%	









**SOILS**

Map Unit Name (Series and Phase):	Gallatin-Shallow Muck Complex Gallatin	Drainage Class:	Imperfectly and Poorly-drained		
Taxonomy (Subgroup):		Field Observations			
		Confirm Mapped Type?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
<b>Profile Description:</b>					
Depth inches	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0 - 6+	A	10 YR 2/1	--	--	Loam with large cobbles
<b>Hydric Soil Indicators:</b>					
<input type="checkbox"/> Histosol		<input type="checkbox"/> Concretions			
<input type="checkbox"/> Histic Epipedon		<input type="checkbox"/> High Organic Content in surface Layer in Sandy Soils			
<input type="checkbox"/> Sulfidic Odor		<input type="checkbox"/> Organic Streaking in Sandy Soils			
<input type="checkbox"/> Aquic Moisture Regime		<input type="checkbox"/> Listed on Local Hydric Soils List			
<input type="checkbox"/> Reducing Conditions		<input type="checkbox"/> Listed on National Hydric Soils List			
<input type="checkbox"/> Gleyed or Low-Chroma Colors		<input type="checkbox"/> Other (Explain in Remarks)			
Soil pit located in area of created upland habitat, soils consisting of fill material excavated from channel reconstruction and removed from historic wetland. No gleyed or low-chroma colors located below the A layer of the profile.					

**WETLAND DETERMINATION**

Hydrophytic Vegetation Present? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Wetland Hydrology Present? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Hydric Soils Present? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Is this Sampling Point Within a Wetland? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Remarks: Sampling point considered within an upland area.	

Approved by HQUSACE 2/92

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

Project/Site: <u>  Camp Creek  </u> Applicant/Owner: <u>  MDT  </u> Investigator: <u>  Greg Howard  </u>	Date: <u>  08/10/07  </u> County: <u>  Ravalli  </u> State: <u>  MT  </u>
Do Normal Circumstances exist on the site: <u>  X  </u> Yes <u>      </u> No Is the site significantly disturbed (Atypical Situation)? <u>      </u> Yes <u>  x  </u> No Is the area a potential Problem Area?: <u>      </u> Yes <u>  x  </u> No (If needed, explain on reverse.)	Community ID: <u>  Emergent  </u> Transect ID: <u>  1  </u> Plot ID: <u>  2  </u>

**VEGETATION**

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1	<i>Carex nebrascensis</i>	H	OBL				
2	<i>Phalaris arundinacea</i>	H	FACW				
3	<i>Geum macrophyllum</i>	H	OBL				
4	<i>Agrostis alba</i>	H	FAC+				
5	<i>Salix exigua</i>	S	OBL				
6	<i>Cirsium vulgare</i>	H	FACU				
7							
Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-).					<u>  5/6 = 83%  </u>		
Area dominated by hydrophytic vegetation. Undesirable species including bull thistle starting to encroach on area.							

**HYDROLOGY**

Recorded Data (Describe in Remarks): <u>      </u> Stream, Lake, or Tide Gauge <u>      </u> Aerial Photographs <u>      </u> Other <u>  X  </u> No Recorded Data Available	Wetland Hydrology Indicators: Primary Indicators: <u>      </u> Inundated <u>      </u> Saturated in Upper 12 Inches <u>      </u> Water Marks <u>      </u> Drift Lines <u>      </u> Sediment Deposits <u>  X  </u> Drainage Patterns in Wetlands Secondary Indicators (2 or more required): <u>      </u> Oxidized Root Channels in Upper 12 Inches <u>      </u> Water-Stained Leaves <u>      </u> Local Soil Survey Data <u>      </u> FAC-Neutral Test <u>      </u> Other (Explain in Remarks)
Field Observations: Depth of Surface Water: <u>      </u> - <u>      </u> (in.) Depth to Free Water in Pit: <u>      </u> - <u>      </u> (in.) Depth to Saturated Soil: <u>      </u> - <u>      </u> (in.)	
Remarks: Soil pit moist, but not saturated. Hydrology indicator is present with drainage patterns along areas of lower topography.	

**SOILS**

Map Unit Name	Gallatin-Shallow Muck Complex	Drainage Class:	Imperfectly and Poorly-drained		
(Series and Phase):	Gallatin	Field Observations			
Taxonomy (Subgroup):		Confirm Mapped Type?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
<b>Profile Description:</b>					
Depth inches	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0 – 3	A	10 YR 2/1	--	--	Loam with roots & organics
5 – 12	B	10 YR 2/1-	--	--	Peat and sandy loam
<b>Hydric Soil Indicators:</b>					
<input type="checkbox"/>	Histosol	<input type="checkbox"/>	Concretions		
<input type="checkbox"/>	Histic Epipedon	<input checked="" type="checkbox"/>	High Organic Content in surface Layer in Sandy Soils		
<input type="checkbox"/>	Sulfidic Odor	<input type="checkbox"/>	Organic Streaking in Sandy Soils		
<input type="checkbox"/>	Aquic Moisture Regime	<input type="checkbox"/>	Listed on Local Hydric Soils List		
<input type="checkbox"/>	Reducing Conditions	<input type="checkbox"/>	Listed on National Hydric Soils List		
<input checked="" type="checkbox"/>	Gleyed or Low-Chroma Colors	<input type="checkbox"/>	Other (Explain in Remarks)		
Hydric soils indicator present with low-chroma colors and high organic content (peat).					

**WETLAND DETERMINATION**

Hydrophytic Vegetation Present?	<input checked="" type="checkbox"/>	Yes	<input type="checkbox"/>	No	Is this Sampling Point Within a Wetland? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Wetland Hydrology Present?	<input checked="" type="checkbox"/>	Yes	<input type="checkbox"/>	No	
Hydric Soils Present?	<input checked="" type="checkbox"/>	Yes	<input type="checkbox"/>	No	
<b>Remarks:</b>					
Sampling point is considered within a wetland. Topographic swale with low areas dominated by emergent vegetation type. Undisturbed wetlands mapped during initial delineation.					

Approved by HQUSACE 2/92

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

Project/Site: <u>Camp Creek</u>	Date: <u>08/10/07</u>
Applicant/Owner: <u>MDT</u>	County: <u>Ravalli</u>
Investigator: <u>Greg Howard</u>	State: <u>MT</u>
Do Normal Circumstances exist on the site: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Community ID: <u>Emergent / Rock Bottom</u>
Is the site significantly disturbed (Atypical Situation)? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Transect ID: <u>1</u>
Is the area a potential Problem Area?: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No (If needed, explain on reverse.)	Plot ID: <u>3</u>

**VEGETATION**

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1 <u>Carex utriculata</u>	<u>H</u>	<u>OBL</u>	7 <u>Agrostis alba</u>	<u>H</u>	<u>FAC+</u>
2 <u>Alopecurus pratensis</u>	<u>H</u>	<u>FACW</u>	8 <u>Salix drummondiana</u>	<u>S</u>	<u>FACW</u>
3 <u>Carex nebrascensis</u>	<u>H</u>	<u>OBL</u>	9 <u>Veronica americana</u>	<u>H</u>	<u>OBL</u>
4 <u>Phalaris arundinacea</u>	<u>H</u>	<u>FACW</u>	10 <u>Juncus ensifolius</u>	<u>H</u>	<u>FACW</u>
5 <u>Epilobium ciliatum</u>	<u>H</u>	<u>FACW</u>	11 <u>Trifolium pratense</u>	<u>H</u>	<u>FACU</u>
6 <u>Deschampsia cespitosa</u>	<u>H</u>	<u>FACW</u>			

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-). 10/11 = 91%

Area consisting of streambank, creek and floodplain margins dominated by hydrophytic vegetation.

**HYDROLOGY**

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

**SOILS**

Map Unit Name		Gallatin-Shallow Muck Complex		Drainage Class: <u>Imperfectly and Poorly-drained</u>	
(Series and Phase):		<u>Gallatin</u>		Field Observations	
Taxonomy (Subgroup):		_____		Confirm Mapped Type? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
<b>Profile Description:</b>					
Depth inches	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0 – 8+	B	10 YR 2/1	--	--	Loam with large cobbles
<b>Hydric Soil Indicators:</b>					
_____ Histosol		_____ Concretions		_____ High Organic Content in surface Layer in Sandy Soils	
_____ Histic Epipedon		_____ Organic Streaking in Sandy Soils		_____ Listed on Local Hydric Soils List	
_____ Sulfidic Odor		_____ Listed on National Hydric Soils List		_____ Other (Explain in Remarks)	
_____ Aquic Moisture Regime		_____			
_____ Reducing Conditions					
<input checked="" type="checkbox"/> Gleyed or Low-Chroma Colors					
Hydric soil indicator present with low-chroma colors.					

**WETLAND DETERMINATION**

Hydrophytic Vegetation Present?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Is this Sampling Point Within a Wetland? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Wetland Hydrology Present?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
Hydric Soils Present?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
<b>Remarks:</b>			
Sampling point considered within a wetland and Waters of the U.S. Floodplain along Camp Creek developing into emergent and scrub-shrub wetland vegetation types.			

Approved by HQUSACE 2/92

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

Project/Site: <u>  Camp Creek  </u> Applicant/Owner: <u>  MDT  </u> Investigator: <u>  Greg Howard  </u>	Date: <u>  08/10/07  </u> County: <u>  Ravalli  </u> State: <u>  MT  </u>
Do Normal Circumstances exist on the site: <u>  X  </u> Yes <u>      </u> No Is the site significantly disturbed (Atypical Situation)? <u>      </u> Yes <u>  x  </u> No Is the area a potential Problem Area?: (If needed, explain on reverse.) <u>      </u> Yes <u>  x  </u> No	Community ID: <u>  Emergent  </u> Transect ID: <u>      1      </u> Plot ID: <u>      4      </u>

**VEGETATION**

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1	<i>Phalaris arundinacea</i>	H	FACW				
2	<i>Agrostis alba</i>	H	FAC+				
3	<i>Carex lanuginosa</i>	H	OBL				
4	<i>Carex nebrascensis</i>	H	OBL				
5	<i>Deschampsia cespitosa</i>	H	FACW				
Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-). <u>  5/5 = 100%  </u>				Area dominated by hydrophytic vegetation.			

**HYDROLOGY**

_____ Recorded Data (Describe in Remarks): _____ Stream, Lake, or Tide Gauge _____ Aerial Photographs _____ Other <u>  X  </u> No Recorded Data Available	<b>Wetland Hydrology Indicators:</b> <b>Primary Indicators:</b> _____ Inundated <u>  X  </u> Saturated in Upper 12 Inches _____ Water Marks _____ Drift Lines _____ Sediment Deposits <u>  X  </u> Drainage Patterns in Wetlands <b>Secondary Indicators (2 or more required):</b> _____ Oxidized Root Channels in Upper 12 Inches _____ Water-Stained Leaves _____ Local Soil Survey Data _____ FAC-Neutral Test _____ Other (Explain in Remarks)
<b>Field Observations:</b>  Depth of Surface Water:                    _____ (in.)  Depth to Free Water in Pit:                _____ (in.)  Depth to Saturated Soil: <u>      8      </u> (in.)	
<b>Remarks:</b> Hydrology indicators present with saturated soils and drainage patterns.	

**SOILS**

Map Unit Name		Gallatin-Shallow Muck Complex	Drainage Class:		Imperfectly and Poorly-drained
(Series and Phase):		Gallatin	Field Observations		
Taxonomy (Subgroup):			Confirm Mapped Type?		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
<b>Profile Description:</b>					
Depth inches	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0 – 3	O	10 YR 2/1	--	--	Roots & organics
3 – 5	A	10 YR 2/1	--	--	Sandy loam & roots
5 – 7	B1	--	--	--	Sand with fine gravels
7 – 10+	B2	10 YR 2/1	--	--	Sandy loam with fine to medium gravels
<b>Hydric Soil Indicators:</b>					
<input type="checkbox"/> Histosol		<input type="checkbox"/> Concretions			
<input type="checkbox"/> Histic Epipedon		<input checked="" type="checkbox"/> High Organic Content in surface Layer in Sandy Soils			
<input type="checkbox"/> Sulfidic Odor		<input type="checkbox"/> Organic Streaking in Sandy Soils			
<input type="checkbox"/> Aquic Moisture Regime		<input type="checkbox"/> Listed on Local Hydric Soils List			
<input type="checkbox"/> Reducing Conditions		<input type="checkbox"/> Listed on National Hydric Soils List			
<input checked="" type="checkbox"/> Gleyed or Low-Chroma Colors		<input type="checkbox"/> Other (Explain in Remarks)			
Hydric soil indicators present with low-chroma colors and high organic content in sandy soils.					

**WETLAND DETERMINATION**

Hydrophytic Vegetation Present? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Is this Sampling Point Within a Wetland? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Wetland Hydrology Present? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Hydric Soils Present? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
<b>Remarks:</b>	
Sampling point is considered within an emergent wetland type. Located on upper terrace adjacent to created floodplain. Remnant wetlands not disturbed during construction efforts.	

Approved by HQUSACE 2/92



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

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

- Primary or Critical habitat (list species)  D  S \_\_\_\_\_
- Secondary habitat (list species)  D  S bull trout
- Incidental habitat (list species)  D  S \_\_\_\_\_
- No usable habitat  D  S \_\_\_\_\_

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

Highest Habitat Level	doc/primary	sus/primary	doc/secondary	sus/secondary	doc/incidental	sus/incidental	none
Functional Point & Rating	---	---	.8 (M)	---	---	---	---

**If documented, list the source** (e.g., observations, records, etc.): FWP records and observations; plus MDT obs pair of bald eagles hunting site in 2006.

**14B. HABITAT FOR PLANTS AND ANIMALS RATED AS S1, S2, OR S3 BY THE MONTANA NATURAL HERITAGE PROGRAM.**

Do not include species listed in 14A(i).

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

- Primary or Critical habitat (list species)  D  S west-slope cutthroat trout
- Secondary habitat (list species)  D  S bald eagle
- Incidental habitat (list species)  D  S \_\_\_\_\_
- No usable habitat  D  S \_\_\_\_\_

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

Highest Habitat Level	doc/primary	sus/primary	doc/secondary	sus/secondary	doc/incidental	sus/incidental	none
Functional Point & Rating	---	.8 (H)	---	---	---	---	---

**If documented, list the source** (e.g., observations, records, etc.): FWP records assume ws cutthroat x rainbow hybrids, so ws not officially "documented". Plus MDT observation of a pair of bald eagles hunting site in 2006.

**14C. GENERAL WILDLIFE HABITAT RATING**

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

- Substantial** (based on any of the following)
  - observations of abundant wildlife #s or high species diversity (during any period)
  - abundant wildlife sign such as scat, tracks, nest structures, game trails, etc.
  - presence of extremely limiting habitat features not available in the surrounding area
  - interviews with local biologists with knowledge of the AA
- Moderate** (based on any of the following)
  - observations of scattered wildlife groups or individuals or relatively few species during peak periods
  - common occurrence of wildlife sign such as scat, tracks, nest structures, game trails, etc.
  - adequate adjacent upland food sources
  - interviews with local biologists with knowledge of the AA
- Low** (based on any of the following)
  - few or no wildlife observations during peak use periods
  - little to no wildlife sign
  - sparse adjacent upland food sources
  - interviews with local biologists with knowledge of AA

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

Structural Diversity (from 13)	<input type="checkbox"/> High								<input checked="" type="checkbox"/> Moderate								<input type="checkbox"/> Low			
	<input type="checkbox"/> Even				<input type="checkbox"/> Uneven				<input type="checkbox"/> Even				<input checked="" type="checkbox"/> Uneven				<input type="checkbox"/> Even			
	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
Class Cover Distribution (all vegetated classes)	--	--	--	--	--	--	--	--	--	--	--	--	--	H	--	--	--	--	--	--
Duration of Surface Water in ≥ 10% of AA	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Low disturbance at AA (see 12)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Moderate disturbance at AA (see 12)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
High disturbance at AA (see 12)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

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

Evidence of Wildlife Use from 14C(i)	Wildlife Habitat Features Rating from 14C(ii)			
	<input type="checkbox"/> Exceptional	<input checked="" type="checkbox"/> High	<input type="checkbox"/> Moderate	<input type="checkbox"/> Low
Substantial	--	--	--	--
Moderate	--	.7 (M)	--	--
Low	--	--	--	--

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

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

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

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

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

Duration of Surface Water in AA	<input checked="" type="checkbox"/> Permanent/Perennial			<input type="checkbox"/> Seasonal / Intermittent			<input type="checkbox"/> Temporary / Ephemeral		
	>25%	10-25%	<10%	>25%	10-25%	<10%	>25%	10-25%	<10%
Cover - % of waterbody in AA containing cover objects (e.g. submerged logs, large rocks & boulders, overhanging banks, floating-leaved vegetation)									
Shading - >75% of streambank or shoreline of AA contains riparian or wetland scrub-shrub or forested communities	--	--	--	--	--	--	--	--	--
Shading - 50 to 75% of streambank or shoreline of AA contains riparian or wetland scrub-shrub or forested communities.	--	H	--	--	--	--	--	--	--
Shading - < 50% of streambank or shoreline of AA contains riparian or wetland scrub-shrub or forested communities.	--	--	--	--	--	--	--	--	--

**ii. Modified Habitat Quality:** Is fish use of the AA precluded or significantly reduced by a culvert, dike, other man-made structure or activity or is the waterbody included on the 'MDEQ list of waterbodies in need of TMDL development' with 'Probable Impaired Uses' listed as cold or warm water fishery or aquatic life support?

Y  N If yes, reduce the rating from 14D(i) by one level and check the modified habitat quality rating:  E  H  M  L

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

Types of Fish Known or Suspected within AA	Modified Habitat Quality from 14D(ii)			
	<input type="checkbox"/> Exceptional	<input checked="" type="checkbox"/> High	<input type="checkbox"/> Moderate	<input type="checkbox"/> Low
Native game fish	--	.9 (H)	--	--
Introduced game fish	--	--	--	--
Non-game fish	--	--	--	--
No fish	--	--	--	--

**Comments:** Reconstructed channel supports native fish populations. Enhancement of habitat: pools, riffles, and overhanging banks. Ratings will improve with establishment of woody vegetation.

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

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

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

Estimated wetland area in AA subject to periodic flooding	<input checked="" type="checkbox"/> ≥ 10 acres			<input type="checkbox"/> <10, >2 acres			<input type="checkbox"/> ≤2 acres		
	75%	25-75%	<25%	75%	25-75%	<25%	75%	25-75%	<25%
% of flooded wetland classified as forested, scrub/shrub, or both									
AA contains no outlet or restricted outlet	--	--	.6 (M)	--	--	--	--	--	--
AA contains unrestricted outlet	--	--	--	--	--	--	--	--	--

**ii. Are residences, businesses, or other features which may be significantly damaged by floods located within 0.5 miles downstream of the AA? (check)**

Y  N **Comments:** USFS offices and residents downstream, adjacent parcel with MDT boundary.

**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 NA above.

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

P/P = permanent/perennial; S/I = seasonal/intermittent; T/E = temporary/ephemeral.

Estimated maximum acre feet of water contained in wetlands within the AA that are subject to periodic flooding or ponding.	<input checked="" type="checkbox"/> >5 acre feet			<input type="checkbox"/> <5, >1 acre feet			<input type="checkbox"/> ≤1 acre foot		
	P/P	S/I	T/E	P/P	S/I	T/E	P/P	S/I	T/E
Duration of surface water at wetlands within the AA									
Wetlands in AA flood or pond ≥ 5 out of 10 years	1 (H)	--	--	--	--	--	--	--	--
Wetlands in AA flood or pond < 5 out of 10 years	--	--	--	--	--	--	--	--	--

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

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

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

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

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

Sediment, Nutrient, and Toxicant Input Levels Within AA	AA receives or surrounding land use has potential to deliver low to moderate levels of sediments, nutrients, or compounds such that other functions are not substantially impaired. Minor sedimentation, sources of nutrients or toxicants, or signs of eutrophication present.				Waterbody on MDEQ list of waterbodies in need of TMDL development for "probable causes" related to sediment, nutrients, or toxicants or AA receives or surrounding land use has potential to deliver high levels of sediments, nutrients, or compounds such that other functions are substantially impaired. Major sedimentation, sources of nutrients or toxicants, or signs of eutrophication present.			
	<input checked="" type="checkbox"/> ≥ 70%		<input type="checkbox"/> < 70%		<input type="checkbox"/> ≥ 70%		<input type="checkbox"/> < 70%	
% cover of wetland vegetation in AA	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Evidence of flooding or ponding in AA								
AA contains no or restricted outlet	--	--	--	--	--	--	--	--
AA contains unrestricted outlet	.9 (H)	--	--	--	--	--	--	--

**Comments:** Minor sedimentation due to logging and recent forest fires.

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

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

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

% Cover of wetland streambank or shoreline by species with deep, binding rootmasses.	Duration of Surface Water Adjacent to Rooted Vegetation		
	<input checked="" type="checkbox"/> Permanent / Perennial	<input type="checkbox"/> Seasonal / Intermittent	<input type="checkbox"/> Temporary / Ephemeral
≥ 65 %	1 (H)	--	--
35-64 %	--	--	--
< 35 %	--	--	--

**Comments:** Increased density of willows and wetland grasses / grass-like plants along streambanks.

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

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

A = acreage of vegetated component in the AA. B = structural diversity rating from #13. C = Yes (Y) or No (N) as to whether or not the AA contains a surface or subsurface outlet. P/P = permanent/perennial; S/I = seasonal/intermittent; T/E/A= temporary/ephemeral/absent.

A	<input checked="" type="checkbox"/> Vegetated component >5 acres						<input type="checkbox"/> Vegetated component 1-5 acres						<input type="checkbox"/> Vegetated component <1 acre					
B	<input type="checkbox"/> High		<input checked="" type="checkbox"/> Moderate		<input type="checkbox"/> Low		<input type="checkbox"/> High		<input type="checkbox"/> Moderate		<input type="checkbox"/> Low		<input type="checkbox"/> High		<input type="checkbox"/> Moderate		<input type="checkbox"/> Low	
C	<input type="checkbox"/> Y	<input type="checkbox"/> N	<input checked="" type="checkbox"/> Y	<input type="checkbox"/> N	<input type="checkbox"/> Y	<input type="checkbox"/> N	<input type="checkbox"/> Y	<input type="checkbox"/> N	<input type="checkbox"/> Y	<input type="checkbox"/> N	<input type="checkbox"/> Y	<input type="checkbox"/> N	<input type="checkbox"/> Y	<input type="checkbox"/> N	<input type="checkbox"/> Y	<input type="checkbox"/> N	<input type="checkbox"/> Y	<input type="checkbox"/> N
P/P	--	--	.9H	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
S/I	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
T/E/A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

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

**14J. GROUNDWATER DISCHARGE / RECHARGE (DR)** (Check the indicators in i & ii below that apply to the AA.)

**i.  Discharge Indicators**

- Springs are known or observed.
- Vegetation growing during dormant season / drought.
- Wetland occurs at the toe of a natural slope.
- Seeps are present at the wetland edge.
- AA permanently flooded during drought periods.
- Wetland contains an outlet, but no inlet.
- Other \_\_\_\_\_

**ii.  Recharge Indicators**

- Permeable substrate presents without underlying impeding layer.
- Wetland contains inlet but not outlet.
- Other \_\_\_\_\_

**iii. Rating:** Use information from 14J(i) and 14J(ii) above and the table below to arrive at the functional point and rating of high (H) or low (L) for this function.

Criteria	Functional Point and Rating
AA has known Discharge/Recharge area or one or more indicators of D/R present	1 (H)
No Discharge/Recharge indicators present	--
Available Discharge/Recharge information inadequate to rate AA D/R potential	--

**Comments:** Channel & floodplain located in Sula Basin. Steep slopes on both sides of basin. Wetland occurring along toe of slope.

**14K. UNIQUENESS**

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

Replacement Potential	AA contains fen, bog, warm springs or mature (>80 yr-old) forested wetland or plant association listed as "S1" by the MTNHP.			AA does not contain previously cited rare types and structural diversity (#13) is high or contains plant association listed as "S2" by the MTNHP.			AA does not contain previously cited rare types or associations and structural diversity (#13) is low-moderate.		
	<input type="checkbox"/> rare	<input type="checkbox"/> common	<input type="checkbox"/> abundant	<input type="checkbox"/> rare	<input type="checkbox"/> common	<input type="checkbox"/> abundant	<input type="checkbox"/> rare	<input checked="" type="checkbox"/> common	<input type="checkbox"/> abundant
Estimated Relative Abundance from 11									
Low disturbance at AA (12i)	--	--	--	--	--	--	--	.4M	--
Moderate disturbance at AA (12i)	--	--	--	--	--	--	--	--	--
High disturbance at AA (12i)	--	--	--	--	--	--	--	--	--

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

**14L. RECREATION / EDUCATION POTENTIAL**

**i. Is the AA a known recreational or educational site?**  Yes [Rate  High (1.0), then proceed to 14L(ii) only]  No [Proceed to 14L(iii)]

**ii. Check categories that apply to the AA:**  Educational / scientific study  Consumptive rec.  Non-consumptive rec.  Other

**iii. Based on the location, diversity, size, and other site attributes, is there a strong potential for recreational or educational use?**

- Yes [Proceed to 14L (ii) and then 14L(iv)]
- No [Rate as low in 14L(iv)]

**iv. Rating** Use the matrix below to arrive at the functional point and rating of high (H), moderate (M), or low (L) for this function.

Ownership	Disturbance at AA from 12(i)		
	<input checked="" type="checkbox"/> Low	<input type="checkbox"/> Moderate	<input type="checkbox"/> High
Public ownership	1(H)	--	--
Private ownership	--	--	--

**Comments:** Good potential for recreation/education as mitigation site located along Highway 93.

**FUNCTION, VALUE SUMMARY, AND OVERALL RATING**

Function and Value Variables	Rating	Actual Functional Points	Possible Functional Points	Functional Units (Actual Points x Estimated AA Acreage)
A. Listed/Proposed T&E Species Habitat	moderate	0.80	1	
B. MT Natural Heritage Program Species Habitat	high	0.80	1	
C. General Wildlife Habitat	moderate	0.70	1	
D. General Fish/Aquatic Habitat	high	0.90	1	
E. Flood Attenuation	moderate	0.60	1	
F. Short and Long Term Surface Water Storage	high	1.00	1	
G. Sediment/Nutrient/Toxicant Removal	high	0.9	1	
H. Sediment/Shoreline Stabilization	high	1.00	1	
I. Production Export/Food Chain Support	high	0.90	1	
J. Groundwater Discharge/Recharge	high	1.00	1	
K. Uniqueness	moderate	0.40	1	
L. Recreation/Education Potential	high	1.00	1	
<b>Total:</b>		<b><u>10.00</u></b>	<b><u>12.00</u></b>	_____
<b>Percent of Total Possible Points:</b>			<b>83%</b> (Actual / Possible) x 100 [rd to nearest whole #]	

<p><b>Category I Wetland:</b> (Must satisfy <b>one</b> of the following criteria. If not satisfied, proceed to Category II.)</p> <p><input type="checkbox"/> Score of 1 functional point for Listed/Proposed Threatened or Endangered Species; <b>or</b></p> <p><input type="checkbox"/> Score of 1 functional point for Uniqueness; <b>or</b></p> <p><input type="checkbox"/> Score of 1 functional point for Flood Attenuation <b>and</b> answer to Question 14E(ii) is "yes"; <b>or</b></p> <p><input checked="" type="checkbox"/> Percent of total Possible Points is &gt; 80%.</p>
<p><b>Category II Wetland:</b> (Criteria for Category I not satisfied <b>and</b> meets any <b>one</b> of the following Category II criteria. If not satisfied, proceed to Category IV.)</p> <p><input type="checkbox"/> Score of 1 functional point for Species Rated S1, S2, or S3 by the MT Natural Heritage Program; <b>or</b></p> <p><input type="checkbox"/> Score of .9 or 1 functional point for General Wildlife Habitat; <b>or</b></p> <p><input type="checkbox"/> Score of .9 or 1 functional point for General Fish/Aquatic Habitat; <b>or</b></p> <p><input type="checkbox"/> "High" to "Exceptional" ratings for <b>both</b> General Wildlife Habitat <b>and</b> General Fish / Aquatic Habitat; <b>or</b></p> <p><input type="checkbox"/> Score of .9 functional point for Uniqueness; <b>or</b></p> <p><input type="checkbox"/> Percent of total possible points is &gt; 65%.</p>
<p><input type="checkbox"/> <b>Category III Wetland:</b> (Criteria for Categories I, II, or IV not satisfied.)</p>
<p><b>Category IV Wetland:</b> (Criteria for Categories I or II are not satisfied <b>and</b> <u>all</u> of the following criteria are met; If not satisfied, return to Category III.)</p> <p><input type="checkbox"/> "Low" rating for Uniqueness; <b>and</b></p> <p><input type="checkbox"/> "Low" rating for Production Export / Food Chain Support; <b>and</b></p> <p><input type="checkbox"/> Percent of total possible points is &lt; 30%.</p>

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

**I**       **II**       **III**       **IV**



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

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

- Primary or Critical habitat (list species)  D  S \_\_\_\_\_
- Secondary habitat (list species)  D  S bull trout
- Incidental habitat (list species)  D  S \_\_\_\_\_
- No usable habitat  D  S \_\_\_\_\_

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

Highest Habitat Level	doc/primary	sus/primary	doc/secondary	sus/secondary	doc/incidental	sus/incidental	none
Functional Point & Rating	---	---	.8 (M)	---	---	---	---

If documented, list the source (e.g., observations, records, etc.): FWP records and observations on MDT site.

**14B. HABITAT FOR PLANTS AND ANIMALS RATED AS S1, S2, OR S3 BY THE MONTANA NATURAL HERITAGE PROGRAM.**

Do not include species listed in 14A(i).

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

- Primary or Critical habitat (list species)  D  S west-slope cutthroat trout
- Secondary habitat (list species)  D  S bald eagle
- Incidental habitat (list species)  D  S \_\_\_\_\_
- No usable habitat  D  S \_\_\_\_\_

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

Highest Habitat Level	doc/primary	sus/primary	doc/secondary	sus/secondary	doc/incidental	sus/incidental	none
Functional Point & Rating	---	.8 (H)	---	---	---	---	---

If documented, list the source (e.g., observations, records, etc.): FWP records assume westslope cutthroat x rainbow hydrids, so ws not officially "documented". Bald eagle observed by MDT.

**14C. GENERAL WILDLIFE HABITAT RATING**

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

- Substantial** (based on any of the following)
  - observations of abundant wildlife #s or high species diversity (during any period)
  - abundant wildlife sign such as scat, tracks, nest structures, game trails, etc.
  - presence of extremely limiting habitat features not available in the surrounding area
  - interviews with local biologists with knowledge of the AA
- Moderate** (based on any of the following)
  - observations of scattered wildlife groups or individuals or relatively few species during peak periods
  - common occurrence of wildlife sign such as scat, tracks, nest structures, game trails, etc.
  - adequate adjacent upland food sources
  - interviews with local biologists with knowledge of the AA
- Low** (based on any of the following)
  - few or no wildlife observations during peak use periods
  - little to no wildlife sign
  - sparse adjacent upland food sources
  - interviews with local biologists with knowledge of AA

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

Structural Diversity (from 13)	<input type="checkbox"/> High								<input checked="" type="checkbox"/> Moderate								<input type="checkbox"/> Low			
	<input type="checkbox"/> Even				<input type="checkbox"/> Uneven				<input type="checkbox"/> Even				<input checked="" type="checkbox"/> Uneven				<input type="checkbox"/> Even			
	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
Class Cover Distribution (all vegetated classes)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Duration of Surface Water in ≥ 10% of AA	--	--	--	--	--	--	--	--	--	--	--	--	H	--	--	--	--	--	--	--
Low disturbance at AA (see 12)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Moderate disturbance at AA (see 12)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
High disturbance at AA (see 12)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

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

Evidence of Wildlife Use from 14C(i)	Wildlife Habitat Features Rating from 14C(ii)			
	<input type="checkbox"/> Exceptional	<input checked="" type="checkbox"/> High	<input type="checkbox"/> Moderate	<input type="checkbox"/> Low
Substantial	--	--	--	--
Moderate	--	.7 (M)	--	--
Low	--	--	--	--

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

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

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

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

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

Duration of Surface Water in AA	<input checked="" type="checkbox"/> Permanent/Perennial			<input type="checkbox"/> Seasonal / Intermittent			<input type="checkbox"/> Temporary / Ephemeral		
	>25%	10-25%	<10%	>25%	10-25%	<10%	>25%	10-25%	<10%
Cover - % of waterbody in AA containing cover objects (e.g. submerged logs, large rocks & boulders, overhanging banks, floating-leaved vegetation)									
Shading - >75% of streambank or shoreline of AA contains riparian or wetland scrub-shrub or forested communities	--	--	--	--	--	--	--	--	--
Shading - 50 to 75% of streambank or shoreline of AA contains riparian or wetland scrub-shrub or forested communities.	--	H	--	--	--	--	--	--	--
Shading - < 50% of streambank or shoreline of AA contains riparian or wetland scrub-shrub or forested communities.	--	--	--	--	--	--	--	--	--

**ii. Modified Habitat Quality:** Is fish use of the AA precluded or significantly reduced by a culvert, dike, other man-made structure or activity or is the waterbody included on the 'MDEQ list of waterbodies in need of TMDL development' with 'Probable Impaired Uses' listed as cold or warm water fishery or aquatic life support?

Y  N If yes, reduce the rating from 14D(i) by one level and check the modified habitat quality rating:  E  H  M  L

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

Types of Fish Known or Suspected within AA	Modified Habitat Quality from 14D(ii)			
	<input type="checkbox"/> Exceptional	<input checked="" type="checkbox"/> High	<input type="checkbox"/> Moderate	<input type="checkbox"/> Low
Native game fish	--	.9 (H)	--	--
Introduced game fish	--	--	--	--
Non-game fish	--	--	--	--
No fish	--	--	--	--

**Comments:** Reconstructed channel supports native fish populations. Enhancement of habitat: pools, riffles, and overhanging banks. Ratings will improve with establishment of woody vegetation.

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

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

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

Estimated wetland area in AA subject to periodic flooding	<input type="checkbox"/> ≥ 10 acres			<input checked="" type="checkbox"/> <10, >2 acres			<input type="checkbox"/> ≤2 acres		
	75%	25-75%	<25%	75%	25-75%	<25%	75%	25-75%	<25%
% of flooded wetland classified as forested, scrub/shrub, or both									
AA contains no outlet or restricted outlet	--	--	--	--	--	--	--	--	--
AA contains unrestricted outlet	--	--	--	--	--	.4 (M)	--	--	--

**ii. Are residences, businesses, or other features which may be significantly damaged by floods located within 0.5 miles downstream of the AA? (check)**

Y  N **Comments:** USFS offices and residents downstream & several other homes located nearby.

**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 NA above.

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

P/P = permanent/perennial; S/I = seasonal/intermittent; T/E = temporary/ephemeral.

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

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

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

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

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

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

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

**Comments:** Minor sediment from nearby burned forest. Potential nutrient input due to heavy livestock grazing in Sula Basin.

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

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

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

% Cover of wetland streambank or shoreline by species with deep, binding rootmasses.	Duration of Surface Water Adjacent to Rooted Vegetation		
	<input checked="" type="checkbox"/> Permanent / Perennial	<input type="checkbox"/> Seasonal / Intermittent	<input type="checkbox"/> Temporary / Ephemeral
≥ 65 %	1 (H)	--	--
35-64 %	--	--	--
< 35 %	--	--	--

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

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

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

A = acreage of vegetated component in the AA. B = structural diversity rating from #13. C = Yes (Y) or No (N) as to whether or not the AA contains a surface or subsurface outlet. P/P = permanent/perennial; S/I = seasonal/intermittent; T/E/A= temporary/ephemeral/absent.

A	<input checked="" type="checkbox"/> Vegetated component >5 acres						<input type="checkbox"/> Vegetated component 1-5 acres						<input type="checkbox"/> Vegetated component <1 acre					
B	<input type="checkbox"/> High		<input checked="" type="checkbox"/> Moderate		<input type="checkbox"/> Low		<input type="checkbox"/> High		<input type="checkbox"/> Moderate		<input type="checkbox"/> Low		<input type="checkbox"/> High		<input type="checkbox"/> Moderate		<input type="checkbox"/> Low	
C	<input type="checkbox"/> Y	<input type="checkbox"/> N	<input checked="" type="checkbox"/> Y	<input type="checkbox"/> N	<input type="checkbox"/> Y	<input type="checkbox"/> N	<input type="checkbox"/> Y	<input type="checkbox"/> N	<input type="checkbox"/> Y	<input type="checkbox"/> N	<input type="checkbox"/> Y	<input type="checkbox"/> N	<input type="checkbox"/> Y	<input type="checkbox"/> N	<input type="checkbox"/> Y	<input type="checkbox"/> N	<input type="checkbox"/> Y	<input type="checkbox"/> N
P/P	--	--	.9H	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
S/I	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
T/E/A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

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

**14J. GROUNDWATER DISCHARGE / RECHARGE (DR)** (Check the indicators in i & ii below that apply to the AA.)

**i.  Discharge Indicators**

- Springs are known or observed.
- Vegetation growing during dormant season / drought.
- Wetland occurs at the toe of a natural slope.
- Seeps are present at the wetland edge.
- AA permanently flooded during drought periods.
- Wetland contains an outlet, but no inlet.
- Other \_\_\_\_\_

**ii.  Recharge Indicators**

- Permeable substrate presents without underlying impeding layer.
- Wetland contains inlet but not outlet.
- Other \_\_\_\_\_

**iii. Rating:** Use information from 14J(i) and 14J(ii) above and the table below to arrive at the functional point and rating of high (H) or low (L) for this function.

Criteria	Functional Point and Rating
AA has known Discharge/Recharge area or one or more indicators of D/R present	1 (H)
No Discharge/Recharge indicators present	--
Available Discharge/Recharge information inadequate to rate AA D/R potential	--

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

**14K. UNIQUENESS**

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

Replacement Potential	AA contains fen, bog, warm springs or mature (>80 yr-old) forested wetland or plant association listed as "S1" by the MTNHP.			AA does not contain previously cited rare types and structural diversity (#13) is high or contains plant association listed as "S2" by the MTNHP.			AA does not contain previously cited rare types or associations and structural diversity (#13) is low-moderate.		
	<input type="checkbox"/> rare	<input type="checkbox"/> common	<input type="checkbox"/> abundant	<input type="checkbox"/> rare	<input type="checkbox"/> common	<input type="checkbox"/> abundant	<input type="checkbox"/> rare	<input type="checkbox"/> common	<input checked="" type="checkbox"/> abundant
Estimated Relative Abundance from 11									
Low disturbance at AA (12i)	--	--	--	--	--	--	--	--	--
Moderate disturbance at AA (12i)	--	--	--	--	--	--	--	--	.2L
High disturbance at AA (12i)	--	--	--	--	--	--	--	--	--

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

**14L. RECREATION / EDUCATION POTENTIAL**

**i. Is the AA a known recreational or educational site?**  Yes [Rate  High (1.0), then proceed to 14L(ii) only]  No [Proceed to 14L(iii)]

**ii. Check categories that apply to the AA:**  Educational / scientific study  Consumptive rec.  Non-consumptive rec.  Other

**iii. Based on the location, diversity, size, and other site attributes, is there a strong potential for recreational or educational use?**

- Yes [Proceed to 14L (ii) and then 14L(iv)]
- No [Rate as low in 14L(iv)]

**iv. Rating** Use the matrix below to arrive at the functional point and rating of high (H), moderate (M), or low (L) for this function.

Ownership	Disturbance at AA from 12(i)		
	<input type="checkbox"/> Low	<input checked="" type="checkbox"/> Moderate	<input type="checkbox"/> High
Public ownership	--	--	--
Private ownership	--	.3(L)	--

Comments: Good potential for recreation/education as it is adjacent to Highway 93, though under private ownership.

**FUNCTION, VALUE SUMMARY, AND OVERALL RATING**

Function and Value Variables	Rating	Actual Functional Points	Possible Functional Points	Functional Units (Actual Points x Estimated AA Acreage)
A. Listed/Proposed T&E Species Habitat	moderate	0.80	1	
B. MT Natural Heritage Program Species Habitat	high	0.80	1	
C. General Wildlife Habitat	moderate	0.70	1	
D. General Fish/Aquatic Habitat	high	0.90	1	
E. Flood Attenuation	moderate	0.40	1	
F. Short and Long Term Surface Water Storage	moderate	0.60	1	
G. Sediment/Nutrient/Toxicant Removal	moderate	0.60	1	
H. Sediment/Shoreline Stabilization	high	1.0	1	
I. Production Export/Food Chain Support	high	0.90	1	
J. Groundwater Discharge/Recharge	high	1.00	1	
K. Uniqueness	low	0.20	1	
L. Recreation/Education Potential	low	0.30	1	
<b>Total:</b>		<b><u>8.20</u></b>	<b><u>12.00</u></b>	_____
<b>Percent of Total Possible Points:</b>			<b><u>68%</u></b> (Actual / Possible) x 100 [rd to nearest whole #]	

<p><b>Category I Wetland:</b> (Must satisfy <b>one</b> of the following criteria. If not satisfied, proceed to Category II.)</p> <p><input type="checkbox"/> Score of 1 functional point for Listed/Proposed Threatened or Endangered Species; <b>or</b></p> <p><input type="checkbox"/> Score of 1 functional point for Uniqueness; <b>or</b></p> <p><input type="checkbox"/> Score of 1 functional point for Flood Attenuation <b>and</b> answer to Question 14E(ii) is "yes"; <b>or</b></p> <p><input type="checkbox"/> Percent of total Possible Points is &gt; 80%.</p>
<p><b>Category II Wetland:</b> (Criteria for Category I not satisfied <b>and</b> meets any <b>one</b> of the following Category II criteria. If not satisfied, proceed to Category IV.)</p> <p><input type="checkbox"/> Score of 1 functional point for Species Rated S1, S2, or S3 by the MT Natural Heritage Program; <b>or</b></p> <p><input type="checkbox"/> Score of .9 or 1 functional point for General Wildlife Habitat; <b>or</b></p> <p><input checked="" type="checkbox"/> Score of .9 or 1 functional point for General Fish/Aquatic Habitat; <b>or</b></p> <p><input type="checkbox"/> "High" to "Exceptional" ratings for <b>both</b> General Wildlife Habitat <b>and</b> General Fish / Aquatic Habitat; <b>or</b></p> <p><input type="checkbox"/> Score of .9 functional point for Uniqueness; <b>or</b></p> <p><input checked="" type="checkbox"/> Percent of total possible points is &gt; 65%.</p>
<p><input type="checkbox"/> <b>Category III Wetland:</b> (Criteria for Categories I, II, or IV not satisfied.)</p>
<p><b>Category IV Wetland:</b> (Criteria for Categories I or II are not satisfied <b>and</b> <u>all</u> of the following criteria are met; If not satisfied, return to Category III.)</p> <p><input type="checkbox"/> "Low" rating for Uniqueness; <b>and</b></p> <p><input type="checkbox"/> "Low" rating for Production Export / Food Chain Support; <b>and</b></p> <p><input type="checkbox"/> Percent of total possible points is &lt; 30%.</p>

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

**I**       **II**       **III**       **IV**

## **Appendix C**

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### **2007 REPRESENTATIVE PHOTOGRAPHS**

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*MDT Wetland Mitigation Monitoring  
Camp Creek  
Sula, Montana*

## CAMP CREEK MITIGATION SITE 2007



Photo Point No. 1: View facing northeast along vegetation transect, end point in foreground. Camp Creek and floodplain margins located in background view.



Photo Point No. 2: View facing southwest along vegetation transect, starting point in foreground, located in upland community type.



Photo Point No. 3: View facing northeast, constructed Camp Creek channel and floodplain margins. Area dominated by wetland species.



Photo Point No. 4: View facing north, floodplain margins with emergent wetland and riparian vegetation. Large containerized cottonwood and aspen plantings.



Photo Point No. 7: View facing south; lowest section of Camp Creek channel, north boundary of MDT parcel.



Photo Point No. 8: View facing west across mitigation site, upland community type in foreground. Area dominated by mostly invasive species.

## CAMP CREEK MITIGATION SITE 2007



Photo Point No. 9: View facing north, main channel just below second culvert. Upland areas dominated by spotted knapweed. Areas also heavily grazed by local livestock.



Photo Point No. 10: View facing south towards channel, increased herbaceous cover along floodplain margins.



Photo Point No. 12: View facing south, main channel running along Grasser structures, shrub community present.



Photo Point No. 13: View facing south, straight sections of main channel running across upper portion of Grasser parcel.

## CAMP CREEK MITIGATION SITE 2007



Photo Point No. 5: Panoramic view facing west across site. Representative photo of channel and adjacent floodplains present at Camp Creek. Floodplain areas dominated by mostly wetland and riparian species. Areas of floodplain with saturated soils during late summer visit. The shrub and tree plantings showing annual growth.



Photo Point No. 8: View facing west across the mitigation site with upland community type in foreground and wetland community in background.

**CAMP CREEK MITIGATION SITE 2007**



Photo Point No. 11: View facing north along creek, road crossing and culvert near Grasser complex. Area dominated by spotted knapweed.

## **Appendix D**

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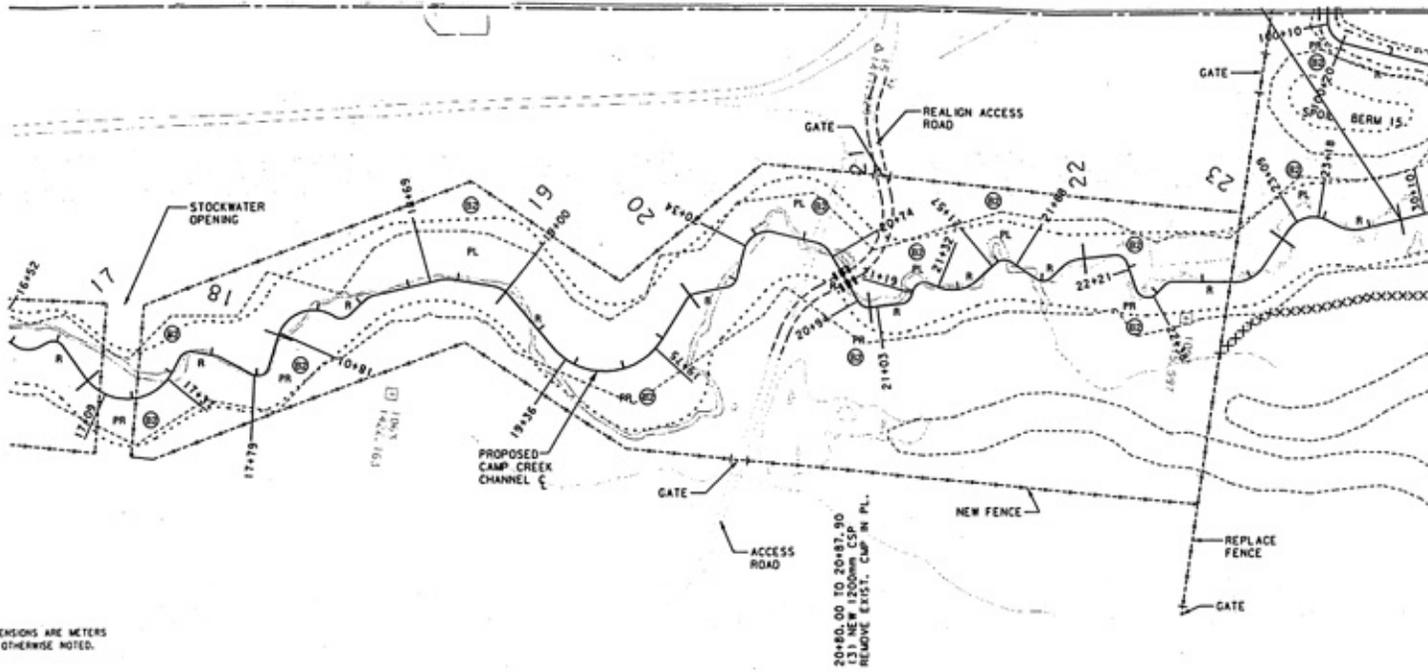
### **ORIGINAL SITE PLAN**

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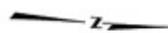
*MDT Wetland Mitigation Monitoring  
Camp Creek  
Sula, Montana*







- LEGEND**
- (B2) BANK PROTECTION TREATMENT TYPE 2 SEE DETAILS
  - PR POOL RIGHT
  - PL POOL LEFT
  - R RIFFLE - INCLUDE 3.6m TRANSITION BETWEEN EACH POOL AND RIFFLE
  - XXXXXXXXXX F&L IRR. DITCH
  - NEW FENCE
  - ..... FLOOD PLAIN
  - ..... CONST. LIMITS



**NOTES**  
1. ALL DIMENSIONS ARE METERS UNLESS OTHERWISE NOTED.

20+80.00 TO 20+87.90  
REMOVE EXIST. CURB ON PL.







## **Appendix E**

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

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*MDT Wetland Mitigation Monitoring  
Camp Creek  
Sula, Montana*

## BIRD SURVEY PROTOCOL

This protocol was developed by the Montana Department of Transportation (MDT) to monitor bird use within their Wetland Mitigation Sites. Though each wetland mitigation site is vastly different, the bird survey data collection methods were standardized to order to increase repeatability. The protocol uses an "area search within a restricted time frame" to collect data on bird species, density, behavior, and habitat-type use.

### Survey Area

***Sites that can be entirely walked:*** Sites where the entire perimeter or area can be walked include, but are not limited to: small ponds, enhanced historic river channels, and wet meadows. If the wetland is not uncomfortably inundated, walk several meandering transects to sufficiently cover the wetland. Meandering transects can be used, even if a small portion of the area is inaccessible (e.g. cannot cross due to inundation). Use binoculars to identify the bird species, to count the number of individuals, and to identify their behavior and habitat type. Data can be recorded directly onto the bird survey form or into a field notebook. The number of meandering transects and their direction (or location) should be recorded in the field notebook and/or drawn onto the aerial photograph or topographic map. Meandering transects are not formal and should not be staked. Each site should be walked and surveyed to the fullest extent within the set time limit.

***Sites than cannot be entirely walked:*** Sites where the entire perimeter or area cannot be walked include, but are not limited to: very large sites (i.e. perimeter of 2-3 miles), and large-bodied waters (i.e. reservoirs), where deep water habitat (> 6 feet) is close to shore. For large-bodied waters where only one area was graded to create or enhance the development of wetland, bird surveys should be walked along meandering transects within or around the graded area (see above.). For sites that cannot be walked, bird surveys should be conducted from many lookout posts, established at key vantage points. The general location of lookout posts should be recorded in the field notebook or drawn onto the aerial photograph or topographic map. Lookout post locations do not need to be staked. Both binoculars and spotting scopes may be used in order to accurately identify and count the birds. Depending upon the size of the open water, more time may be spent viewing the mitigation area from lookout posts than is spent traveling between posts.

### Survey Time

Ideally, bird surveys should be conducted in the morning hours when bird activity is often greatest (i.e. sunrise to no later than 11:00 am). Surveys can be completed before 11am if all transects have been walked or all lookout posts have been viewed with no new bird activity observed. For some sites bird surveys may need to be performed in the late afternoon or evening due to traveling constraints or weather. The overall limiting time factor will be the number of budgeted hours for the project.

### Data Recording

***Bird Species List:*** Record each bird species observed onto the Bird Survey-Field Data Sheet (or field notebook). Record the bird's common name using the appropriate 4-letter code. The 4-letter code uses the first two letters of the first two word's of the bird's common name or if one name, the first four letters. For example, Mourning Dove is coded as MODO while Mallard is coded as MALL. If an unknown individual is observed, use the 4-letter protocol, but define your

## BIRD SURVEY PROTOCOL (continued)

abbreviation at the bottom of the field data sheet. For example, unknown shorebird is UNSB; unknown brown bird is UNBR; unknown warbler is UNWA; and unknown waterfowl is UNWF. For a flyover of a flock of unknown species, use a term that describes the birds' general characteristics and include the approximate flock size in parenthesis; do not fill in the habitat column. For example, a flock of black, medium-sized birds could be coded as UNBB / FO (25).

**Bird Density:** For each observation record the actual or estimated number of individuals observed per species and per behavior. Totals can be tallied in the office and entered onto the Bird Survey-Field Data Sheet.

**Bird Behavior:** Bird behavior must be identified by what is known. When a species is observed, the behavior that is immediately exhibited is recorded. Only behaviors that have discreet descriptive terms should be used. The following terms are recommended: breeding pair (BP); foraging (F); flyover (FO); loafing (L), which is defined as sleeping, roosting, or floating with head tucked under wing; and nesting (N). If other behaviors that have a specific descriptive word are observed then it can be used and should later be added to the protocol. Descriptive words or phrases such as "migrating" or "living on site" are unknown behaviors.

**Bird Species Habitat Use:** When a species is observed, the habitat is also recorded. The following broad habitat categories are used:

- ◆ aquatic bed (AB), defined as rooted-floating, floating-leaved, or submergent vegetation.
- ◆ marsh (MA), defined as emergent (e.g. cattail, bulrush) vegetation with surface water.
- ◆ wet meadow (WM), defined as grasses, sedges, or rushes with little to no surface water.
- ◆ scrub-shrub (SS), defined as shrub covered wetland.
- ◆ forested (FO), defined as tree covered wetland.
- ◆ open water (OW), defined as unvegetated surface water.
- ◆ upland (UP), defined as the upland buffer.

Other categories can be used and defined on the data sheet and should later be added to the protocol.

### Other Fields

**Bird Visit:** Each bird survey (i.e. spring, fall, and mid-season) should be completed on separate Bird Survey-Field Data Sheets.

**Time:** Record the start time and end time on the Bird Survey-Field Data Sheet.

**Date:** Record the date of the bird survey.

**Weather:** Record the weather conditions (i.e. temperature, wind, condition).

**Notes:** Note if a particular individual bird is using a constructed nest box and note the condition of constructed nest box(es). Also record any comments about the site, wildlife, wetland conditions, etc.

## **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 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, some sites continued to be mapped using the Trimble GEO III GPS unit while most 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**

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### **2007 MACROINVERTEBRATE SAMPLING PROTOCOL AND DATA**

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*MDT Wetland Mitigation Monitoring  
Camp Creek  
Sula, 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 – 2007**

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

## **INTRODUCTION**

Aquatic invertebrate assemblages were collected at a number of mitigated wetlands throughout Montana. This report summarizes data generated from seven years of collection. Over all years of sampling, a total of 182 invertebrate samples were collected. Table 1 lists the currently monitored sites at which aquatic invertebrates were collected in 2007, 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 and 2007 by personnel of PBS&J. Sampling procedures utilized were based on the protocols developed by the Montana Department of Environmental Quality (MT DEQ) 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.

### **Quality assurance systems**

Quality control procedures for initial sample processing and subsampling involved checking sorting efficiency. These checks were conducted on 96% of the samples by independent observers who microscopically re-examined 20% of sorted substrate from each sample. All organisms that were missed were counted and this number was added to the total number obtained in the original sort. Sorting efficiency was evaluated by applying the following calculation:

$$SE = \frac{n_1}{n_{1+2}} \times 100$$

where: SE is the sorting efficiency, expressed as a percentage,  $n_1$  is the total number of specimens in the first sort, and  $n_{1+2}$  is the total number of specimens in the first and second sorts combined.

Quality control procedures for taxonomic determinations of invertebrates involved checking accuracy, precision and enumeration. At least 10% of samples are targeted for quality assurance procedures. For this project, three samples were randomly selected and all organisms re-identified and counted by an independent taxonomist. Taxa lists and enumerations were compared by calculating a Bray-Curtis similarity statistic (Bray and Curtis 1957) for each

selected sample. Routinely, discrepancies between the original identifications and the QC identifications are discussed among the taxonomists, and necessary rectifications to the data are made. Discrepancies that cannot be rectified by discussions are routinely sent out to taxonomic specialists for identification. However, taxonomic certainty for identifications in this project was high, and no external verifications were necessary.

## **Assessment**

The method employed to assess these wetlands is based on an index incorporating a battery of 12 bioassessment metrics or attributes (Table 1) tested and recommended by Stribling et al. (1995) in a report to the Montana Department of Health and Environmental Science. In that study, it was determined that some of the metrics were of limited use in some geographic regions, and for some wetland types. Despite that finding, all 12 metrics are used in this evaluation of mitigated wetlands, since detailed geographic information and wetland classifications were unavailable. Scoring criteria for 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, “optimal” scores were generally those that fell above the 75<sup>th</sup> percentile (for those metrics that decrease in value in response to stress) or below the 25<sup>th</sup> percentile (for metrics that respond to stress by an increase in value) of all scores. Additional scoring ranges were established by bisecting the range below the 75<sup>th</sup> percentile for decreasing scores (or above the 25<sup>th</sup> percentile for increasing scores) into “sub-optimal” and “poor” assessment categories. A score of 5, 3, or 1 was assigned to optimal, sub-optimal, and poor metric performance, respectively. In this way, metric values were translated into normalized metric scores, and scores for all metrics were summed to produce a total bioassessment score, 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.

Several 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 2007, the lotic sites were Camp Creek (2 sites), Cloud Ranch stream, Kleinschmidt stream, Jack Creek, and Woodson Creek-Ringling stream. 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 (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 (the Hilsenhoff Biotic Index and %Dominant taxon) were included in the bioassessment battery. The HBI indicates the overall invertebrate assemblage tolerance to nutrient enrichment, warm water, and/or low dissolved oxygen conditions. The percent abundance of the dominant taxon has been demonstrated to be strongly associated with pH, conductance, salinity, total organic carbon, and total dissolved solids.

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

Summary metric values and scores for the 2007 samples are given in Tables 4a-4c and 5.

In 2007, thermal preference of the invertebrate assemblages was calculated when possible, using the tool developed by 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 Arctopsyche 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 monitored in 2007 are included. An asterisk (\*) indicates lotic sites.

Site Identifier	2001	2002	2003	2004	2005	2006	2007
Roundup	+	+	+	+	+	+	+
Ridgeway	+	+	+	+	+	+	+
Hoskins Landing MS-1		+	+	+	+		+
Hoskins Landing MS-2							+
Peterson Ranch pond 1		+	+	+	+	+	+
Peterson Ranch pond 2		+		+	+	+	+
Peterson Ranch pond 4		+	+	+	+	+	+
Peterson Ranch pond 5		+	+	+	+	+	+
Camp Creek MS-1*		+	+	+	+	+	+
Camp Creek MS-2*						+	+
Kleinschmidt		+	+	+	+	+	+
Kleinschmidt – stream*			+	+	+	+	+
Cloud Ranch Pond				+	+		+
Cloud Ranch Stream*				+			+
Jack Creek – pond				+	+		+
Jack Creek – McKee*							+
Norem				+	+	+	+
Rock Creek Ranch					+	+	+
Wagner Marsh					+	+	+
Alkali Lake 1						+	+
Charley Creek							+
Woodson pond MI 1							+
Woodson stream MI 2*							+
Little Muddy Creek							+
Selkirk Ranch							+
DH Ranch							+

**Table 2.** Aquatic invertebrate metrics employed for wetland (lentic) invertebrate assemblages in the MDT mitigated wetlands study, 2001 – 2007.

<b>Metric</b>	<b>Metric calculation</b>	<b>Expected response to degradation or impairment</b>
Total taxa	Count of unique taxa identified to lowest recommended taxonomic level	Decrease
POET	Count of unique Plecoptera, Trichoptera, Ephemeroptera, and Odonata taxa identified to lowest recommended taxonomic level	Decrease
Chironomidae taxa	Count of unique midge taxa identified to lowest recommended taxonomic level	Decrease
Crustacea taxa + Mollusca taxa	Count of unique Crustacea taxa and Mollusca taxa identified to lowest recommended taxonomic level	Decrease
% Chironomidae	Percent abundance of midges in the subsample	Increase
Orthoclaadiinae / Chironomidae	Number of individual midges in the sub-family Orthoclaadiinae / total number of midges in the subsample.	Decrease
% Amphipoda	Percent abundance of amphipods in the subsample	Increase
% Crustacea + % Mollusca	Percent abundance of crustaceans in the subsample plus percent abundance of molluscs in the subsample	Increase
HBI	Relative abundance of each taxon multiplied 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 section of individual project monitoring reports. Summary tables for lentic (4a – 4c) and lotic (5) sites and project specific taxa listings and metrics reports are provided on the following pages.)

### Quality Assurance

Table 3 gives the results of quality assurance procedures for sample sorting efficiency (SE) and Bray-Curtis similarity statistics for comparisons of taxonomic determinations and enumeration. Sorting efficiency averaged 97.54% for the project, and taxonomic similarity averaged 97.44%.

**Table 3.** Results of quality control procedures for subsampling and taxonomic and enumeration similarity.

Site name	SE	Bray-Curtis similarity
Roundup	100.00%	
Ridgeway	100.00%	
Hoskins Landing MS-1	100.00%	
Hoskins Landing MS-2	93.40%	
Peterson Ranch pond 1	100.0%	95.38%
Peterson Ranch pond 2	96.64%	
Peterson Ranch pond 4	91.66%	
Peterson Ranch pond 5	96.64%	
Camp Creek MS-1	100.00%	
Camp Creek MS-2	100.00%	96.94%
Kleinschmidt – pond	100.00%	
Kleinschmidt – stream	99.10%	
Cloud Ranch Pond	95.65%	
Cloud Ranch Stream	91.61%	
Jack Creek – pond	n.a.	
Jack Creek - McKee	96.49%	
Norem	100.00%	100.00%
Rock Creek Ranch	100.00%	
Wagner Marsh	100.00%	
Alkali Lake 1	98.04%	
Charley Creek	100.00%	
Woodson pond	91.37%	
Woodson stream	100.00%	
Little Muddy Creek	92.31%	
Selkirk Ranch	95.56%	
DH Ranch	100.00%	

**Table 4a.** Metric values and scores for wetland (lentic) sites in the MDT mitigated wetland study – 2007 sampling.

	<b>ROUNDUP</b>	<b>RIDGEWAY</b>	<b>HOSKINS LANDING MS-1</b>	<b>HOSKINS LANDING MS-2</b>	<b>PETERSON RANCH 1</b>	<b>PETERSON RANCH 2</b>	<b>PETERSON RANCH 4</b>	<b>PETERSON RANCH 5</b>
Total taxa	7	13	18	21	17	18	26	18
POET	0	2	3	5	2	0	6	4
Chironomidae taxa	5	5	2	8	8	12	12	6
Crustacea + Mollusca	1	2	5	4	4	5	4	4
% Chironomidae	7.62%	30.00%	18.75%	52.68%	36.45%	51.79%	42.59%	14.78%
Orthoclaadiinae/Chir	0.38	0.17	0.00	0.03	0.08	0.16	0.09	0.12
% Amphipoda	0.00%	10.00%	0.00%	0.00%	0.93%	0.00%	21.30%	1.74%
% Crustacea + % Mollusca	89.52%	15.00%	26.79%	8.04%	10.28%	43.75%	28.70%	37.39%
HBI	8.02	7.11	7.23	6.55	7.42	7.76	6.53	7.23
% Dominant taxon	89.52%	30.00%	17.86%	35.71%	39.25%	23.21%	17.59%	30.43%
% Collector-Gatherers	92.38%	70.00%	78.57%	82.14%	49.53%	71.43%	38.89%	26.96%
% Filterers	0.00%	0.00%	0.89%	6.25%	9.35%	3.57%	1.85%	5.22%
Total taxa	1	1	3	5	3	3	5	3
POET	1	1	3	5	1	1	5	5
Chironomidae taxa	3	3	1	5	5	5	3	3
Crustacea + Mollusca	1	1	3	3	3	3	1	3
% Chironomidae	5	3	3	1	3	1	1	5
Orthoclaadiinae/Chir	3	1	1	1	1	1	3	1
% Amphipoda	5	3	5	5	5	5	5	5
% Crustacea + % Mollusca	1	5	5	5	5	3	5	3
HBI	1	3	3	5	3	1	5	3
% Dominant taxon	1	5	5	3	3	5	1	5
% Collector-Gatherers	5	3	3	5	3	3	3	1
% Filterers	3	3	3	1	1	3	5	3
<b>Total score</b>	<b>30</b>	<b>32</b>	<b>38</b>	<b>44</b>	<b>36</b>	<b>34</b>	<b>42</b>	<b>40</b>
<b>Percent of maximum score</b>	<b>50.00%</b>	<b>53.33%</b>	<b>63.33%</b>	<b>73.33%</b>	<b>60.00%</b>	<b>56.67%</b>	<b>70.00%</b>	<b>66.67%</b>
<b>Impairment classification</b>	<b>poor</b>	<b>sub-optimal</b>	<b>optimal</b>	<b>optimal</b>	<b>sub-optimal</b>	<b>sub-optimal</b>	<b>optimal</b>	<b>optimal</b>

**Table 4b.** Metric values and scores for wetland (lentic) sites in the MDT mitigated wetland study – 2007 sampling.

	<b>KLEIN-SCHMIDT POND</b>	<b>CLOUD RANCH POND</b>	<b>JACK CREEK POND</b>	<b>NOREM</b>	<b>ROCK CREEK RANCH</b>	<b>WAGNER MARSH</b>	<b>ALKALI LAKE 1</b>	<b>CHARLEY CREEK</b>
Total taxa	25	13	9	6	18	11	9	13
POET	5	2	0	1	2	2	0	0
Chironomidae taxa	8	11	5	2	4	4	2	3
Crustacea + Mollusca	8	1	4	1	4	0	2	3
% Chironomidae	18.63%	81.54%	92.79%	31.58%	4.76%	11.39%	1.96%	27.17%
Orthoclaadiinae/Chir	0.53	0.38	0.03	0.00	0.60	0.44	0.50	0.68
% Amphipoda	10.78%	3.08%	0.00%	0.00%	17.14%	0.00%	0.00%	22.83%
% Crustacea + % Mollusca	36.27%	3.08%	7.21%	21.05%	23.81%	0.00%	61.76%	53.26%
HBI	7.35	7.22	9.73	6.63	6.33	7.28	8.07	6.88
% Dominant taxon	13.73%	18.46%	62.16%	26.32%	29.52%	45.57%	60.78%	29.35%
% Collector-Gatherers	53.92%	84.62%	70.27%	57.89%	29.52%	15.19%	70.59%	32.61%
% Filterers	11.76%	9.23%	0.90%	0.00%	0.95%	0.00%	0.00%	0.00%
Total taxa	5	1	1	1	3	1	1	1
POET	5	1	1	1	1	1	1	1
Chironomidae taxa	5	5	3	1	3	3	1	3
Crustacea + Mollusca	5	1	3	1	3	1	1	1
% Chironomidae	3	1	1	3	5	5	5	3
Orthoclaadiinae/Chir	5	3	1	1	5	3	5	5
% Amphipoda	3	5	5	5	3	5	5	3
% Crustacea + % Mollusca	3	5	5	5	5	5	3	3
HBI	3	3	1	5	5	3	1	5
% Dominant taxon	5	5	1	5	5	3	1	5
% Collector-Gatherers	3	5	3	3	1	1	3	1
% Filterers	1	1	3	3	3	3	3	3
<b>Total score</b>	<b>46</b>	<b>36</b>	<b>28</b>	<b>34</b>	<b>42</b>	<b>34</b>	<b>30</b>	<b>34</b>
<b>Percent of maximum score</b>	<b>76.67%</b>	<b>60.00%</b>	<b>46.67%</b>	<b>56.67%</b>	<b>70.00%</b>	<b>56.67%</b>	<b>50.00%</b>	<b>56.67%</b>
<b>Impairment classification</b>	<b>optimal</b>	<b>sub-optimal</b>	<b>poor</b>	<b>sub-optimal</b>	<b>poor</b>	<b>sub-optimal</b>	<b>poor</b>	<b>sub-optimal</b>

**Table 4c.** Metric values and scores for wetland (lentic) sites in the MDT mitigated wetland study – 2007 sampling.

	<b>WOODSON POND</b>	<b>LITTLE MUDDY CREEK</b>	<b>SELKIRK RANCH</b>	<b>DH RANCH</b>
Total taxa	12	2	16	8
POET	0	0	2	1
Chironomidae taxa	9	0	8	4
Crustacea + Mollusca	1	1	2	2
% Chironomidae	85.71%	0.00%	77.27%	27.50%
Orthocladinae/Chir	0.32	0.00	0.61	0.00
% Amphipoda	0.00%	0.00%	0.00%	0.00%
% Crustacea + % Mollusca	2.86%	75.00%	8.18%	64.17%
HBI	9.34	8.50	7.82	7.38
% Dominant taxon	33.33%	75.00%	46.36%	39.17%
% Collector-Gatherers	55.24%	75.00%	32.73%	27.50%
% Filterers	0.00%	0.00%	8.18%	17.50%
Total taxa	1	1	3	1
POET	1	1	1	1
Chironomidae taxa	5	1	5	3
Crustacea + Mollusca	1	1	1	1
% Chironomidae	1	5	1	3
Orthocladinae/Chir	3	1	5	1
% Amphipoda	5	5	5	5
% Crustacea + % Mollusca	5	1	5	1
HBI	1	1	1	3
% Dominant taxon	5	1	3	3
% Collector-Gatherers	3	3	1	1
% Filterers	3	3	1	1
<b>Total score</b>	<b>34</b>	<b>24</b>	<b>32</b>	<b>24</b>
<b>Percent of maximum score</b>	<b>56.67%</b>	<b>40.00%</b>	<b>53.33%</b>	<b>40.00%</b>
<b>Impairment classification</b>	<b>sub-optimal</b>	<b>poor</b>	<b>sub-optimal</b>	<b>poor</b>

**Table 5.** Metric values and scores for stream (lotic) sites in the MDT mitigated wetland study – 2007 sampling.

	<b>CAMP CREEK MS-1</b>	<b>CAMP CREEK MS-2</b>	<b>KLEIN- SCHMIDT STREAM</b>	<b>CLOUD RANCH STREAM</b>	<b>JACK CREEK - MCKEE</b>	<b>WOODSON STREAM</b>
<b>E Richness</b>	6	6	0	2	1	1
<b>P Richness</b>	0	0	0	2	0	0
<b>T Richness</b>	4	6	2	4	4	0
<b>Pollution Sensitive Richness</b>	3	4	0	1	0	0
<b>Filterer Percent</b>	4.85%	5.56%	7.14%	3.57%	2.83%	16.67%
<b>Pollution Tolerant Percent</b>	32.04%	34.26%	9.82%	14.29%	58.49%	8.33%
<b>E Richness</b>	3	3	0	1	0	0
<b>P Richness</b>	0	0	0	2	0	0
<b>T Richness</b>	2	3	1	2	2	0
<b>Pollution Sensitive Richness</b>	2	3	0	1	0	0
<b>Filterer Percent</b>	3	2	2	3	3	1
<b>Pollution Tolerant Percent</b>	1	1	2	1	0	2
<b>Total score</b>	<b>11</b>	<b>12</b>	<b>5</b>	<b>10</b>	<b>5</b>	<b>3</b>
<b>Percent of maximum score</b>	<b>61.11%</b>	<b>66.67%</b>	<b>27.78%</b>	<b>55.56%</b>	<b>27.78%</b>	<b>16.67%</b>
<b>Impairment classification</b>	<b>slight</b>	<b>slight</b>	<b>moderate</b>	<b>slight</b>	<b>moderate</b>	<b>severe</b>

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- Brandt, D. 2001. Temperature Preferences and Tolerances for 137 Common Idaho Macroinvertebrate Taxa. Report to the Idaho Department of Environmental Quality, Coeur d' Alene, Idaho.
- Bray, J. R. and J. T. Curtis. 1957. An ordination of upland forest communities of southern Wisconsin. Ecological Monographs 27: 325-349.
- 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: MDT07PBSJ  
RAI No.: MDT07PBSJ001

RAI No.: MDT07PBSJ001

Sta. Name: Camp Creek MS 1

Client ID:

Date Coll.: 8/10/2007

No. Jars: 1

STORET ID:

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
<b>Non-Insect</b>							
Acari	2	1.94%	Yes	Unknown		5	PR
Enchytraeidae							
Enchytraeidae	12	11.65%	Yes	Unknown		4	CG
Lymnaeidae							
Lymnaeidae	1	0.97%	Yes	Immature		6	SC
Naididae							
Naididae	1	0.97%	Yes	Unknown		8	CG
Physidae							
<i>Physa</i> sp.	5	4.85%	Yes	Unknown		8	SC
Planariidae							
<i>Polycelis coronata</i>	1	0.97%	Yes	Unknown		1	OM
<b>Ephemeroptera</b>							
Baetidae							
<i>Diphotor hageni</i>	1	0.97%	Yes	Larva		5	CG
Ephemerellidae							
<i>Attenella</i> sp.	1	0.97%	No	Larva	Early Instar	2	CG
<i>Attenella margarita</i>	2	1.94%	Yes	Larva		3	CG
<i>Drunella grandis</i>	3	2.91%	Yes	Larva		2	SC
<i>Timpanoga hecuba</i>	1	0.97%	Yes	Larva		2	CG
Heptageniidae							
<i>Nixe</i> sp.	3	2.91%	Yes	Larva		4	SC
Leptohyphidae							
<i>Tricorythodes</i> sp.	1	0.97%	Yes	Larva		4	CG
<b>Trichoptera</b>							
Apataniidae							
<i>Apatania</i> sp.	1	0.97%	Yes	Larva		3	SC
Brachycentridae							
<i>Brachycentrus</i> sp.	2	1.94%	No	Pupa		1	CF
<i>Brachycentrus americanus</i>	2	1.94%	Yes	Larva		1	CF
Hydroptilidae							
<i>Hydroptila</i> sp.	1	0.97%	Yes	Larva		6	PH
<i>Ochrotrichia</i> sp.	1	0.97%	Yes	Larva		4	PH
<b>Coleoptera</b>							
Dytiscidae							
Dytiscidae	1	0.97%	No	Larva		5	PR
<i>Oreodytes</i> sp.	2	1.94%	Yes	Adult		5	PR
Elmidae							
<i>Optioservus</i> sp.	8	7.77%	Yes	Adult		5	SC
<i>Optioservus</i> sp.	14	13.59%	No	Larva		5	SC
Hydrophilidae							
Hydrophilidae	1	0.97%	Yes	Larva		5	PR

# Taxa Listing

Project ID: MDT07PBSJ  
RAI No.: MDT07PBSJ001

RAI No.: MDT07PBSJ001

Sta. Name: Camp Creek MS 1

Client ID:

Date Coll.: 8/10/2007

No. Jars: 1

STORET ID:

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
<b>Diptera</b>							
Athericidae							
<i>Atherix</i> sp.	1	0.97%	Yes	Larva		5	PR
Ceratopogonidae							
Ceratopogoninae	2	1.94%	Yes	Larva		6	PR
Tipulidae							
<i>Tipula</i> sp.	2	1.94%	Yes	Larva		4	SH
<b>Chironomidae</b>							
Chironomidae							
Chironomidae	3	2.91%	No	Pupa		10	CG
<i>Cricotopus (Nostococladius)</i> sp.	3	2.91%	Yes	Larva		6	SH
<i>Cricotopus bicinctus</i>	11	10.68%	Yes	Larva		7	SH
Eukiefferiella Devonica Gr.	1	0.97%	Yes	Larva		8	CG
<i>Micropsectra</i> sp.	2	1.94%	Yes	Larva		4	CG
Orthoclaadiinae	1	0.97%	No	Larva	Early Instar	6	CG
<i>Orthocladus</i> sp.	2	1.94%	Yes	Larva		6	CG
<i>Parametriocnemus</i> sp.	1	0.97%	Yes	Larva		5	CG
<i>Rheocricotopus</i> sp.	2	1.94%	Yes	Larva		4	CG
<i>Tanytarsus</i> sp.	1	0.97%	Yes	Larva		6	CF
Tvetenia Bavarica Gr.	4	3.88%	Yes	Larva		5	CG
	<b>Sample Count</b>	<b>103</b>					

# Metrics Report

Project ID: MDT07PBSJ  
 RAI No.: MDT07PBSJ001  
 Sta. Name: Camp Creek MS 1  
 Client ID:  
 STORET ID:  
 Coll. Date: 8/10/2007

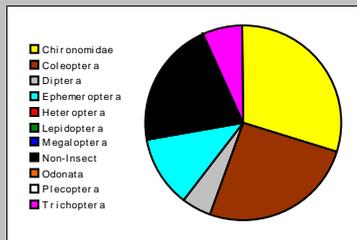
## Abundance Measures

Sample Count: 103  
 Sample Abundance: 2,472.00 4.17% of sample used

Coll. Procedure:  
 Sample Notes:

## Taxonomic Composition

Category	R	A	PRA
Non-Insect	6	22	21.36%
Odonata			
Ephemeroptera	6	12	11.65%
Plecoptera			
Heteroptera			
Megaloptera			
Trichoptera	4	7	6.80%
Lepidoptera			
Coleoptera	3	26	25.24%
Diptera	3	5	4.85%
Chironomidae	9	31	30.10%

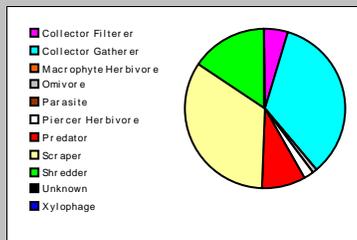


## Dominant Taxa

Category	A	PRA
Optioservus	22	21.36%
Enchytraeidae	12	11.65%
Cricotopus bicinctus	11	10.68%
Physa	5	4.85%
Tvetenia Bavarica Gr.	4	3.88%
Nixe	3	2.91%
Drunella grandis	3	2.91%
Cricotopus (Nostococladus)	3	2.91%
Chironomidae	3	2.91%
Oreodytes	2	1.94%
Micropsectra	2	1.94%
Ceratopogoninae	2	1.94%
Brachycentrus americanus	2	1.94%
Brachycentrus	2	1.94%
Acari	2	1.94%

## Functional Composition

Category	R	A	PRA
Predator	5	9	8.74%
Parasite			
Collector Gatherer	12	35	33.98%
Collector Filterer	2	5	4.85%
Macrophyte Herbivore			
Piercer Herbivore	2	2	1.94%
Xylophage			
Scraper	6	35	33.98%
Shredder	3	16	15.53%
Omnivore	1	1	0.97%
Unknown			

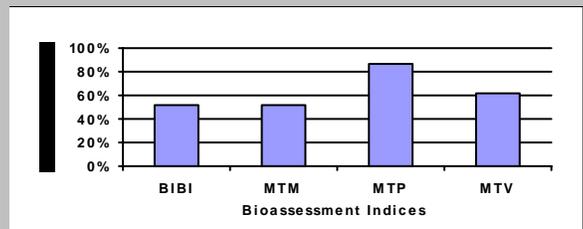


## Metric Values and Scores

Metric	Value	BIBI	MTP	MTV	MTM
<i>Composition</i>					
Taxa Richness	31	3	3		3
Non-Insect Percent	21.36%				
E Richness	6	3		3	
P Richness	0	1		0	
T Richness	4	1		2	
EPT Richness	10		3		0
EPT Percent	18.45%		1		0
Oligochaeta+Hirudinea Percent	12.62%				
Baetidae/Ephemeroptera	0.083				
Hydropsychidae/Trichoptera	0.000				
<i>Dominance</i>					
Dominant Taxon Percent	21.36%		3		3
Dominant Taxa (2) Percent	33.01%				
Dominant Taxa (3) Percent	43.69%	5			
Dominant Taxa (10) Percent	66.02%				
<i>Diversity</i>					
Shannon H (loge)	3.051				
Shannon H (log2)	4.402		3		
Margalef D	6.827				
Simpson D	0.056				
Evenness	0.047				
<i>Function</i>					
Predator Richness	5		2		
Predator Percent	8.74%	1			
Filterer Richness	2				
Filterer Percent	4.85%			3	
Collector Percent	38.84%		3		3
Scraper+Shredder Percent	49.51%		3		2
Scraper/Filterer	7.000				
Scraper/Scraper+Filterer	0.875				
<i>Habit</i>					
Burrower Richness	2				
Burrower Percent	3.88%				
Swimmer Richness	2				
Swimmer Percent	2.91%				
Clinger Richness	12	3			
Clinger Percent	52.43%				
<i>Characteristics</i>					
Cold Stenotherm Richness	2				
Cold Stenotherm Percent	3.88%				
Hemoglobin Bearer Richness	0				
Hemoglobin Bearer Percent	0.00%				
Air Breather Richness	3				
Air Breather Percent	5.83%				
<i>Voltinism</i>					
Univoltine Richness	13				
Semivoltine Richness	4	3			
Multivoltine Percent	35.92%		3		
<i>Tolerance</i>					
Sediment Tolerant Richness	3				
Sediment Tolerant Percent	3.88%				
Sediment Sensitive Richness	1				
Sediment Sensitive Percent	2.91%				
Metals Tolerance Index	3.613				
Pollution Sensitive Richness	3	3			2
Pollution Tolerant Percent	32.04%	3			1
Hilsenhoff Biotic Index	5.049		2		0
Intolerant Percent	9.71%				
Supertolerant Percent	9.71%				
CTQa	83.600				

## Bioassessment Indices

BioIndex	Description	Score	Pct	Rating
BIBI	B-IBI (Karr et al.)	26	52.00%	
MTP	Montana DEQ Plains (Bukantis 1998)	26	86.67%	None
MTV	Montana Revised Valleys/Foothills (Bollman 1998)	11	61.11%	Slight
MTM	Montana DEQ Mountains (Bukantis 1998)	11	52.38%	Moderate



# Taxa Listing

Project ID: MDT07PBSJ  
RAI No.: MDT07PBSJ002

RAI No.: MDT07PBSJ002

Sta. Name: Camp Creek MS 2

Client ID:

Date Coll.: 8/10/2007

No. Jars: 1

STORET ID:

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
<b>Non-Insect</b>							
Acari	2	1.85%	Yes	Unknown		5	PR
Nematoda	1	0.93%	Yes	Unknown		5	PA
Turbellaria	5	4.63%	Yes	Unknown		4	PR
Enchytraeidae							
Enchytraeidae	7	6.48%	Yes	Unknown		4	CG
Naididae							
Naididae	3	2.78%	Yes	Unknown		8	CG
Physidae							
<i>Physa</i> sp.	8	7.41%	Yes	Unknown		8	SC
Pisidiidae							
Pisidiidae	1	0.93%	Yes	Unknown		8	CG
Tubificidae							
Tubificidae	1	0.93%	Yes	Unknown		10	CG
<b>Ephemeroptera</b>							
Ameletidae							
<i>Ameletus</i> sp.	1	0.93%	Yes	Larva		0	CG
Baetidae							
<i>Acentrella</i> sp.	1	0.93%	Yes	Larva		4	CG
<i>Centropilum</i> sp.	1	0.93%	Yes	Larva		2	CG
Ephemerellidae							
<i>Attenella margarita</i>	1	0.93%	Yes	Larva		3	CG
<i>Drunella grandis</i>	2	1.85%	Yes	Larva		2	SC
Heptageniidae							
<i>Nixe</i> sp.	1	0.93%	Yes	Larva		4	SC
<b>Trichoptera</b>							
Apataniidae							
<i>Apatania</i> sp.	4	3.70%	Yes	Larva		3	SC
Brachycentridae							
<i>Brachycentrus americanus</i>	1	0.93%	Yes	Larva		1	CF
<i>Micrasema</i> sp.	1	0.93%	Yes	Larva		1	SH
Hydroptilidae							
<i>Hydroptila</i> sp.	2	1.85%	Yes	Larva		6	PH
<i>Ochrotrichia</i> sp.	1	0.93%	Yes	Larva		4	PH
Lepidostomatidae							
<i>Lepidostoma</i> sp.	3	2.78%	Yes	Larva		1	SH
<b>Coleoptera</b>							
Dytiscidae							
Dytiscidae	3	2.78%	No	Larva		5	PR
<i>Oreodytes</i> sp.	2	1.85%	Yes	Adult		5	PR
Elmidae							
<i>Narpus</i> sp.	1	0.93%	Yes	Larva		2	CG
<i>Optioservus</i> sp.	16	14.81%	No	Larva		5	SC
<i>Optioservus</i> sp.	4	3.70%	Yes	Adult		5	SC

# Taxa Listing

Project ID: MDT07PBSJ  
RAI No.: MDT07PBSJ002

RAI No.: MDT07PBSJ002

Sta. Name: Camp Creek MS 2

Client ID:

Date Coll.: 8/10/2007

No. Jars: 1

STORET ID:

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
<b>Diptera</b>							
Empididae							
<i>Clinocera</i> sp.	1	0.93%	Yes	Larva		5	PR
Simuliidae							
Simuliidae	1	0.93%	No	Pupa		6	CF
<i>Simulium</i> sp.	2	1.85%	Yes	Larva		6	CF
Tipulidae							
<i>Antocha</i> sp.	1	0.93%	Yes	Larva		3	CG
<i>Hexatoma</i> sp.	1	0.93%	Yes	Larva		2	PR
<b>Chironomidae</b>							
Chironomidae							
Chironomidae	2	1.85%	No	Pupa		10	CG
<i>Cladotanytarsus</i> sp.	1	0.93%	Yes	Larva		7	CG
<i>Corynoneura</i> sp.	1	0.93%	Yes	Larva		7	CG
<i>Cricotopus (Nostococladus)</i> sp.	1	0.93%	Yes	Larva		6	SH
<i>Cricotopus bicinctus</i>	1	0.93%	Yes	Larva		7	SH
Eukiefferiella Devonica Gr.	2	1.85%	Yes	Larva		8	CG
<i>Heterotrissocladus marcidus</i>	1	0.93%	Yes	Larva		4	CG
<i>Micropsectra</i> sp.	4	3.70%	Yes	Larva		4	CG
Orthoclaadiinae	1	0.93%	No	Larva	Early Instar	6	CG
<i>Parametriocnemus</i> sp.	1	0.93%	Yes	Larva		5	CG
<i>Phaenopsectra</i> sp.	2	1.85%	Yes	Larva		7	SC
<i>Polypedilum</i> sp.	1	0.93%	Yes	Larva		6	SH
<i>Rheocricotopus</i> sp.	1	0.93%	Yes	Larva		4	CG
<i>Stempellinella</i> sp.	2	1.85%	Yes	Larva		4	CG
<i>Tanytarsus</i> sp.	2	1.85%	Yes	Larva		6	CF
<i>Thienemanniella</i> sp.	1	0.93%	Yes	Larva		6	CG
Tvetenia Bavarica Gr.	5	4.63%	Yes	Larva		5	CG
<b>Sample Count</b>	<b>108</b>						

# Metrics Report

Project ID: MDT07PBSJ  
 RAI No.: MDT07PBSJ002  
 Sta. Name: Camp Creek MS 2  
 Client ID:  
 STORET ID:  
 Coll. Date: 8/10/2007

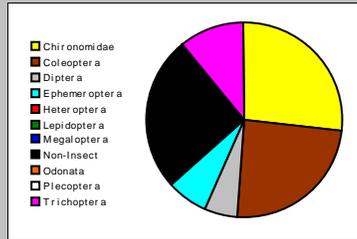
## Abundance Measures

Sample Count: 108  
 Sample Abundance: 1,178.18 9.17% of sample used

Coll. Procedure:  
 Sample Notes:

## Taxonomic Composition

Category	R	A	PRA
Non-Insect	8	28	25.93%
Odonata			
Ephemeroptera	6	7	6.48%
Plecoptera			
Heteroptera			
Megaloptera			
Trichoptera	6	12	11.11%
Lepidoptera			
Coleoptera	3	26	24.07%
Diptera	4	6	5.56%
Chironomidae	15	29	26.85%

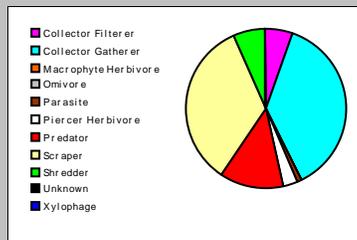


## Dominant Taxa

Category	A	PRA
Optioservus	20	18.52%
Physa	8	7.41%
Enchytraeidae	7	6.48%
Tvetenia Bavarica Gr.	5	4.63%
Turbellaria	5	4.63%
Micropsectra	4	3.70%
Apatania	4	3.70%
Naididae	3	2.78%
Lepidostoma	3	2.78%
Dytiscidae	3	2.78%
Tanytarsus	2	1.85%
Hydroptila	2	1.85%
Eukiefferiella Devonica Gr.	2	1.85%
Drunella grandis	2	1.85%
Chironomidae	2	1.85%

## Functional Composition

Category	R	A	PRA
Predator	5	14	12.96%
Parasite	1	1	0.93%
Collector Gatherer	20	40	37.04%
Collector Filterer	3	6	5.56%
Macrophyte Herbivore			
Piercer Herbivore	2	3	2.78%
Xylophage			
Scraper	6	37	34.26%
Shredder	5	7	6.48%
Omnivore			
Unknown			

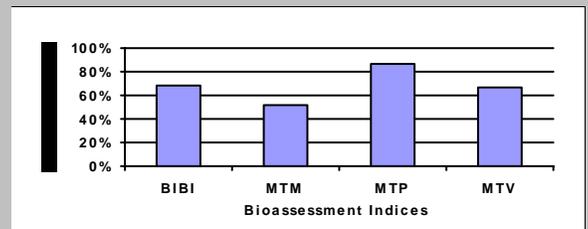


## Metric Values and Scores

Metric	Value	BIBI	MTP	MTV	MTM
<i>Composition</i>					
Taxa Richness	42	5	3		3
Non-Insect Percent	25.93%				
E Richness	6	3		3	
P Richness	0	1		0	
T Richness	6	3		3	
EPT Richness	12		3		0
EPT Percent	17.59%		1		0
Oligochaeta+Hirudinea Percent	10.19%				
Baetidae/Ephemeroptera	0.286				
Hydropsychidae/Trichoptera	0.000				
<i>Dominance</i>					
Dominant Taxon Percent	18.52%		3		3
Dominant Taxa (2) Percent	25.93%				
Dominant Taxa (3) Percent	32.41%	5			
Dominant Taxa (10) Percent	57.41%				
<i>Diversity</i>					
Shannon H (loge)	3.477				
Shannon H (log2)	5.017		3		
Margalef D	9.229				
Simpson D	0.029				
Evenness	0.032				
<i>Function</i>					
Predator Richness	5		2		
Predator Percent	12.96%	3			
Filterer Richness	3				
Filterer Percent	5.56%			2	
Collector Percent	42.59%		3		3
Scraper+Shredder Percent	40.74%		3		2
Scraper/Filterer	6.167				
Scraper/Scraper+Filterer	0.860				
<i>Habit</i>					
Burrower Richness	1				
Burrower Percent	0.93%				
Swimmer Richness	4				
Swimmer Percent	4.63%				
Clinger Richness	18	3			
Clinger Percent	42.59%				
<i>Characteristics</i>					
Cold Stenotherm Richness	2				
Cold Stenotherm Percent	4.63%				
Hemoglobin Bearer Richness	3				
Hemoglobin Bearer Percent	3.70%				
Air Breather Richness	3				
Air Breather Percent	6.48%				
<i>Voltinism</i>					
Univoltine Richness	16				
Semivoltine Richness	4	3			
Multivoltine Percent	38.89%		3		
<i>Tolerance</i>					
Sediment Tolerant Richness	3				
Sediment Tolerant Percent	2.78%				
Sediment Sensitive Richness	1				
Sediment Sensitive Percent	0.93%				
Metals Tolerance Index	3.686				
Pollution Sensitive Richness	4	5		3	
Pollution Tolerant Percent	34.26%	3		1	
Hilsenhoff Biotic Index	5.028		2		0
Intolerant Percent	10.19%				
Supertolerant Percent	15.74%				
CTQa	84.750				

## Bioassessment Indices

BioIndex	Description	Score	Pct	Rating
BIBI	B-IBI (Karr et al.)	34	68.00%	
MTP	Montana DEQ Plains (Bukantis 1998)	26	86.67%	None
MTV	Montana Revised Valleys/Foothills (Bollman 1998)	12	66.67%	Slight
MTM	Montana DEQ Mountains (Bukantis 1998)	11	52.38%	Moderate



## **Appendix G**

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### **FIGURE 5 - CAMP CREEK CHANNEL CROSS SECTIONS PLANTING SPECIFICATIONS**

---

*MDT Wetland Mitigation Monitoring  
Camp Creek  
Sula, Montana*

**Nature's Enhancement, Inc.**

2980 Eastside Highway  
Stevensville, Montana 59870  
Phone: (406) 777-3560  
FAX: (406) 777-3560

**SOLD TO:**

Department of Transportation

Project No:

NH7-1(58)9 F Sula-North &amp; South

NH41(24) Camp Creek Restoration

**SHIPPED TO:**

Sula North &amp; South/ Camp Creek Restoration

Project Site

Sula, Montana

**MONITORING**

INVOICE NUMBR  
PURCHASE ORDER #  
ORDER DATE  
SHIP DATE (EST.)  
TERMS  
DUE DATE  
SALES REP  
SHIP VIA

Greg  
NE

**CC5: REVEGETATION**

446	<i>Alnus Incana</i>	1 Gallon	1-2'
315	<i>Alnus Incana</i>	5 Gallon	3-4'
752	<i>Amelanchier alnifolia</i>	1 Gallon	1-2'
374	<i>Betula occidentalis</i>	5 Gallon	3-4'
667	<i>Cornus stolonifera</i>	1 Gallon	2-3'
369	<i>Cornus stolonifera</i>	5 Gallon	4-5'
213	<i>Pinus contorta</i>	1 Gallon	1-2'
89	<i>Pinus contorta</i>	5 Gallon	2-3'
213	<i>Pinus ponderosa</i>	1 Gallon	1-2'
89	<i>Pinus ponderosa</i>	5 Gallon	2-3'
303	<i>Populus tremuloides</i>	1 Gallon	18-24"SS
15	<i>Populus tremuloides</i>	5 Gallon	4-5"SS
791	<i>Populus tremuloides</i>	1 Gallon	18-24"MS
311	<i>Populus tremuloides</i>	5 Gallon	4-5"MS
800	<i>Populus trichocarpa</i>	1 Gallon	2-3'
518	<i>Populus trichocarpa</i>	5 Gallon	5-8'
2025	<i>Potentilla fruticosa</i>	1 Gallon	12-18"
213	<i>Pseudotsuga menziesii</i>	1 Gallon	12-18"
89	<i>Pseudotsuga menziesii</i>	5 Gallon	24-30"
1178	<i>Rosa woodsii</i>	1 Gallon	2-3'
1802	<i>Willow (Salix spp.)</i>	1 Gallon	2-3"MS

Monitoring.WK4



429	Willow (Salix spp.)	5 Gallon	4-5 MS
1178	Symphoricarpos albus	1 Gallon	18-24
10681	Installation of above 1 Gallon Plants		
2598	Installation of above 5 Gallon Plants		
20,480	Willow Cuttings 12" long with a minimum base of .75 inches(800/Hectare). Includes collection, installation	12" x .75 Base	
57	<b>WILLOW SALVAGE</b> Tree Spade dig at a minimum diameter of 24", burlap, basket, crimp, tie Storage of the above on site in .75m fine soil, to be provided by prime contractor Replant willow clumps		
<b>Shipping Charges:</b>			
Common Carrier (CMN):		billed COD from the trucking company.	
Nature's Enhancement (NE):		billed from NE on the Final Invoice.	
Nursery Pick Up (NPU):		no charge.	
SUBTOTAL			
QTY. DISCOUNT			Included
SHIPPING (ESTIMATE)			Included
BOXING & HANDLING			Included
TOTAL			0.00

Questions concerning this order?  
 Call: PHONE: (406) 777-3560  
 FAX: (406) 777-3500

**MAKE ALL CHECKS PAYABLE TO:**  
 Nature's Enhancement, Inc.  
 2980 Eastside Highway  
 Stevensville, Montana 59670

**\$0.00**  
 PAY THIS  
 AMOUNT

**THANK YOU FOR YOUR ORDER! WE LOOK FORWARD TO SERVING YOU AGAIN.**

R  
11/18/2002

SEED BLENDING REPORT  
Dept. of Transportation, Great Falls, MT



1-Materials Bureau, (Pat Hoy)  
1-District Lab Gt. Falls  
1-E.P.M. T. DENKDIK

PROJECT NO.: NH 41(24)

TERMINI: CAMP CREEK RESTORATION

MISSOULA

BLENDING WITNESSED BY: JAMES O. BLOSSOM *JB*

DATE: 04/22/2002

LOCATION: Fairfield, Montana

SEED SUPPLIER: Treasure State Seed Inc.

Type Of Seed	Lot No.	ACRES/Hectare Area 1/.25		(e) Total Bulk Seed Blended For Area 1	MSU Seed Laboratory test results			Hectare Area 2		(e) Total Bulk Seed Blended for Area 2	Mat'l's. Bureau Pretest Lab. No	MSU Test Date Expires
		LBS kg Pls per AC.	(d) Total kg LBS Pls		(a) % Purity	(b) % Germ	(c) % Pls	kg Pls Per ha	(d) Total kg Pls			
MEADOW BARLEY •	NBS-1-05381	0.5	0.6	0.7	93.59	97	90.78					
BLUEJOINT REEDGRASS •	CACA24204	0.3	0.4	0.6	85.88	77	86.13					
FOWL BLUEGRASS •	00-043	2.0	2.5	3.2	86.91	89	77.35					
TUFFED HAIRGRASS •	99-1438-75	2.0	2.5	2.7	94.2	99	93.25					
BLUE WILCRYE •	685-0-300	7.0	8.8	9.7	99.06	92	91.15					
BROMAR MOUNTAIN BROME	006-026-12A	6.0	7.5	7.8	98.85	97	95.88					
TOTAL				24.7 LBS								

BULK SEEDING RATE AREA 1 19.76 KILOGRAMS (kg) PER HECTARE (ha).  
LBS ACRE

BULK AREA 2 \_\_\_\_\_ KILOGRAMS (kg) PER HECTARE (ha)

% PURITY (a) X % GERMINATION (b) = % PURE LIVE SEED @ X 100.

TOTAL KILOGRAMS (kg) PURE LIVE SEED (d) = % PURE LIVE SEED @ X 100 = BULK SEED NEEDED (e)

REMARKS:

12/24/2002

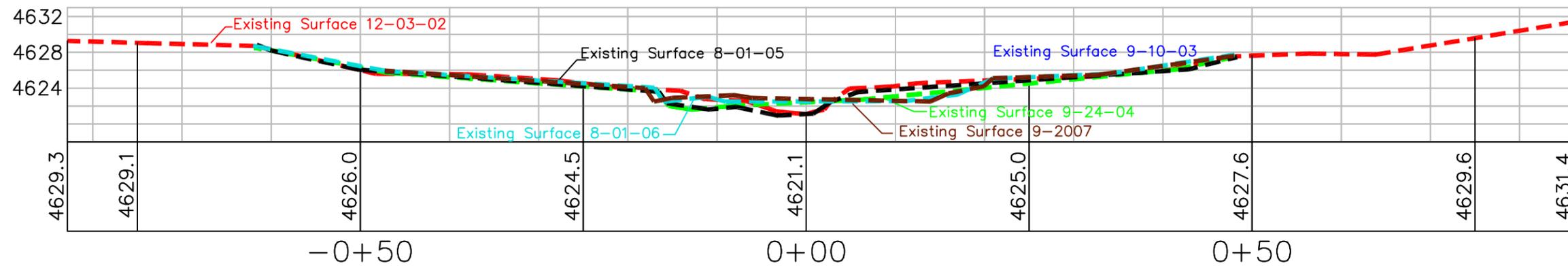
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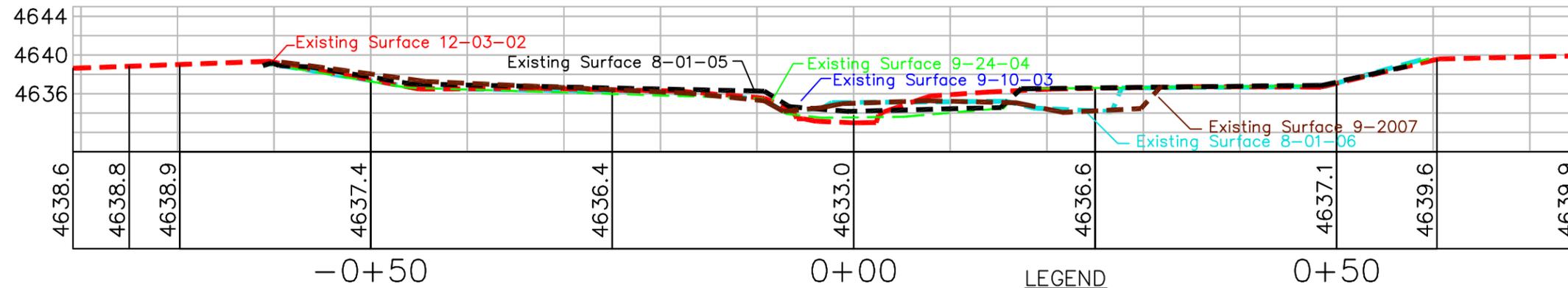
MDT ENVIRONMENTAL

PAGE 02

# Figure 5 - Channel Cross Sections



Cross Section 3-A



Cross Section 4-A

LEGEND

- Existing Surface 12-3-02
- Existing Surface 9-10-03
- Existing Surface 9-24-04
- Existing Surface 8-01-05
- Existing Surface 8-01-06
- Existing Surface 9-2007