MONTANA DEPARTMENT OF TRANSPORTATION
WETLAND MITIGATION MONITORING REPORT: YEAR 2004

Camp Creek
Sula, Montana

Prepared for:

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

Prepared by:

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

June 2005

Project No: B43054.00 - 0106

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1.0 INTRODUCTION

This report documents the third year (2004) of monitoring at the Camp Creek mitigation site. The Camp Creek was developed to mitigate wetland impacts associated with the Montana Department of Transportation (MDT) proposed 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** (**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 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 the functional restoration/enhancement of 42.7 acres of wetland, enhancement of 24 acres of heavily grazed and cleared riparian vegetation, and creation and restoration of about 16.5 acres of Camp Creek channel bottom and floodplain margins. MDT is currently developing a credit allocation scheme for this site in cooperation with the Corps of Engineers. 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 drainage ditches.

Enhancements

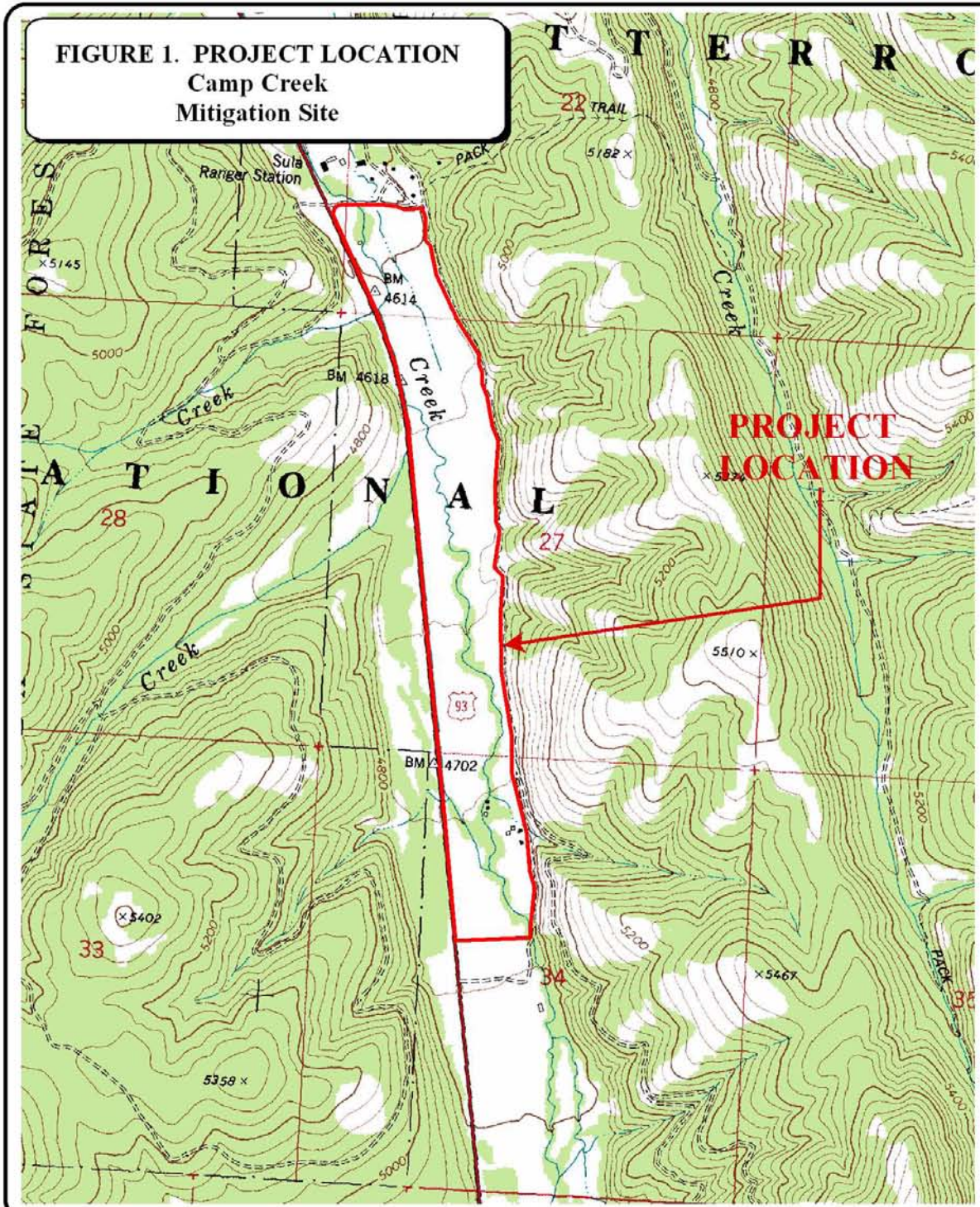
- Riparian shrub and tree plantings throughout the created floodplain margins.
- Drier upland species planting in areas of created upland slopes.

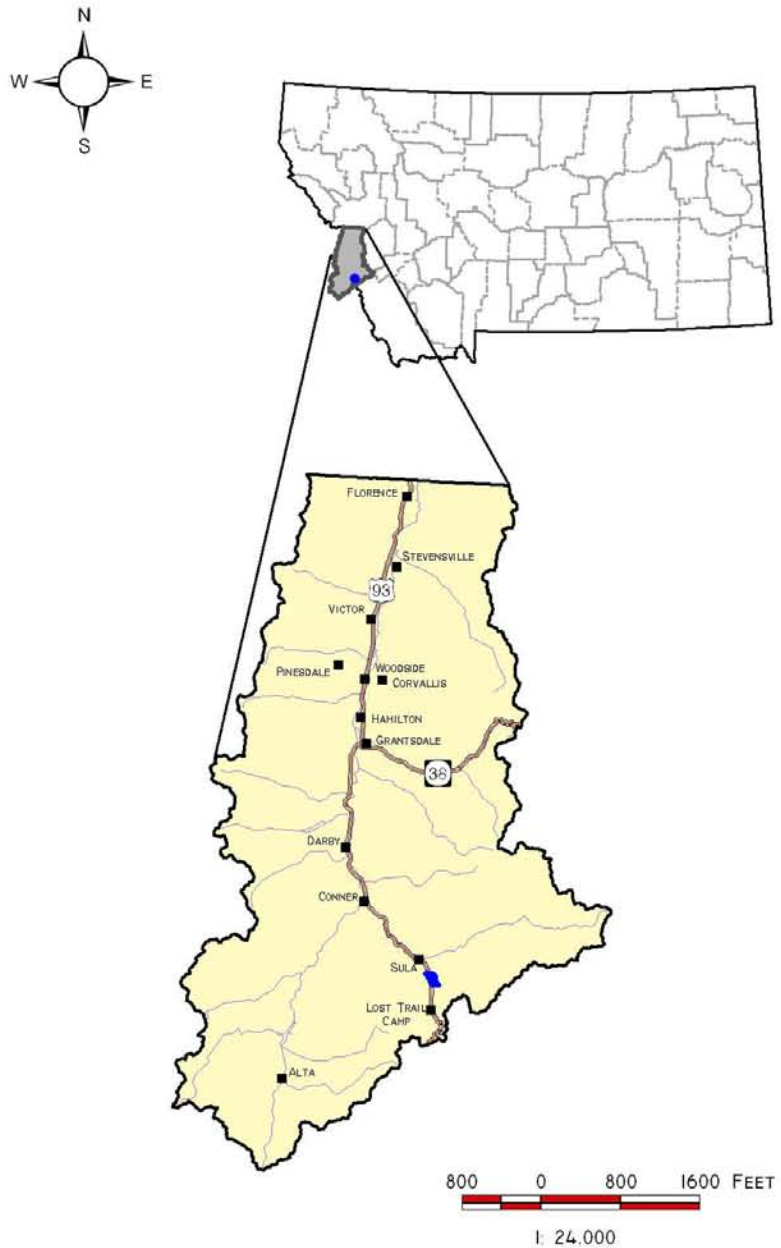
Creation

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

FIGURE 1. PROJECT LOCATION
Camp Creek
Mitigation Site





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

LAND & WATER CONSULTING, INC.

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2.0 METHODS

2.1 Monitoring Dates and Activities

The site was visited on August 17th (mid-season) and September 24, 2004 (early fall season). Monitoring activities were conducted on the MDT-owned portion of the site, as well as within the fenced portion of the adjacent Grasser property. 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; and (non-engineering) examination of topographic features. The early fall season visit was conducted to collect 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 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, Appendix A**. The cross sections will be 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 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** (**Appendix A**). The transect will be used to evaluate changes over time, especially the establishment and increase of hydrophytic vegetation. The transect location was marked on the air photo and all data were recorded on the mitigation site monitoring form. 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 will be updated as new species are encountered. Ultimately, observations from past years will be compared with new data to document vegetation changes over time. 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 2004 were accomplished by hand-mapping onto the 2002 aerial photograph. The wetland/upland boundary in combination with the wetland/open water boundary was used to calculate the final wetland acreage.

Pre-project wetland delineation acreages within the current monitoring limits ranged between 33.47 (28.3 MDT, 5.17 Grasser) to 63.17 (55.32 MDT, 7.85 Grasser) acres. To resolves these discrepancies, in 2004 LWC used a stereoscope and examined the 2000 (pre-fire) aerial photographs, as well as the two pre-project delineation maps and data, and the post-project delineation maps and data to date to provide an opinion regarding pre-project wetlands at the site. Using these methods, LWC mapped 43.36 acres of wetland /open water channel signature on the MDT parcel and concurred with the 5.37- acre wetland / open water channel total within the monitoring limits on the Grasser parcel for a total baseline of 48.73 acres. This clarification of baseline conditions was approved by the Corps of Engineers in 2004 (Steinle pers. comm.). Pre-project wetlands are shown on **Figure 4, 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.

2.8 Macroinvertebrates

Macroinvertebrate samples were collected during the mid-season site visit at one location along Camp Creek (**Figure 2**). Macroinvertebrate sampling procedures are provided in **Appendix F**. Samples were preserved as outlined in the sampling procedure and sent to Rhithron Associates for analysis.

2.9 Functional Assessment

A functional assessment form was completed using the 1999 MDT Montana Wetland Assessment Method (**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

Photographs were taken illustrating current land uses surrounding the site, the upland buffer, the monitored area and the vegetation transects. Each photograph point location was recorded with a resource grade GPS in 2002. The location of photo points is shown 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 2004. The method used to collect these points is described in the GPS protocol 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 monitoring form.

3.0 RESULTS

3.1 Hydrology

The main source of hydrology for this site is Camp Creek, a perennial flowing 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 course alluvium materials located throughout the valley bottom. The location of this mitigation site is within the historic Camp Creek floodplain. The site consists of a constructed main channel, streambanks and floodplain terraces. Depressional wetlands are present, supported by seasonal overland flooding of Camp Creek and 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 in recent 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.

Rock channel bottom occurred across approximately 2.15 acres or 5% of the current 46-acre mitigation site (**Figure 3**). 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** (**Appendix G**). These cross sections represent, in essence, post-project "baseline" (2002), as well and 2003 and 2004 channel conditions. Cross section results measured during the 2004 monitoring show that some adjustments have taken place.

Cross Section 3-A is located below the Praine Creek confluence. During 2004 runoff, this cross-section changed shape somewhat. The channel bottom and left bank remained in the same location as 2003, but the right bank leveled off (was lowered), forming a more gradual floodplain transition to upland.

Cross Section 4-A is located above the Praine Creek confluence. This cross section also adjusted slightly during 2004 runoff. The left bank retreated 3 to 4 feet, back to the 2002 position, while the channel bottom and right bank remained at 2003 locations. Cross section monitoring will continue to ascertain stability and facilitate development of corrective measures, if necessary.

3.2 Vegetation

Eighty-one plant species were identified at the site and are listed in **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**, **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 data 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 wetlands in saturated to shallow water conditions. Type 6 consists of several shrubs such as willow (*Salix*), alder (*Alnus*) and birch (*Betula*), found 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 geo-textile 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 and 2004 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 the redtop (*Agrostis alba*) and tufted hairgrass (*Deschampsia cespitosa*). During the 2004 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 are presented in **Appendix B** and describe specific details on each species.

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 the time of 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.

Several noxious weeds were observed throughout the Camp Creek Mitigation Site. These plants include spotted knapweed, Canada thistle (*Cirsium arvense*), bull thistle (*Cirsium vulgare*), Oxeye daisy (*Chrysanthemum leucanthemum*) and hound's-tongue (*Cynoglossum officinale*). Other weedy or non-native species include common dandelion, lambsquarters (*Chenopodium album*), clasping pepper-grass (*Lepidium perfoliatum*), pennycress, tumbleweed and quackgrass.

Vegetation transect results are detailed in the attached data forms (**Appendix B**) and are summarized below in **Table 2** and **Charts 1** and **2**. The previous years transect data is included to compare changes between monitoring periods.

Table 1: ***2002 - 2004 camp creek vegetation species list.***

Scientific Name[1]	Common Name	Region 9 (Northwest) Wetland Indicator
Achillea millefolium	Common Yarrow	FACU
Agropyron repens	Quackgrass	FACU
Agrostis alba	Redtop	FAC+
Alnus incana	Thin leaved alder	FACW
Alopecurus pratensis	Meadow foxtail	FACW
Amelanchier alnifolia	Service-berry	FACU
Betula occidentalis	Water birch	FACW
Bromus inermis	Smooth brome	--
Bromus tectorum	Cheatgrass	--
Calamagrostis canadensis	Bluejoint reedgrass	FACW+
Carex aquatilis	Water sedge	OBL
Carex bebbii	Bebb's sedge	OBL
Carex nebrascensis	Nebraska sedge	OBL
Carex crawfordii	Crawford's sedge	FAC
Carex praegracilis	Clustered field sedge	FACW
Carex utriculata	Beaked sedge	OBL
Centaurea maculosa	Spotted Knapweed	--
Cercocarpus ledifolius	Mountain-mahogany	--
Chenopodium album	White Goosefoot	FAC
Chrysanthemum leucanthemum	Oxeye daisy	--
Cirsium arvense	Canada Thistle	FACU+
Cirsium vulgare	Bull thistle	FACU
Cornus stolonifera	Red-osier dogwood	FACW
Crataegus douglasii	Douglas Hawthorn	FAC
Crepis tectorum	Annual hawksbeard	--
Cynoglossum officinale	Hound's tongue	FACU
Danthonia spp.	Oatgrass	--
Deschampsia cespitosa	Tufted hairgrass	FACW
Epilobium ciliatum	Hairy willow-herb	FACW+
Epilobium paniculatum	Willow-herb	--
Equisetum arvense	Field horsetail	FAC
Equisetum laevigatum	Smooth scouring-rush	FACW
Festuca pratensis	Meadow fescue	FACU+
Geum macrophyllum	Big leafed avens	OBL
Glyceria elata	Tall mannagrass	FACW+
Glyceria grandis	American mannagrass	OBL
Gnaphalium palustre	Cudweed	FAC+
Juncus balticus	Baltic rush	FACW
Juncus bufonius	Toad rush	FACW

Scientific Name[1]	Common Name	Region 9 (Northwest) Wetland Indicator
Juncus confuses	Colorado rush	FAC
Juncus ensifolius	Three-stamen Rush	FACW
Lactuca serriola	Prickly lettuce	FAC-
Lepidium perfoliatum	Clasping pepper-grass	FACU+
Linaria vulgaris	Butter and eggs	--
Lonicera involucrate	Honeysuckle	FAC+
Lupinus wyethii	Wyeth's lupine	NI
Lychnis alba	White campion	--
Matricaria matricarioides	Pineapple-weed	FACU
Melilotus officinalis	Yellow Sweet clover	FACU
Mentha arvensis	Field mint	FAC
Phalaris arundinacea	Canary Reed Grass	FACW
Phleum pretense	Timothy	FACU
Pinus ponderosa	Ponderosa pine	--
Plantago major	Plantain	FACU+
Poa pratensis	Kentucky Bluegrass	FACU+
Polygonum amphibium	Water smartweed	OBL
Populus tremuloides	Quaking aspen	FAC+
Populus trichocarpa	Cottonwood	FAC
Potentilla fruticosa	Shrubby cinquefoil	FAC-
Potentilla gracilis	Northwest cinquefoil	FAC
Pseudotsuga menziesii	Douglas fir	FACU
Ranunculus aquatilis var. hispidulus	White-water buttercup	OBL
Ranunculus repens	Buttercup	FACW
Rosa woodsii	Woods rose	FACU
Rubus idaeus	Wild raspberry	FACU
Rumex crispus	Curly Dock	FACW
Salix bebbiana	Bebb's willow	FACW
Salix drummondiana	Drummond willow	FACW
Salix exigua	Sandbar Willow	OBL
Salix geyeriana	Geyer willow	FACW+
Salix lutea	Yellow willow	OBL
Senecio vulgaris	Common groundsel	FACU
Sisymbrium altissimum	Tall tumble mustard	FACU-
Smilacina stellata	Starry false-Solomon's-seal	FAC-
Symphoricarpos albus	Snowberry	FACU
Tanacetum vulgare	Common tansy	NI
Taraxacum officinale	Common dandelion	FACU
Thlaspi arvensis	Pennycress	NI
Trifolium pretense	Red clover	FACU
Verbascum thapsus	Common mullein	--
Veronica Americana	American speedwell	OBL

[1] **Bolded** species indicate those documented in the analysis area for the first time in 2004.

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

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

Chart 1: ***Transect maps showing vegetation type from the start of transect (0 feet) to the end of transect (471 feet) for each year monitored.***

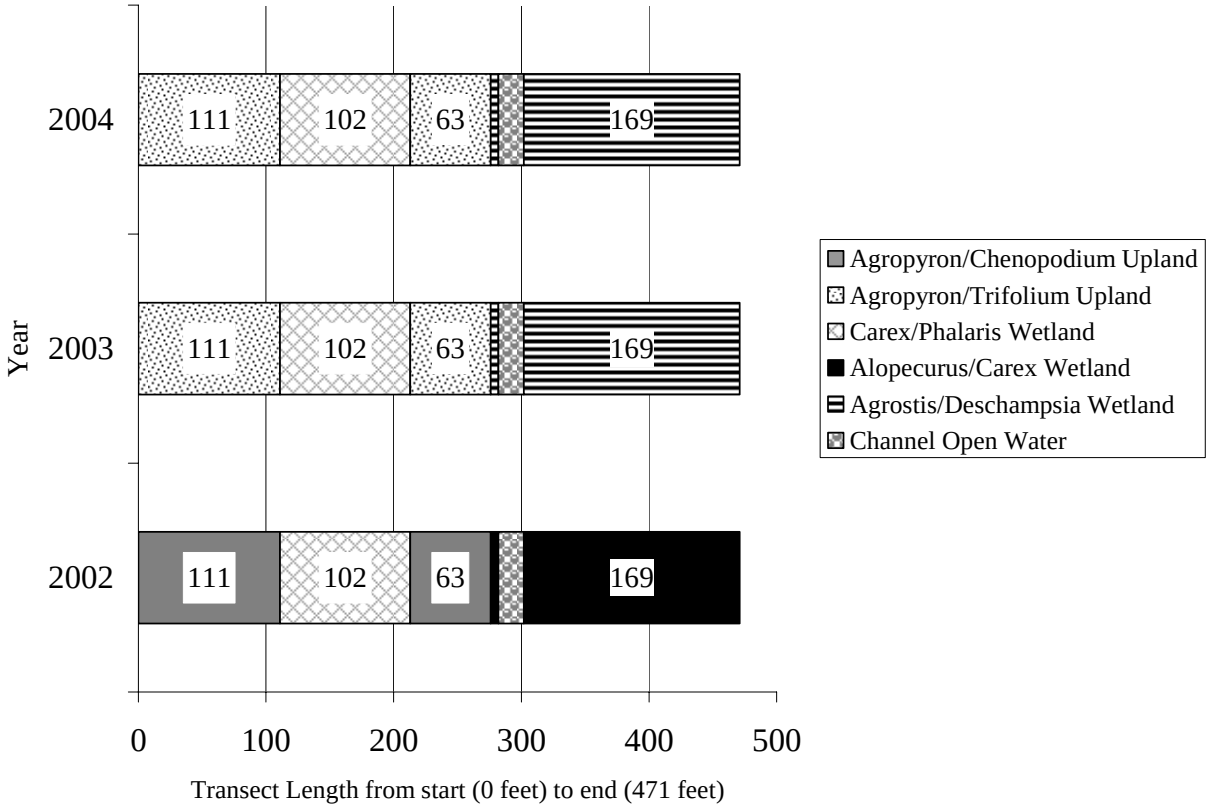
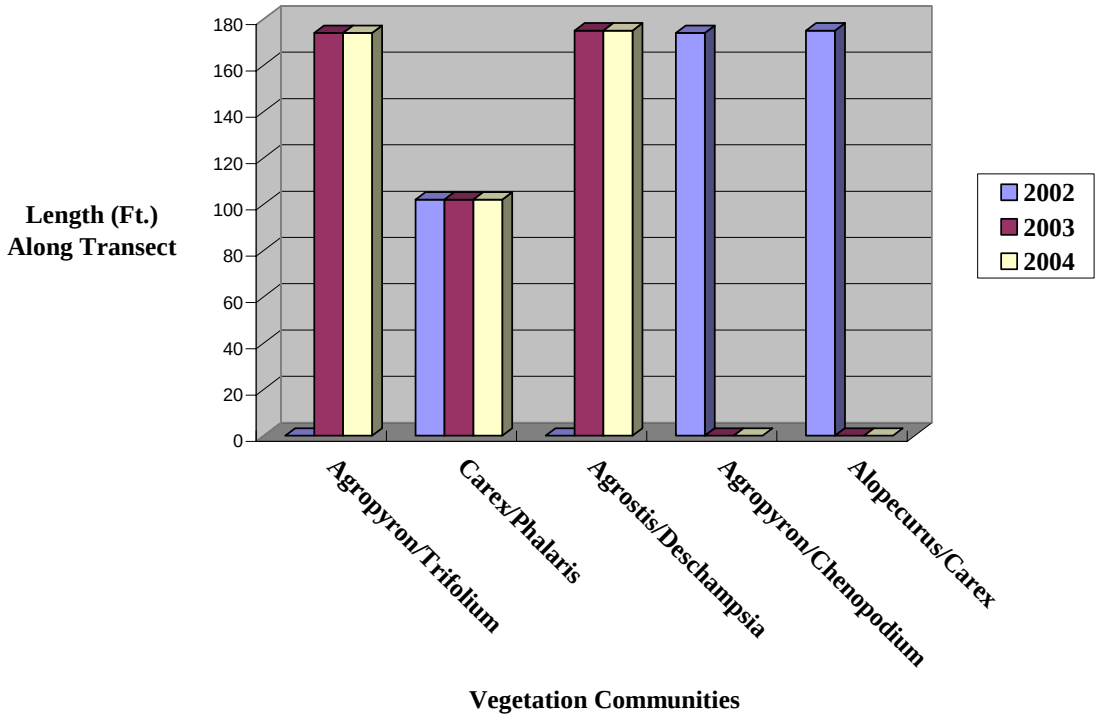


Chart 2: ***Length of vegetation communities along Transect 1.***



3.3 Soils

The soils located at the Camp Creek site are mapped as Gallatin-shallow muck complex, gently sloping. 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 Routine Wetland Determination form were mostly peat, loams, sandy loams, or sands with very low chromas (1 or 2). 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 wetland delineation 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 (see Section 2.5). Pre-project wetland locations are shown on **Figure 4** in **Appendix A**. Monitoring in 2004 identified the conditions listed in **Table 3**.

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

Condition	MDT Property Monitoring Area 2004 (acre)	Grasser Property Monitoring Area 2004 (acre)	MDT Property Monitoring Area 2000 Baseline (acre)	Grasser Property Monitoring Area 2000 Baseline (acre)
Wetland Area	36.83	7.32	42.61	4.62
Open Water Area	0.95	1.20	0.75	0.75
Subtotals	37.78	8.52	43.36	5.37
Total Aquatic Habitat	**46.30**		**48.73**	

The project has gained 2.7 wetland acres and 0.45 stream acre on the Grasser property, and "lost" an estimated 5.58 wetland acres and gained 0.2 stream acre on the MDT property. Cumulatively, approximately 44.15 wetland acres and 2.15 open water acres now occur within the monitoring area (**Figure 3, Appendix A**), for a total of 46.3 acres of aquatic habitat. Prior to construction, the site contained approximately 48.73 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. No change in the net wetland area or open water area was observed between 2003 and 2004. However, the overall cumulative change in aquatic habitat at the site since construction has been approximately 46.3 – 48.73 = (-2.43) acres.

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

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 impact on site hydrology.

Final plan designs were based on a preliminary 2000 wetland delineation conducted before the 2001 delineation conducted by Turnstone Biological. The preliminary 2000 baseline wetland delineation was substantially smaller in acres than the 2001 baseline delineation. 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. However, 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 then the original size of the mapped upland.

During the 2004 monitoring, wetland acreages remained similar to those observed in 2003. Wetland boundaries exhibited little to no change on the MDT or Grasser owned parcels. Wetland decreases were observed during 2003 monitoring along the floodplain margins on the

Grasser owned parcel. The decrease of wetlands observed during 2003 was due to the change in vegetation from mostly wetland species to high abundance of weeds and upland species. An increase in invasive or upland species along the floodplain margins of Grasser owned parcel was also observed during 2004, although no additional loss of wetland area was recorded during the 2004 monitoring.

During 2003 and 2004, a dramatic resurgence of spotted knapweed and other upland species has lead to the change in community type descriptions. Areas of heavy spotted knapweed coverage are located adjacent to and throughout the site. Disturbance from construction activities to the pre-existing seed bank, likely spreading of seed by heavy equipment, and lack of pre-project weed control could have contributed to the overall increase. It is likely that other factors such as lack of hydrology along the floodplains may be leading to the ultimate conversion of floodplains to a drier vegetation type. Thus, a combination of numerous land use (irrigation practices), construction, environmental, and baseline mapping factors likely resulted in the wetland "loss" observed at the site.

3.5 Wildlife

Wildlife species or evidence of wildlife, observed on the site during 2002, 2003 and 2004 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 2004 monitoring data. Two mammal, one reptile and two bird species were noted at the mitigation site during the 2004 site visits.

The newly constructed channel offers habitat for several fish species, including westslope cutthroat and brook trout. Pre-project and post-project surveys along Camp Creek were conducted by the Montana Fish Wildlife and Parks during 1999 and 2003. The 2003 surveys documented 300 westslope cutthroat trout ranging is size from 3 to 12 inches and also several small sized brook trout. A comparison between the 1999 and 2003 surveys is presented in **Chart 3**. The majority of fish observed were in the 3 to 6 inch size class, which is expected for new habitat because smaller fish usually colonize these areas first (MFWP 2003).

3.6 Macroinvertebrates

Complete results from the macroinvertebrate sampling location (**Figure 2**) are presented in **Appendix F.** Sampling points were located along one area of the creek. The following analysis was provided by Rhithron Associates (Bollman 2004). Macroinvertebrate sampling results were summarized by Rhithron Associates in the italicized section below (Bollman 2004) and in **Chart 4**.

The assemblage present at the Camp Creek site was characteristic of a cold-water foothill or montane stream with cobble substrate; it did not resemble a wetland fauna. As most taxa collected here were rheophilic, it does not seem appropriate to apply wetland criteria to the site; nonetheless the graph above shows scores based on the wetland criteria used in this report.

When evaluated as a stream site, Camp Creek exhibits good water quality based on high mayfly taxa richness. Sediment deposition was likely minimal, but the stonefly fauna was more depauperate than expected, suggesting reach-scale habitat disturbances. The functional composition appeared to be entirely appropriate for a foothill stream.

Chart 3: ***Westslope cutthroat trout survey for Camp Creek (MFWP 2003).***

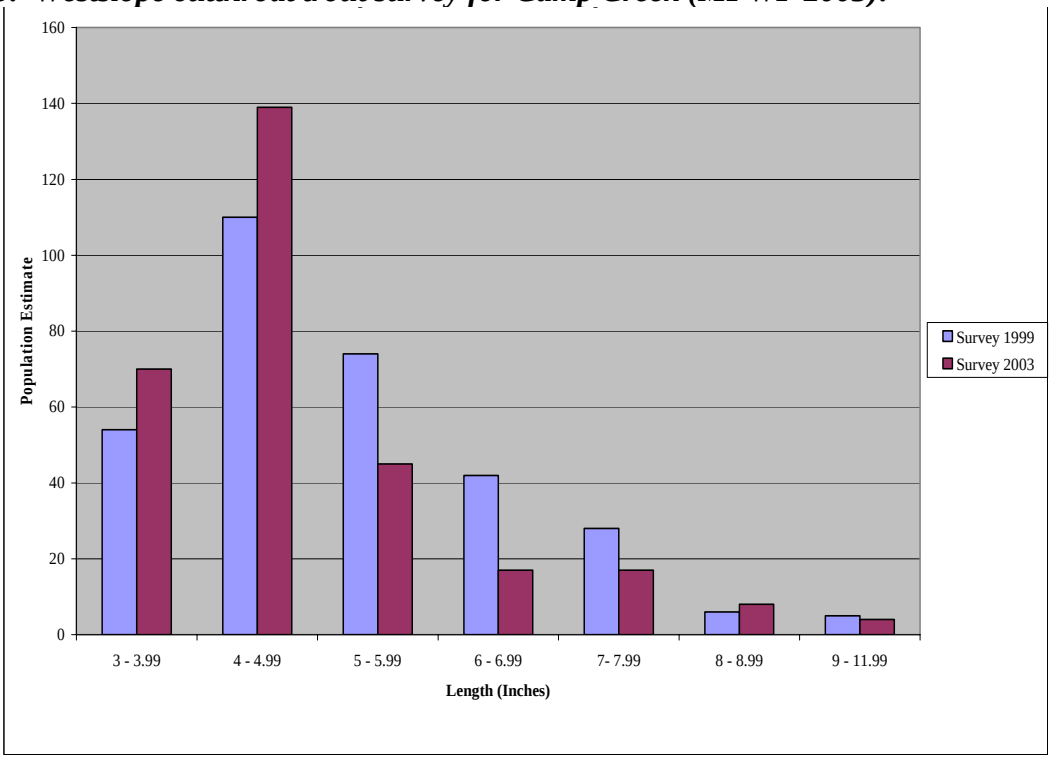


Chart 4: ***Bioassessment scores for Camp Creek.***

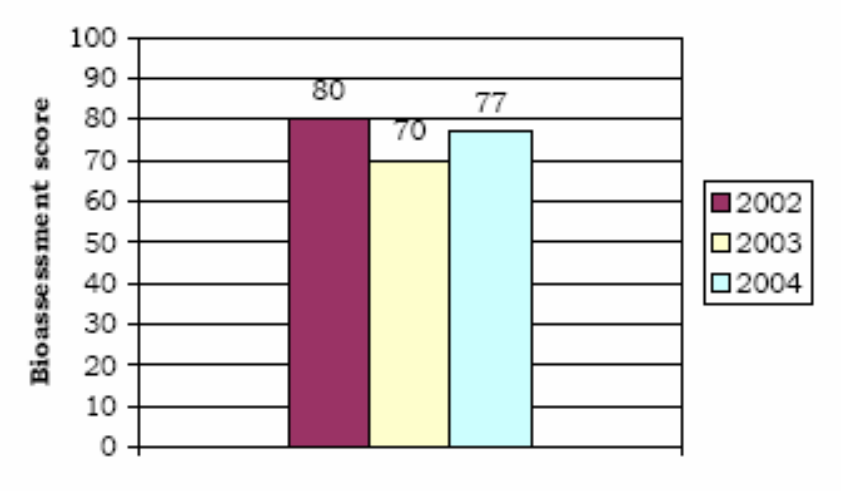


Table 4: ***Wildlife species observed at the Camp Creek Mitigation Site during 2002-2004 monitoring.***

FISH
Westslope Cutthroat Trout (*Oncorhynchus clarki lewisi*)[1]
Brook Trout (*Salvelinus fontinalis*)[1]
AMPHIBIANS
Spotted Frog (*Rana luteiventris*)
REPTILES
None
BIRDS
American Crow (*Corvus brachyrhynchos*)
Canada Goose (*Branta canadensis*)
Killdeer (*Charadrius vociferus*)
Red-tail Hawk (*Buteo jamaicensis*)
Mallard (*Anas platyrhynchos*)[2]
Grasshopper Sparrow (*Ammodramus savannarum*)[2]
American Robin (*Turdus migratorius*)[2]
American Dipper (*Cinclus mexicanus*)[2]
American Goldfinch (*Carduelis tristis*)[2]
Cedar Waxwing (*Bombycilla cedrorum*)[2]
Black-billed Magpie (*Pica pica*)[2]
Common Raven (*Corvus corax)*[2]
European Starling (*Sturnus vulgaris*)[2]
Brewer's Blackbird (*Euphagus cyanocephalus*)[2]
MAMMALS
Bobcat (*Felis rufus*)
Coyote (*Canis latrans*)
Deer (*Odocoileus spp.*)
Elk (*Cervus elaphus*)
Moose (*Alces alces*)

[1] Survey conducted by Montana Fish, Wildlife & Parks.
[2] Observed by MDT May 2003.
Bolded species were observed during 2004 monitoring. All other species were observed during one or more of the previous monitoring years, but not during 2004.

3.7 Functional Assessment

Completed 2004 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. Because of this "artificial", ownership boundary-based separation of assessment areas (AAs), and based on development of the site and discussions with the Corps, the MDT parcel, formerly split into two AAs, was assessed in its entirety as one contiguous AA. Results are presented in **Table 5**.

The AA on the MDT parcel rated as Category II (high value). This overall rating was primarily due to high ratings for MNHP species habitat (documented primary habitat for westslope cutthroat trout [*Oncorhynchus clarki lewisi*] based on 2003 fish survey conducted by Montana

Department of Fish, Wildlife and Parks), surface water storage, production export / food chain support, groundwater discharge/recharge, and recreation/education ratings (public ownership with excellent access). Remaining parameters generally rated as moderate.

In 2004, the MDT site received a moderate sediment/shoreline stabilization rating due to the increase in species with deep binding roots along the streambank. Shoreline species during evaluation consisted of grasses and willow sprigs; an increase in willow cover between 2003 and 2004 monitoring has increased the functional rating for sediment/shoreline stabilization category. Over time, willow sprigs will develop into larger, even more robust shrubs with extensive deep binding roots systems. Enhancement of both wetland and upland vegetation should increase wildlife usage 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 Category III (moderate value). This AA received high ratings for MNHP species habitat (again due to west-slope cutthroat trout), production export / food chain support, and groundwater discharge/recharge. All other parameters rated low to moderate.

Pre-project (2001) and post-project (2004) wetland assessment scores are presented in **Table 5**. Turnstone Biological conducted the initial wetland delineation and functional assessments for the Camp Creek Mitigation Site. Baseline wetland acreages were adjusted per subsequent study (see Section 2.5). Turnstone Biological 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 MNHP species habitat (west-slope cutthroat trout), general wildlife habitat, general fish habitat, surface water storage, sediment/shoreline stabilization, production export/food chain support, uniqueness, and recreation/education potential. Rating have increased in the Grasser parcel for MNHP species habitat (west-slope cutthroat trout), general fish habitat, surface water storage, and sediment/shoreline stabilization

Approximately 160 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 129 functional units have been gained at the MDT parcel, and nearly 31 have been gained on the Grasser parcel.

3.8 Photographs

Representative photographs taken from photo-points and transect ends are presented 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

Table 5: ***Summary of 2001 (baseline) and 2004 wetland function/value ratings and functional points [1] at Camp Creek.***

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	2004 Grasser Property	2004 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)
MNHP 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 (0.5)	Mod (0.7)
General Fish/Aquatic Habitat	Low (0.1)	Mod (0.5)	Low (0.1)	Low (0.1)	Mod (0.5)	Mod (0.7)	Mod (0.7)
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)	Mod (0.7)
Sediment/Shoreline Stabilization	Low (0.2)	Low (0.3)	Low (0.2)	Mod (0.6)	Low (0.3)	Low (0.3)	Mod (0.7)
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 (1.00)
Actual Points/Possible Points	5.1 / 12	6.2 / 12	5.1 / 12	5.9 / 12	6.2 / 12	7.1 / 12	9.3 / 12
% of Possible Score Achieved	42%	52%	42%	49%	52%	59%	78%
Overall Category	III	III	III	III	III	III	II
Total Acreage of Assessed Wetlands and Open Water within Easement	**42.3**	**1.06[2]**	**3.51[2]**	**0.50[2]**	**1.36[2]**	**8.52**	**37.78**
Functional Units (fu) (acreage x actual points)	**215.73**	**6.57**	**17.90**	**2.95**	**8.43**	**60.49**	**351.35**
Functional Unit Gain to Date by Ownership (fu)	**NA**	**NA**	**NA**	**NA**	**NA**	**31.21**	**129.05**
Total Functional Unit Gain to Date (fu)	**NA**	**NA**	**NA**	**NA**	**NA**	**160.26**	

[1] see completed functional assessment forms in **Appendix B** for further detail.

[2] Baseline acreages adjusted per subsequent study; see Section 2.5.

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 were observed to have decreased during the 2004 monitoring. In 2003, a majority of the survival rates ranged from 70% to 100%. Survival data recorded in 2004 showed seven out of 13 species had a survival rate below 50 %. These mostly included species that had been planted in uplands such as woods rose, ponderosa pine, snowberry, shrubby potentilla and red-osier dogwood. Almost all the Douglas-fir observed had died after initial planting; mortality is likely due to weak planting stock and lack of irrigation.

The wetter species planted along the streambank and floodplain margins had a much higher survival rate ranging from 60% to 90%. These included alder, aspen, cottonwood and willows. The willow sprigs are spreading out along the banks, increasing in sizes and density. Several other planted shrubs had increased in overall stature and exhbitied vigorous growth.

These survival rates are based on a low number of total observations and might misrepresent the true survival rate. The current survival rates are based on the occurrences recorded during the 2002 monitoring. The 2002 planting specifications are presented in **Appendix G**.

3.10 Maintenance Needs/Recommendations

Per Corps recommendations, the potential for enhancing the surface connection between Camp Creek and the large emergent complex on the MDT parcel was investigated. Based on field survey investigations, a shallow flood channel could be excavated between the creek and existing swales to enhance the connectivity of these two systems during high water events. **Figure 6** (**Appendix B**) illustrates the location and approximate cross-sectional view of such a channel. Construction of such a channel should be considered by MDT.

Several noxious weeds are present on both MDT and Grasser parcels including bull thistle, Canada thistle, hound's-tongue and spotted knapweed. 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 limited to upland areas not affected during construction efforts. Control measures for these areas should be implemented to avoid potential spread of invasive species into the wetland areas. 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 located along floodplain margins should be controlled and reseeded or planted with appropriate wetland species to help control further spread of invasive species.

3.11 Current Credit Summary

As of 2004, the project has gained 2.7 wetland acres and 0.45 stream acre on the Grasser property, and "lost" an estimated 5.58 wetland acres and gained 0.2 stream acre on the MDT property. Cumulatively, approximately 44.15 wetland acres and 2.15 open water acres now occur within the monitoring area (**Figure 3, Appendix A**), for a total of 46.3 acres of aquatic habitat. Prior to construction, the site contained approximately 48.73 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. No change in the net wetland area or open water area was observed between 2003 and 2004. However, the overall cumulative change in aquatic habitat at the site since construction has been approximately 46.3 – 48.73 = (-2.43) acres.

This "decrease" in wetland acreage could be attributable to several factors. However, a primary cause is thought to be the virtual termination of flood irrigation on both the MDT and adjacent Grasser parcels, which appears to have had a substantive impact on site hydrology. Other possible causes include drought, fire, short-term construction-related disturbance (haul routes, drive-through areas, staging areas, etc.), longer-term construction-related disturbance, slight differences in pre- and post-construction delineation approaches, or a combination of all factors.

Despite the apparent decrease in wetland acreage, approximately 160 functional units (score x wetland acreage) have been gained thus far at the Camp Creek mitigation site. Approximately 129 functional units have been gained at the MDT parcel, and 31 have been gained on the Grasser parcel.

A final method of credit allocation for this site is being worked out between MDT and COE, and will be based upon this monitoring data and other information. As such, the current amount of credit applicable to this site is unknown. However, one approach under consideration pertains to the use of functional units, 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 18.28 credit acres could be assigned to the Camp Creek site.

Table 6: ***Potential functional unit-based credit - Camp Creek Mitigation Project.***

Property	2004 Wetland & Channel Acreage	2004 Score	2004 Functional Units	Baseline Functional Units	Functional Unit "Gain"	"Gain" Divided by Current Score (potential credit acres)
MDT	37.78	9.3	351.35	222.30	129.05	13.88
Grasser	8.52	7.1	60.49	29.28	31.21	4.40
Total	**46.3**	**--**	**411.84**	**251.58**	**160.26**	**18.28**

4.0 REFERENCES

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Appendix A

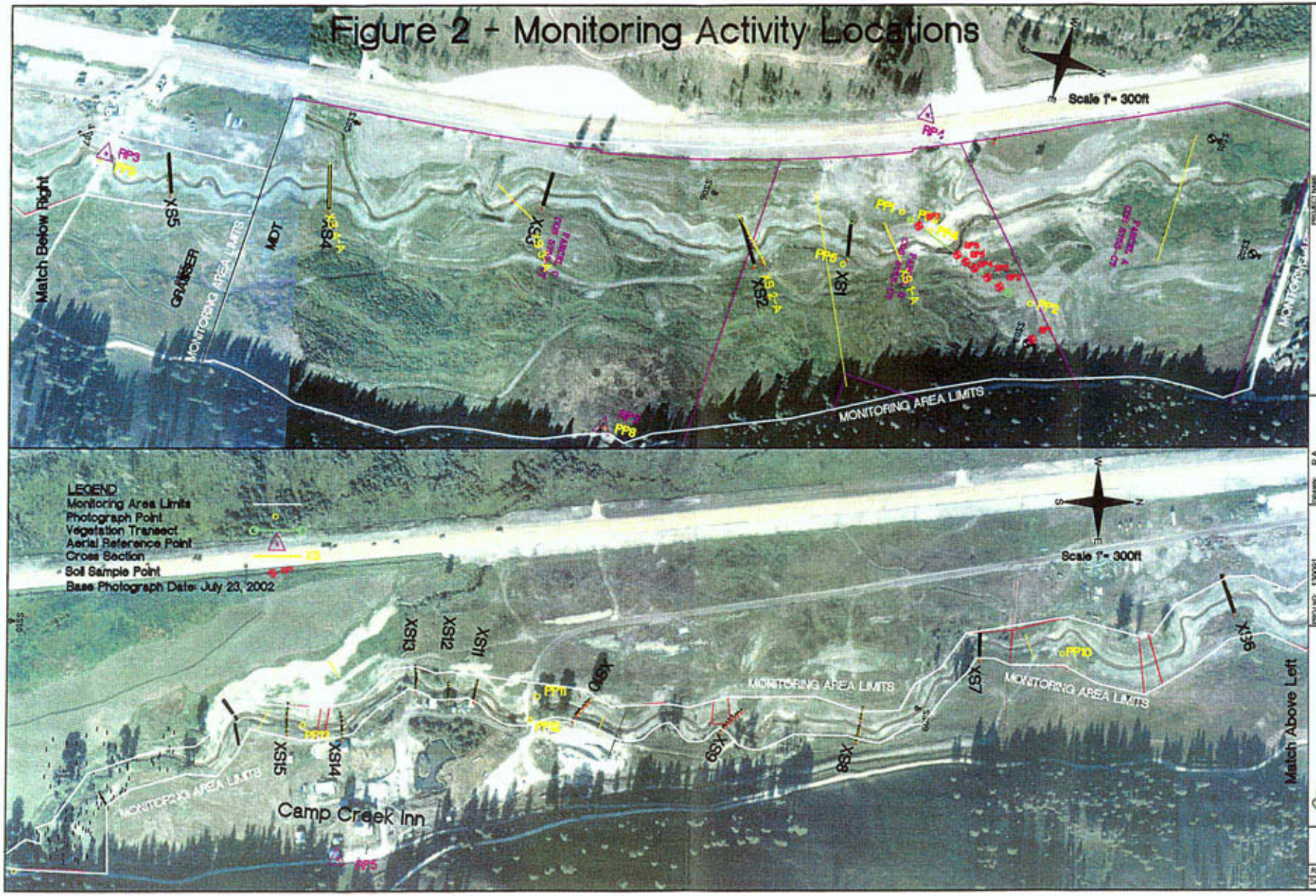
FIGURES 2, 3, 4, AND 6

MDT Wetland Mitigation Monitoring
Camp Creek
Sula, Montana

PBSJ

LAND & WATER

Figure 2 - Monitoring Activity Locations



MDT Camp Creek Wetland Mitigation

Monitoring Activity Locations

DRAWN: R.A.
CHECKED: B.D.
APPVD: B.D.
PROJ MGR: B.Dutton

PROJ NO: 130021
FILE NAME: TASK08\BASE
SCALE: 1"=300ft
LOCATION: Delta, MT

LAND & WATER CONSULTING, INC.
P.O. BOX 8254
Missoula, MT 59807

FIGURE F2
REV -
DATE 9-10-02

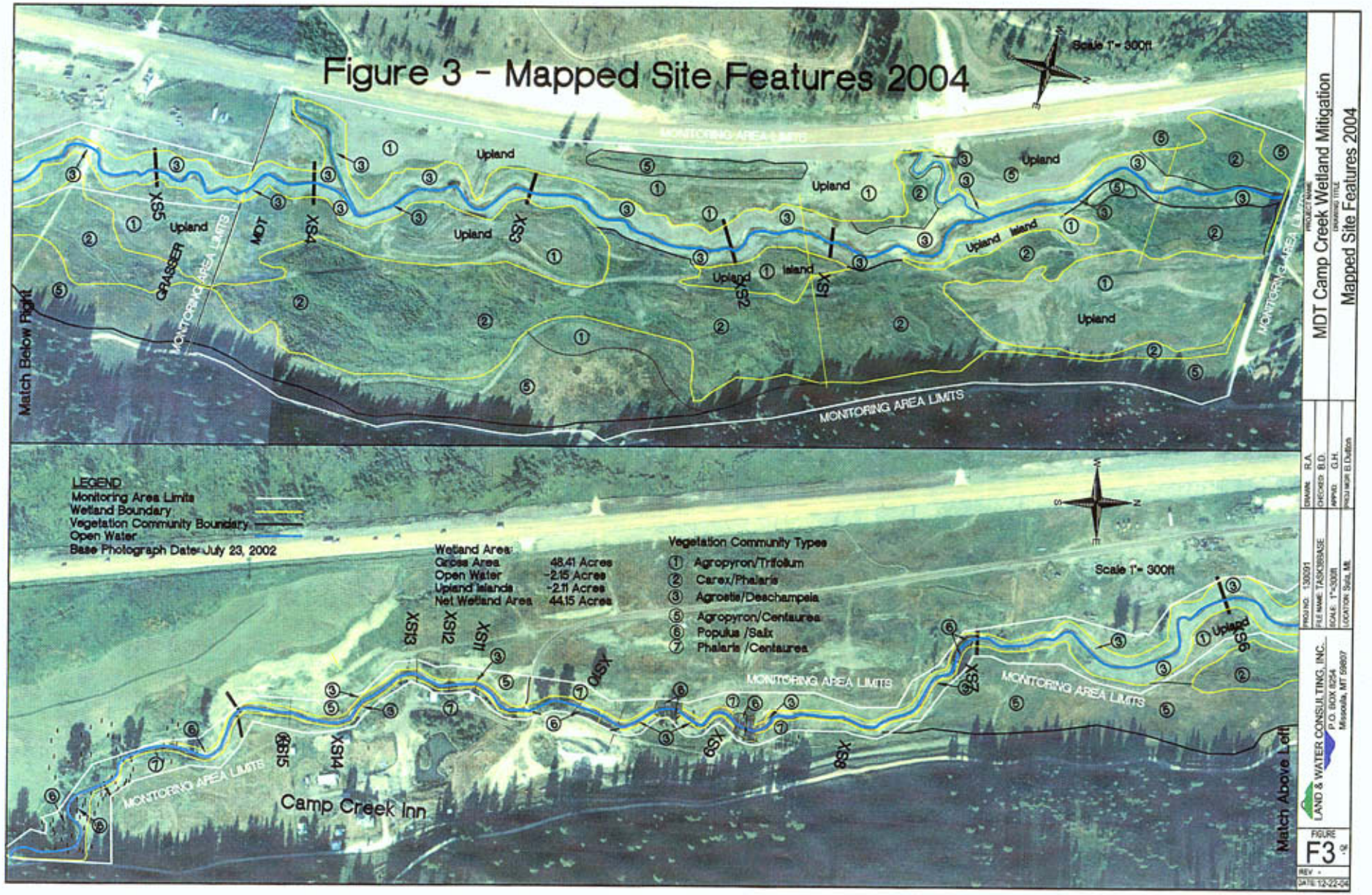
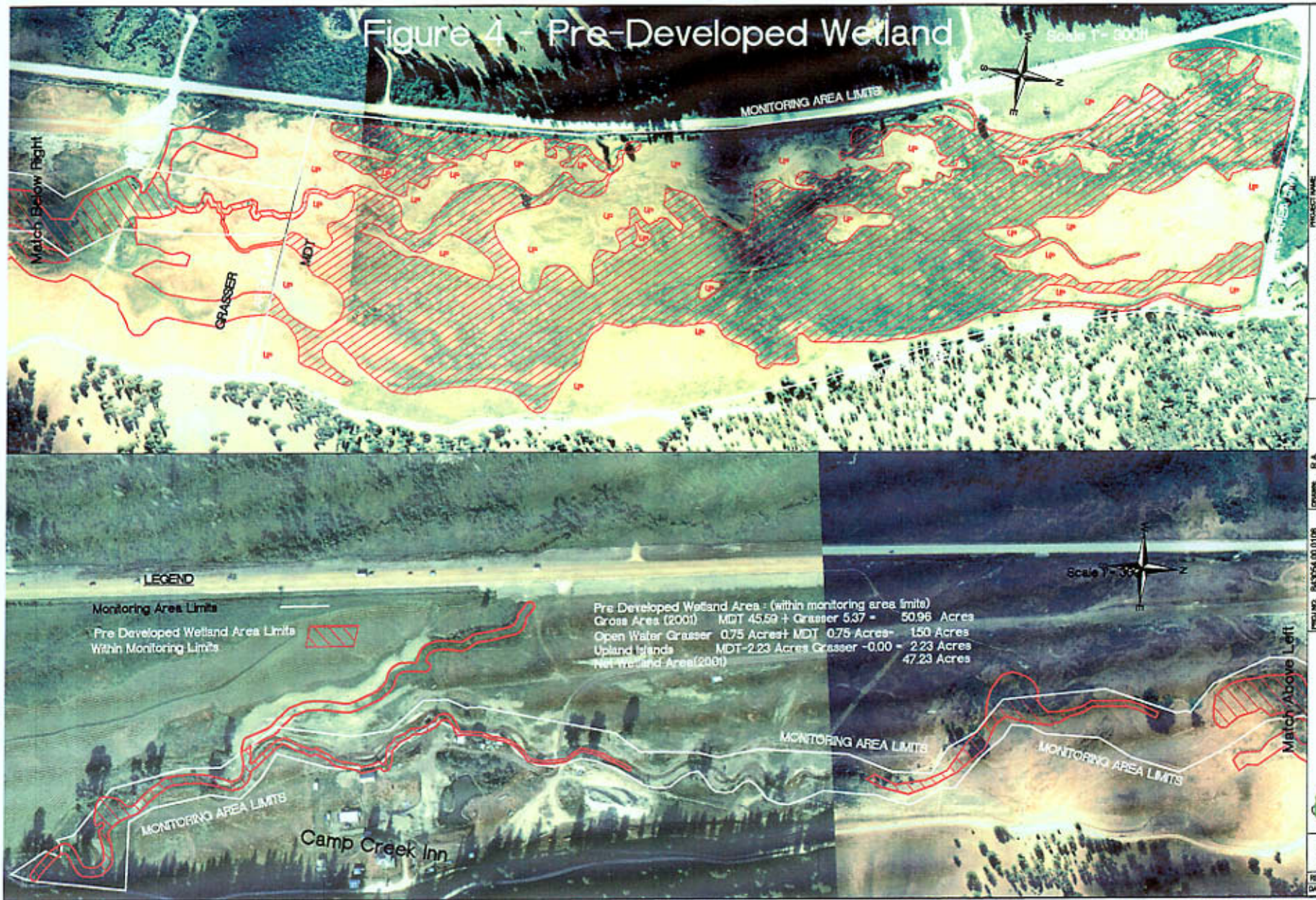


Figure 3 - Mapped Site Features 2004
Scale 1"= 300ft
MONITORING AREA LIMITS
Upland
Island
XS5
XS4
XS3
XS2
XS1
MDT
GRASSER
Match Below Right
LEGEND
Monitoring Area Limits
Wetland Boundary
Vegetation Community Boundary
Open Water
Base Photograph Date: July 23, 2002
Wetland Area:
Gross Area 48.41 Acres
Open Water -2.15 Acres
Upland Islands -2.11 Acres
Net Wetland Area 44.15 Acres
Vegetation Community Types
1 Agropyron/Trifolium
2 Carex/Phalaris
3 Agrostis/Deschampsia
5 Agropyron/Centaurea
6 Populus /Salix
7 Phalaris /Centaurea
XS13
XS12
XS11
XS10
XS9
XS8
XS7
XS6
XS15
XS14
Camp Creek Inn
Match Above Left
MDT Camp Creek Wetland Mitigation
Mapped Site Features 2004
LAND & WATER CONSULTING, INC.
P.O. BOX 8254
Missoula, MT 59807
FIGURE F3
REV -
DATE 12-22-04

Figure 4 - Pre-Developed Wetland



PROJECT NAME: MDT Camp Creek Wetland Mitigation

DRAWING TITLE: Pre-Developed Wetland

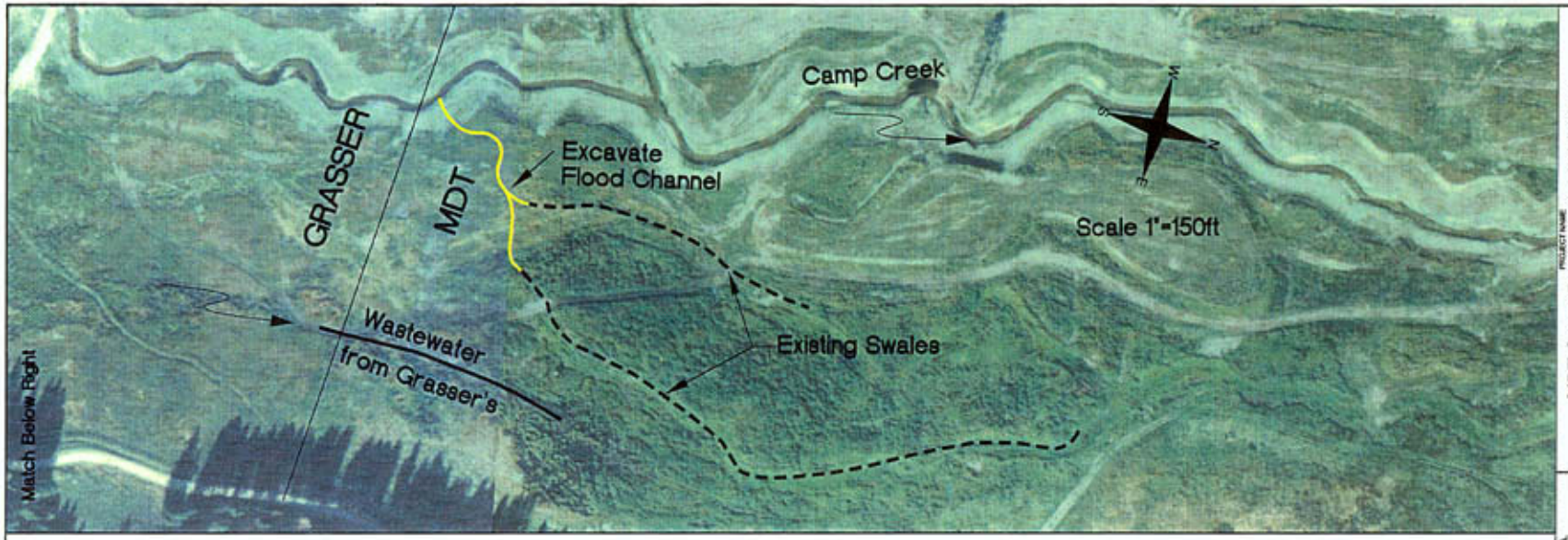
DRAWN: R.A.
CHECKED: J.B.
APP'D: J.B.
PROJ MGR: J.B.

PROJ NO. 843054.00 0109
FILE NAME: TASK 109BASE
SCALE: 1"=300ft
LOCATION: Silla, MT.

LAND & WATER CONSULTING, INC.
P.O. BOX 8254
Missoula, MT 59807

FIGURE F4

REV -
DATE: 8-13-05



Typical Section of Excavated Flood Channel

MDT Camp Creek Wetland Mitigation

Flood Channel Plan and Typical

LAND & WATER CONSULTING, INC.
P.O. BOX 8254
Missoula, MT 59807

FIGURE F6

REV -

DATE 10-28-03

Appendix B

2004 WETLAND MITIGATION SITE MONITORING FORM
2004 BIRD SURVEY FORM
2004 WETLAND DELINEATION FORMS
2004 FUNCTIONAL ASSESSMENT FORM

MDT Wetland Mitigation Monitoring
Camp Creek
Sula, Montana

LWC / MDT WETLAND MITIGATION SITE MONITORING FORM

Project Name: Camp Creek Project Number: 330054.106 Assessment Date: 08/17/04
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: Cloudy & overcast Person(s) conducting the assessment: Greg Howard
Initial Evaluation Date: 09/05/02 Visit #: 2 Monitoring Year: 2004
Size of evaluation area: 200 acres Land use surrounding wetland: Agriculture; livestock grazing & pasture

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. Surface and groundwater flows in areas of lower topography, observed in 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: Third year of monitoring at the Camp Creek site. Streambanks and floodplains looking more stabilized. Vegetation cover along floodplains and creek margins dominated by wetland species. Areas of the floodplain saturated throughout the season. Shrubs and trees planted showing vigorous new growth. Willows sprigged along the streambanks showing new growth and spreading rhizomes. Vegetation community types and mapping remained similar to 2003 monitoring within the MDT owned parcel. Grasser parcel continued to change due to increase 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
Agropyron repens	60	Planted Species	10
Thlaspi arvensis	P	*Trifolium pratense*	10
Rumex crispus	P	*Centaurea maculosa*	10
Lychnis alba	P	*Alopecurus pratensis*	P
Agrostis alba	P		

COMMENTS/PROBLEMS: Created uplands, planted with several drier species: *Pinus ponderosa*, *Pseudotsuga menziesii*, *Symphoricarpos albus*, *Rosa woodsii*, *Potentilla fruticosa*, and *Amelanchier alnifolia*. Similar condition except for the decrease in *Chenopodium album* and increase in *Agrostis alba.*

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

Dominant Species	% Cover	Dominant Species	% Cover
Carex aquatilis	P	*Alopecurus pratensis*	P
Phalaris arundinacea	20	*Phleum pratense*	P
Carex utriculata	20	*Agrostis alba*	P
Carex nebrascensis	50	*Sisymbrium altissimum*	10
Geum macrophyllum	P		

COMMENTS/PROBLEMS: Open wetland meadow with extensive sedges, intermixed with a few drier grass species.

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

Dominant Species	% Cover	Dominant Species	% Cover
Alopecurus pratensis	P	*Carex nebrascensis*	P
Populus trichocarpa - Planted	P	*Phalaris arundinacea*	10
Populus tremuloides - Planted	P	*Phleum pratense*	T
Epilobium ciliatum	P	*Salix* – sprigged	20
Agrostis alba	30	*Alnus incana*	10
Deschampsia cespitosa	30	*Carex crawfordii*	P
Glyceria grandis	P	*Carex stipata*	P

COMMENTS/PROBLEMS: Vegetation community's along streambanks and floodplain are further transitioning from upland to wetland species. Coverage in general of wetland species have increased. Willow sprigging successful increasing coverage in many areas along bank. Saturated soils observed along many of the floodplain margins near the lower end of MDT owned parcels. Increase in diversity of sedges and rushes. Scrubs and trees installed during first year have vigorous new growth. Heights of several planted shrubs and tress ranging from 3-4ft. 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
Ranunculus aquatilis var. hispidulus	10		

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

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

Dominant Species	% Cover	Dominant Species	% Cover
Centaurea maculosa	60	*Agropyron repens*	20
Sisymbrium altissimum	P	*Linaria vulgaris*	P
Bromus inermis	10		
Bromus tectorum	10		
Alopecurus pratensis	P		

COMMENTS/PROBLEMS: Upland slopes observed on both the east and west sides of site. On the east side, slopes running down from the tree line, into lower wetland basin and floodplain. On the west side, upland slopes disturbed during construction efforts. Area dominated by spotted knapweed and several other pasture grasses such as smooth brome and quackgrass.

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

Dominant Species	% Cover	Dominant Species	% Cover
Populus trichocarpa	30	*Rosa woodsii*	10
Salix bebbiana	P	*Symphoricarpos albus*	P
Alnus incana	P	*Salix drummondiana*	P
Salix geyeriana	10	*Salix exigua*	P
Cornus stolonifera	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
Phalaris arundinacea	20	*Taraxacum officinale*	T
Centaurea maculosa	50	*Chrysanthemum leucanthemum*	T
Verbascum thapsus	T	*Trifolium pratense*	P
Bromus inermis	T	*Rumex crispus*	T
Agropyron repens	20	Plantings	P

COMMENTS/PROBLEMS: Vegetation type found along the upland fringes of constructed floodplain on mostly Grasser-owned parcels. Community No. 7 located near areas dominated by spotted knapweed. Noxious weed invasion in these areas due to nearby location of pre-existing high density weed patches and spreading of these weed seeds during construction. Aggressive reed canarygrass also invading in many areas with spotted knapweed. Floodplain margins unable to support wetland species due lack of hydrology.

COMPREHENSIVE VEGETATION LIST

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

COMMENTS/PROBLEMS: Seven new species added to the list for 2004. These included Colorado rush (*Juncus confusus),* American reedgrass (*Glyceria grandis*), Crawford sedge (*Carex crawfordii*), bull thistle (*Cirsium vulgare*) and white-water buttercup (*Ranunculus aquatilis var. hispidulus*).

PLANTED WOODY VEGETATION SURVIVAL

Species	Number Originally Planted	Number Observed Alive	Mortality Causes
Rosa woodsii	8	3	
Pinus ponderosa	19	3	
Pseudotsuga menziesii	17	0	
Symphoricarpos albus	17	6	
Potentilla fruticosa	30	2	
Populus trichocarpa	55	36	
Populus tremuloides	11	10	
Salix lutea	3	2	
Willow sprigs	225	200+	
Cornus stolonifera	22	4	
Amelanchier alnifolia	4	0	
Alnus incana	4	4	
Betula occidentalis	6	3	

COMMENTS/PROBLEMS: Three transects were used to assess overall survival. Transect 1 was located along the same line as the vegetation monitoring transect, using the same belt width. The transect no. 2, starts at the beginning of transect no. 1, running towards the east (45^{o}), approximately 165 ft long. Transect no. 2 bisects an area of created uplands and associated drier species plantings. Plantings were counted and tallied for either being dead or alive. Transect 3 was located along floodplain margins near vegetation transect.

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		
Elk		X	X		
Bobcat		X			
Moose*		X			X
Coyote		X	X		
Frog*	3				

* Observed during the 2004 monitoring.

Additional Activities Checklist:
_X_ Macroinvertebrate sampling (if required)

COMMENTS/PROBLEMS: Macroinvertebrate samples taken at one location along the main 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:

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

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

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:
_X_ Delineate wetlands according to the 1987 Army Corps manual.
_X_ 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 2002 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: 08/17/04 Examiner: Greg Howard Transect # 1

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

Vegetation type 1:	Agropyron / Trifolium (Community No. 1)
Length of transect in this type:	111 feet
Species:	Cover:
Agropyron repens	60
Thlaspi arvensis	T
Potentilla fruticosa	10
Agrostis alba	10
Cirsium vulgare	T
Trifolium pratense	P
Matricaria matricarioides	T
Rumex crispus	T
Epilobium ciliatum	P
Centaurea maculosa	P
Lychnis alba	T
Total Vegetative Cover:	90%

Vegetation type 2:	Carex / Phalaris (Community No. 2)
Length of transect in this type:	102 feet
Species:	Cover:
Carex nebrascensis	70
Carex utriculata	10
Phalaris arundinacea	P
Geum macrophyllum	T
Cirsium arvense	T
Lychnis alba	P
Agrostis alba	P
Salix exigua	P
Sisymbrium altissimum	P
Cirsium vulgare	P
Trifolium pratense	T
Total Vegetative Cover:	90%

Vegetation type 3:	Agropyron / Trifolium (Community No. 1)
Length of transect in this type:	63 feet
Species:	Cover:
Carex nebrascensis	P
Thlaspi arvensis	T
Epilobium ciliatum	P
Agropyron repens	20
Festuca pratensis	30
Phalaris arundinacea	T
Trifolium pratense	P
Lactuca serriola	T
Centaurea maculosa	T
Verbascum thapsus	T
Deschampsia cespitosa	20
Total Vegetative Cover:	80%

Vegetation type 4:	Agrostis / Deschampsia (Community No. 3)
Length of transect in this type:	6 feet
Species:	Cover:
Carex utriculata	T
Epilobium ciliatum	P
Agrostis alba	20
Centaurea maculosa	T
Alopecurus pratensis	P
Juncus ensifolius	P
Trifolium pratense	20
Carex nebrascensis	T
Deschampsia cespitosa	20
Plantings (Populus tremuloides & Populus trichocarpa)	P
Willow Sprigs	P
Phalaris arundinacea	P
Total Vegetative Cover:	85%

MDT WETLAND MONITORING – VEGETATION TRANSECT

Site: Camp Creek Date: 08/17/04 Examiner: Greg Howard Transect # 1

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

Vegetation type 5:	Open Water - Channel	
Length of transect in this type:	20	feet
Species:		Cover:

Vegetation type 6:	Agrostis / Deschampsia (Community No. 3)	
Length of transect in this type:	169	feet
Species:		Cover:
Carex utriculata		T
Epilobium ciliatum		T
Agrostis alba		20
Alopecurus pratensis		P
Juncus ensifolius		P
Juncus confusus		P
Trifolium pratense		20
Glyceria grandis		P
Carex nebrascensis		T
Deschampsia cespitosa		20
Plantings (Populus tremuloides & Populus trichocarpa)		P
Willow Sprigs		P
Phalaris arundinacea		10
Carex crawfordii		P
	Total Vegetative Cover:	85%

MDT WETLAND MONITORING – VEGETATION TRANSECT (back of form)

Cover Estimate

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

Indicator Class:

+ = Obligate
- = Facultative/Wet
0 = Facultative

Source:

P = Planted
V = Volunteer

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

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

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

Notes:

3

BIRD SURVEY – FIELD DATA SHEET

Page__1_of_1__
Date: 8/17/04

SITE: Camp Creek

Survey Time: 0800-1200

Bird Species	#	Behavior	Habitat	Bird Species	#	Behavior	Habitat
Killdeer	1	F	UP				
American Crow	1	F	UP				

Notes:

Behavior: BP – one of a breeding pair; BD – breeding display; F – foraging; FO – flyover; L – loafing; N – nesting

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

DATA FORM

ROUTINE WETLAND DETERMINATION

(1987 COE Wetlands Delineation Manual)

Project/Site: Camp Creek	Date: 08/17/04
Applicant/Owner: MDT/Grasser	County: Ravalli
Investigator: Greg Howard	State: MT
Do Normal Circumstances exist on the site: x Yes ___ No	Community ID: Upland
Is the site significantly disturbed (Atypical Situation)? ___ Yes ___ No	Transect ID: 1
Is the area a potential Problem Area? ___ Yes ___ No	Plot ID: 1
(If needed, explain on reverse.)	

VEGETATION

	Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1	*Agropyron repens*	H	FAC-			
2	*Thlaspi arvensis*	H	--			
3	*Agrostis alba*	H	FAC+			
4	*Trifolium pratense*	H	FACU			
5	*Centaurea maculosa*	H	--			
6	*Potentilla fruticosa*	S	FAC-			

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-). 1/6 = 17%

Area dominated by upland vegetation.

HYDROLOGY

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

X No Recorded Data Available

Field Observations:

Depth of Surface Water: ___ - ___ (in.)

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

Depth to Saturated Soil: ___ - ___ (in.)

Wetland Hydrology Indicators:

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

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

Remarks:
No hydrology indicators present.

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?	X Yes ____ No

Profile Description:

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

Hydric Soil Indicators:

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

Soil pit located in area of created upland habitat, soils consisting of fill material excavated from channel reconstruction and removed from historic wetland.

WETLAND DETERMINATION

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

Remarks:
Sampling point considered within an upland area.

Approved by HQUSACE 2/92

DATA FORM

ROUTINE WETLAND DETERMINATION

(1987 COE Wetlands Delineation Manual)

Project/Site: Camp Creek	Date: 08/17/04
Applicant/Owner: MDT/Grasser	County: Ravalli
Investigator: Greg Howard	State: MT

Do Normal Circumstances exist on the site:	X	Yes		No
Is the site significantly disturbed (Atypical Situation)?		Yes		No
Is the area a potential Problem Area?:		Yes		No
(If needed, explain on reverse.)				

Community ID: Emergent
Transect ID: 1
Plot ID: 2

VEGETATION

	Dominant Plant Species	Stratum	Indicator
1	*Carex nebrascensis*	H	OBL
2	*Phalaris arundinacea*	H	FACW
3	*Geum macrophyllum*	H	OBL
4	*Agrostis alba*	H	FAC+
5	*Cirsium arvense*	H	FACU+
6	*Carex utriculata*	H	OBL
7	*Salix exigua*	S	OBL

Dominant Plant Species	Stratum	Indicator

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-). 6/7 = 85%

Area dominated by hydrophytic vegetation.

HYDROLOGY

Recorded Data (Describe in Remarks):
- Stream, Lake, or Tide Gauge
- Aerial Photographs
- Other
- X No Recorded Data Available

Field Observations:

Depth of Surface Water: _____ (in.)

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

Depth to Saturated Soil: 8 (in.)

Wetland Hydrology Indicators:

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

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

Remarks:
Hydrology indicators present with saturated soils. Drainage patterns evident, area of lower topography. Historic side channel of Camp Creek.

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?	X Yes ____ No

Profile Description:

Depth inches	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0 – 3	O	10 YR 2/2	--	--	Roots & organics
3 – 6	A1	10 YR 2/1	--	--	Sandy loam & roots
6 – 8	A2	10 YR 2/1	--	--	Peat & sandy loam

Hydric Soil Indicators:

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

Hydric soils present, low-chroma indicator and high organic content (peat).

WETLAND DETERMINATION

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

Remarks:
Sampling point is considered within a wetland. Area of lower topography dominated by emergent type vegetation. Undisturbed wetlands mapped during initial delineation.

Approved by HQUSACE 2/92

ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Camp Creek	Date: 08/17/04
Applicant/Owner: MDT/Grasser	County: Ravalli
Investigator: Greg Howard	State: MT

Do Normal Circumstances exist on the site:	X	Yes		No	Community ID: Emergent / Rock Bottom
Is the site significantly disturbed (Atypical Situation)?		Yes		No	Transect ID: 1
Is the area a potential Problem Area?: (If needed, explain on reverse.)		Yes		No	Plot ID: 3

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1	*Carex utriculata*	H	OBL	7	*Agrostis alba*	H	FAC+
2	*Alopecurus pratensis*	H	FACW	8	*Centaurea maculosa*	H	--
3	*Carex nebrascensis*	H	OBL	9	*Veronica americana*	H	OBL
4	*Phalaris arundinacea*	H	FACW	10	*Juncus ensifolius*	H	FACW
5	*Epilobium ciliatum*	H	FACW	11	*Trifolium pratense*	H	FACU
6	*Deschampsia cespitosa*	H	FACW				

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-). 9/11 = 81%

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

HYDROLOGY

Recorded Data (Describe in Remarks):
- ____ Stream, Lake, or Tide Gauge
- ____ Aerial Photographs
- ____ Other
- X No Recorded Data Available

Field Observations:

Depth of Surface Water: ____ (in.)

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

Depth to Saturated Soil: 6 (in.)

Wetland Hydrology Indicators:

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

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

Remarks:
Hydrology indicator present with saturated soils and drainage patterns.

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?	X Yes ____ No

Profile Description:

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

Hydric Soil Indicators:

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

Hydric soil indicator present with low-chroma colors.

WETLAND DETERMINATION

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

Remarks:
Sampling point considered within a wetland. 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: Camp Creek	Date: 08/17/04
Applicant/Owner: MDT/Grasser	County: Ravalli
Investigator: Greg Howard	State: MT

Do Normal Circumstances exist on the site:	X	Yes		No
Is the site significantly disturbed (Atypical Situation)?		Yes		No
Is the area a potential Problem Area?:		Yes		No
(If needed, explain on reverse.)				

Community ID: Emergent
Transect ID: 1
Plot ID: 4

VEGETATION

	Dominant Plant Species	Stratum	Indicator
1	*Phalaris arundinacea*	H	FACW
2	*Agrostis alba*	H	FAC+
3	*Carex lanuginosa*	H	OBL
4	*Carex nebrascensis*	H	OBL

Dominant Plant Species	Stratum	Indicator

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

Area dominated by hydrophytic vegetation.

HYDROLOGY

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

X No Recorded Data Available

Field Observations:

Depth of Surface Water: _____ (in.)

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

Depth to Saturated Soil: 10 (in.)

Wetland Hydrology Indicators:

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

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

Remarks:
Hydrology indicators present with saturated soils and drainage patterns.

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?	X Yes ____ No

Profile Description:

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	B	--	--	--	Sand with fine gravels
7 – 10+	A	10 YR 2/1	--	--	Sandy loam with fine to medium gravels

Hydric Soil Indicators:

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

Hydric soils present, low-chroma indicator and high organic content in sandy soils.

WETLAND DETERMINATION

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

Remarks:
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

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

1. Project Name: Camp Creek **2. Project #:** 330054.106 **Control #:** AA-1

3. Evaluation Date: 8/17/2004 **4. Evaluator(s):** Greg Howard **5. Wetland / Site #(s):** MDT Property

6. Wetland Location(s) i. T: 1 N **R:** 19 W **S:** 27 & 34 **T:** __ N **R:** __ E **S:** _____

ii. Approx. Stationing / Mileposts: _____

iii. Watershed: 17010205 **GPS Reference No. (if applies):** _____

Other Location Information: Located in Sula Basin, newly constructed Camp Creek channel,floodplain and adjacent emergent areas on MDT Property.

7. A. Evaluating Agency MDT

B. Purpose of Evaluation:

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

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

9. Assessment Area (total acres): (visually estimated)
37.78 (measured, e.g. GPS)

Comments: AA includes 0.95 acre of stream channel

10. CLASSIFICATION OF WETLAND AND AQUATIC HABITATS IN AA

HGM CLASS [1]	SYSTEM [2]	SUBSYSTEM [2]	CLASS [2]	WATER REGIME [2]	*MODIFIER* [2]	% OF AA
Riverine	Riverine	Upper Perennial	Rock Bottom	Permanently Flooded	---	3
Riverine	Palustrine	---	Emergent Wetland	Seasonally Flooded	---	82
Riverine	Palustrine	---	Scrub-Shrub Wetland	Seasonally Flooded	---	15
---	---	---	---	---	---	

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

Comments: _____

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

12. GENERAL CONDITION OF AA

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

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

Comments: (types of disturbance, intensity, season, etc.) Past disturbances include grazing, clearing and hydrologic alterations; currently low disturbance..

ii. Prominent weedy, alien, & introduced species: Spotted knapweed, bull thistle, Canada thistle, hound's tongue, pennycress, common dandelion & tumble mustard.

iii. Briefly describe AA and surrounding land use / habitat: AA located in Sula Basin , historically heavily grazed. USFS lands & private ownership adjacent. Surrounding land use habitat include pasture, livestock grazing & logging.

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

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

Comments: _____

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

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

Primary or Critical habitat (**list species**)	☐ D ☐ S	_____
Secondary habitat (**list species**)	☒ D ☐ S	bull trout, bald eagle
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, observations

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	_____
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

14C. GENERAL WILDLIFE HABITAT RATING

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

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

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

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

ii. Wildlife Habitat Features: Working from top to bottom, select 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)	☐High				☒Moderate				☐Low											
Class Cover Distribution (all vegetated classes)	☐Even				☐Uneven				☐Even				☒Uneven				☐Even			
Duration of Surface Water in ≥ 10% of AA	P/P	S/I	T/E	A	P/P	S/I	T/E	A	P/P	S/I	T/E	A	P/P	S/I	T/E	A	P/P	S/I	T/E	A
Low disturbance at AA (see 12)	--	--	--	--	--	--	--	--	--	--	--	--	--	H	--	--	--	--	--	--
Moderate disturbance at AA (see 12)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
High disturbance at AA (see 12)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

iii. Rating: 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)			
	☐ Exceptional	☒ High	☐ Moderate	☐ Low
Substantial	--	--	--	--
Moderate	--	.7 (M)	--	--
Low	--	--	--	--

Comments: _____

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

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

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

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

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

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

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

Types of Fish Known or Suspected Within AA	**Modified Habitat Quality** from 14D(ii)			
	☐ Exceptional	☐ High	☒ Moderate	☐ Low
Native game fish	--	--	.7 (M)	--
Introduced game fish	--	--	--	--
Non-game fish	--	--	--	--
No fish	--	--	--	--

Comments: 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 flooded from in-channel or overbank flow, check NA above.

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

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

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

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

Comments: Channel flooplain margins have high capacity to hold large volumes of water during seasonal flooding.

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

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

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

Sediment, Nutrient, and Toxicant Input Levels Within AA	AA receives or surrounding land use has potential to deliver low to moderate levels of sediments, nutrients, or compounds such that other functions are not substantially impaired. Minor sedimentation, sources of nutrients or toxicants, or signs of eutrophication present.				Waterbody on MDEQ list of waterbodies in need of TMDL development for "probable causes" related to sediment, nutrients, or toxicants **or** AA receives or surrounding land use has potential to deliver high levels of sediments, nutrients, or compounds such that other functions are substantially impaired. Major sedimentation, sources of nutrients or toxicants, or signs of eutrophication present.			
% cover of wetland vegetation in AA	☐ ≥ 70%		☒ < 70%		☐ ≥ 70%		☐ < 70%	
Evidence of flooding or ponding in AA	☐ Yes	☐ No	☒ Yes	☐ No	☐ Yes	☐ No	☐ Yes	☐ No
AA contains **no or restricted outlet**	--	--	.7 (M)	--	--	--	--	--
AA contains **unrestricted outlet**	--	--	--	--	--	--	--	--

Comments: Minor sedimentation due to logging & recent forest fires.

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

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

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

% Cover of wetland streambank or shoreline by species with deep, binding rootmasses.	***Duration of Surface Water Adjacent to Rooted Vegetation***		
	☒Permanent / Perennial	☐Seasonal / Intermittent	☐Temporary / Ephemeral
≥ 65 %	--	--	--
35-64 %	.7 (M)	--	--
< 35 %	--	--	--

Comments: Currently low woody plant density along streambank. Ratings will increase afte willow sp-rigs become more established.

14I. PRODUCTION EXPORT / FOOD CHAIN SUPPORT

i. **Rating** (Working from top to bottom, use the matrix below to arrive at the functional point and rating of high (H), moderate (M), or low (L) for this function.
A = acreage of vegetated component in the AA. **B** = structural diversity rating from #13. **C** = Yes (Y) or No (N) as to whether or not the AA contains a surface or subsurface outlet; **P/P** = permanent/perennial; **S/I** = seasonal/intermittent; **T/E/A**= temporary/ephemeral/absent.

A	☒ Vegetated component >5 acres						☐ Vegetated component 1-5 acres						☐ Vegetated component <1 acre					
B	☐ High		☒ Moderate		☐ Low		☐ High		☐ Moderate		☐ Low		☐ High		☐ Moderate		☐ Low	
C	☐Y	☐N	☒Y	☐N	☐Y	☐N	☐Y	☐N	☐Y	☐N	☐Y	☐N	☐Y	☐N	☐Y	☐N	☐Y	☐N
P/P	--	--	.9H	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
S/I	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
T/E/A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Comments: _____

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

i. ☒ **Discharge Indicators**
- ☐ Springs are known or observed.
- ☐ Vegetation growing during dormant season/drought.
- ☒ Wetland occurs at the toe of a natural 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 the information from 14J(i) and 14j(ii) above and the table below to arrive at the functional point and rating of high (H) or low (L) for this function.

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

Comments: Channel & floodplains located in Sula Basin, steep slopes on both sides of basin. Wetlands occuring 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.		
Estimated Relative Abundance from #11	☐rare	☐common	☐abundant	☐rare	☐common	☐abundant	☐rare	☒common	☐abundant
Low disturbance at AA (#12i)	--	--	--	--	--	--	--	.4M	--
Moderate disturbance at AA (#12i)	--	--	--	--	--	--	--	--	--
High disturbance at AA (#12i)	--	--	--	--	--	--	--	--	--

Comments: _____

14L. RECREATION / EDUCATION POTENTIAL

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

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

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

☒ **Yes** [Proceed to 14L (ii) and then 14L(iv).] ☐ **No** [Rate as low in 14L(iv)]

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

Ownership	Disturbance at AA from #12(i)		
	☒ Low	☐ Moderate	☐ High
Public ownership	1(H)	--	--
Private ownership	--	--	--

Comments: Good potential for rec/ed site, located along hwy 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	Moderate	0.70	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	Moderate	0.70	1	
H. Sediment/Shoreline Stabilization	Moderate	0.70	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	Moderate	1.00	1	
	Totals:	**9.30**	**12.00**	
	Percent of Total Possible Points:		**78%** (Actual / Possible) x 100 [rd to nearest whole #]	

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

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

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

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

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

☐ **I** ☒ **II** ☐ **III** ☐ **IV**

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

1. Project Name: Camp Creek **2. Project #:** 330054.106 **Control #:** AA-2

3. Evaluation Date: 8/17/2004 **4. Evaluator(s):** Greg Howard **5. Wetland / Site #(s):** Grasser Property

6. Wetland Location(s) i. T: 1 N **R:** 19 W **S:** 22,27 & 34 **T:** __ N **R:** __ E **S:** _____

ii. Approx. Stationing / Mileposts: _____

iii. Watershed: 17010205 **GPS Reference No. (if applies):** _____

Other Location Information: _____

7. A. Evaluating Agency MDT

B. Purpose of Evaluation:

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

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

9. Assessment Area (total acres): (visually estimated)
8.52 (measured, e.g. GPS)

Comments: AA includes 1.2 acres of stream channel

10. CLASSIFICATION OF WETLAND AND AQUATIC HABITATS IN AA

HGM CLASS [1]	SYSTEM [2]	SUBSYSTEM [2]	CLASS [2]	WATER REGIME [2]	*MODIFIER* [2]	% OF AA
Riverine	Palustrine	None	Emergent Wetland	Seasonally Flooded	---	80
Riverine	Riverine	Upper Perennial	Rock Bottom	Permanently Flooded	---	15
Riverine	Palustrine	None	Scrub-Shrub Wetland	Seasonally Flooded	---	5
---	---	---	---	---	---	

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

Comments: _____

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

12. GENERAL CONDITION OF AA

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

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

Comments: (types of disturbance, intensity, season, etc.) Past alteration from historic grazing; currently grazed.

ii. Prominent weedy, alien, & introduced species: Spotted knapweed, Canada thistle, hound's tongue, pennycress, common dandelion & tumble mustard.

iii. Briefly describe AA and surrounding land use / habitat: Camp creek and adjacent wetlands on Grasser property. Site is grazed. Adjacent land uses are pasture, logging, MDT conservation easement.

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

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

Comments:

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

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

Primary or Critical habitat (**list species**)	☐ D ☐ S	_____
Secondary habitat (**list species**)	☒ D ☐ S	bull trout, bald eagle
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, 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	_____
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

14C. GENERAL WILDLIFE HABITAT RATING

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

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

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

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

ii. Wildlife Habitat Features: Working from top to bottom, select 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)	☐ High								☒ Moderate								☐ Low			
Class Cover Distribution (all vegetated classes)	☐ Even				☐ Uneven				☐ Even				☒ Uneven				☐ Even			
Duration of Surface Water in ≥ 10% of AA	P/P	S/I	T/E	A	P/P	S/I	T/E	A	P/P	S/I	T/E	A	P/P	S/I	T/E	A	P/P	S/I	T/E	A
Low disturbance at AA (see 12)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Moderate disturbance at AA (see 12)	--	--	--	--	--	--	--	--	--	--	--	--	--	M	--	--	--	--	--	--
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)			
	☐ Exceptional	☐ High	☒ Moderate	☐ Low
Substantial	--	--	--	--
Moderate	--	--	.5 (M)	--
Low	--	--	--	--

Comments: _____

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

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

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

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

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

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

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

Types of Fish Known or Suspected Within AA	**Modified Habitat Quality** from 14D(ii)			
	☐ Exceptional	☐ High	☒ Moderate	☐ Low
Native game fish	--	--	.7 (M)	--
Introduced game fish	--	--	--	--
Non-game fish	--	--	--	--
No fish	--	--	--	--

Comments: West-slope cutthroat present, bull trout in drainage

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

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

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

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

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

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

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

Comments:

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

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

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

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

Comments: Minor sediment source 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 or a river, stream, or other natural or man-made drainage, or on the shoreline of a standing water body that is subject to wave action. If this does not apply, check NA above.

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

% Cover of wetland streambank or shoreline by species with deep, binding rootmasses.	***Duration of Surface Water Adjacent to Rooted Vegetation***		
	☒Permanent / Perennial	☐Seasonal / Intermittent	☐Temporary / Ephemeral
≥ 65 %	--	--	--
35-64 %	--	--	--
< 35 %	.3 (L)	--	--

Comments: _____

14I. PRODUCTION EXPORT / FOOD CHAIN SUPPORT

i. **Rating** (Working from top to bottom, use the matrix below to arrive at the functional point and rating of high (H), moderate (M), or low (L) for this function.
A = acreage of vegetated component in the AA. **B** = structural diversity rating from #13. **C** = Yes (Y) or No (N) as to whether or not the AA contains a surface or subsurface outlet; **P/P** = permanent/perennial; **S/I** = seasonal/intermittent; **T/E/A**= temporary/ephemeral/absent.

A	☒ Vegetated component >5 acres						☐ Vegetated component 1-5 acres						☐ Vegetated component <1 acre					
B	☐ High		☒ Moderate		☐ Low		☐ High		☐ Moderate		☐ Low		☐ High		☐ Moderate		☐ Low	
C	☐Y	☐N	☒Y	☐N	☐Y	☐N	☐Y	☐N	☐Y	☐N	☐Y	☐N	☐Y	☐N	☐Y	☐N	☐Y	☐N
P/P	--	--	.9H	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
S/I	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
T/E/A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Comments:

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

i. ☒ **Discharge Indicators**
- ☐ Springs are known or observed.
- ☐ Vegetation growing during dormant season/drought.
- ☒ Wetland occurs at the toe of a natural 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 the information from 14J(i) and 14j(ii) above and the table below to arrive at the functional point and rating of high (H) or low (L) for this function.

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

Comments: _____

14K. UNIQUENESS

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

Replacement Potential	AA contains fen, bog, warm springs or mature (>80 yr-old) forested wetland or plant association listed as "S1" by the MTNHP.			AA does not contain previously cited rare types and structural diversity (#13) is high or contains plant association listed as "S2" by the MTNHP.			AA does not contain previously cited rare types or associations and structural diversity (#13) is low-moderate.		
Estimated Relative Abundance from #11	☐rare	☐common	☐abundant	☐rare	☐common	☐abundant	☐rare	☐common	☒abundant
Low disturbance at AA (#12i)	--	--	--	--	--	--	--	--	--
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)		
	☐ Low	☒ Moderate	☐ High
Public ownership	--	--	--
Private ownership	--	.3(L)	--

Comments: Good potential for rec/ed area, adjacent to HWY. 93, but privately owned.

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	0.50	1	
D. General Fish/Aquatic Habitat	Moderate	0.70	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	Low	0.30	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	
	Totals:	**7.10**	**12.00**	
	Percent of Total Possible Points:		**58%** (Actual / Possible) x 100 [rd to nearest whole #]	

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

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

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

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

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

☐ **I** ☐ **II** ☒ **III** ☐ **IV**

Appendix C

REPRESENTATIVE PHOTOGRAPHS
AERIAL PHOTOGRAPH

MDT Wetland Mitigation Monitoring
Camp Creek
Sula, Montana

Photo Point No. 1: View looking northeast along vegetation transect, end point in foreground.

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

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

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

Photo Point No. 5: View looking north, Camp Creek and floodplain margins. Areas of floodplain with saturated soils during late summer visit.

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

Camp Creek: 2004

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

Photo Point No. 9: View looking north, main channel just below second culvert. Example of fabric work along constructed streambanks.

Photo Point No. 10: View looking south, section of channel with remnant shrub communities present.

Photo Point No. 11: View looking north on Gasser owned parcel. Mature cottonwoods located along the main channel. Floodplain margins dominated by invasive species.

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

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

Camp Creek: 2004

Camp Creek 2004

Photo Point No. 5: Panoramic looking west across site. Representative photo of typical channel and floodplain section present at Camp Creek with MDT owned parcels. Floodplain areas dominated by mostly wetland species. The shrub and tree plantings showing new vigorous growth.

Photo Point No. 11: View looking north along creek, below upper road crossing and culvert near Grasser complex. Mature cottonwoods and remnant shrub communities present along creek. Floodplain areas with spotted knapweed infestations.

2004 Camp Creek Aerial Photograph

Appendix D

ORIGINAL SITE PLAN

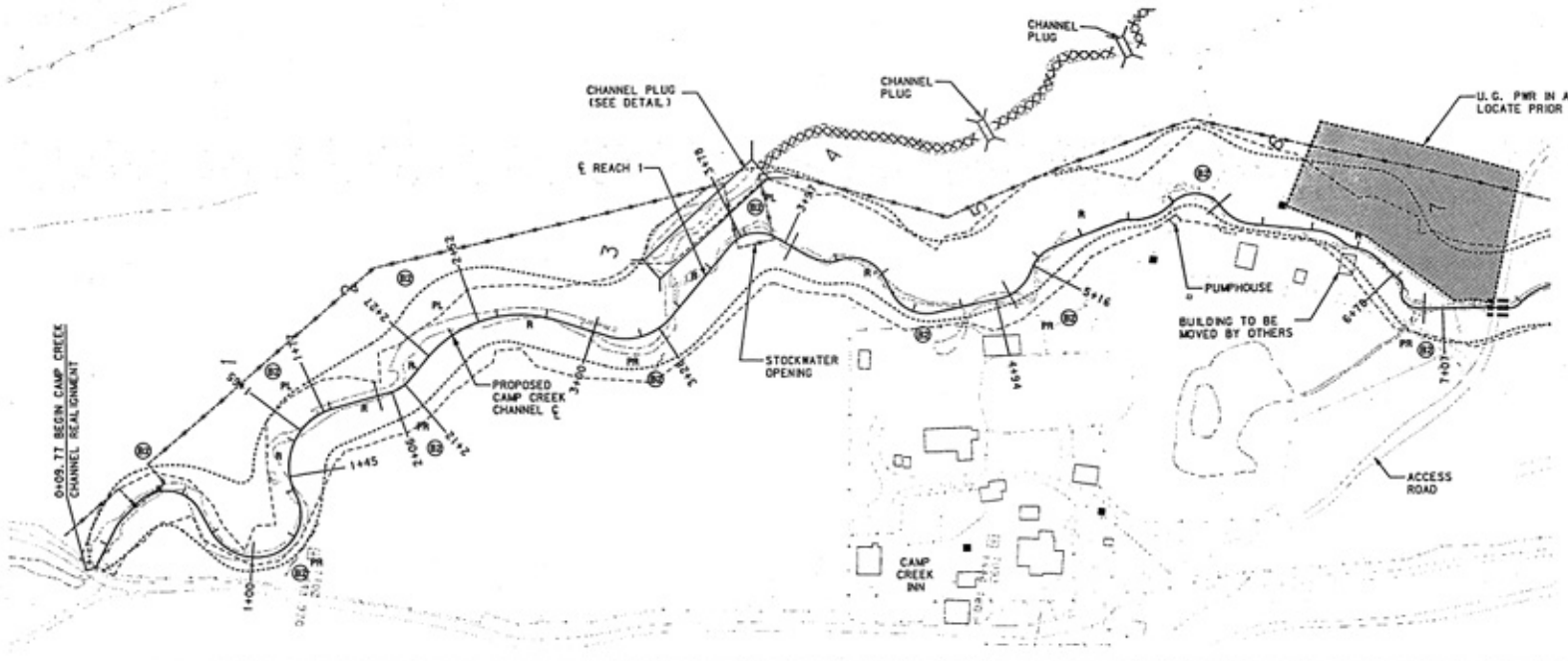
MDT Wetland Mitigation Monitoring
Camp Creek
Sula, Montana

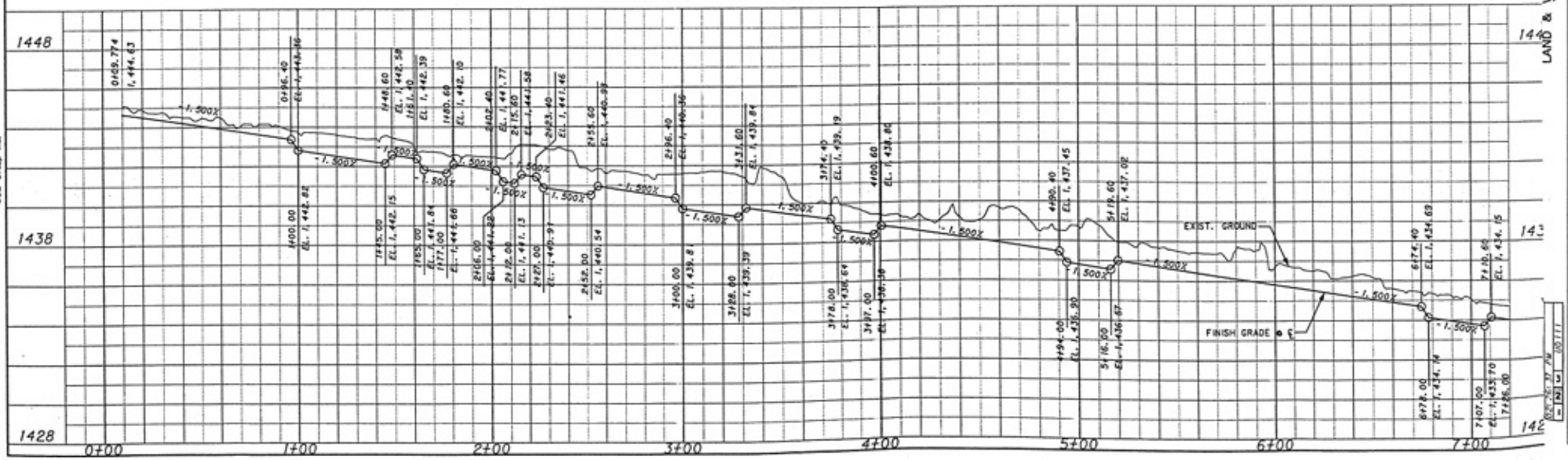
PBSJ

LAND & WATER

STATE	PROJECT NUMBER	SHEET
MONTANA	NH 41(24)	29

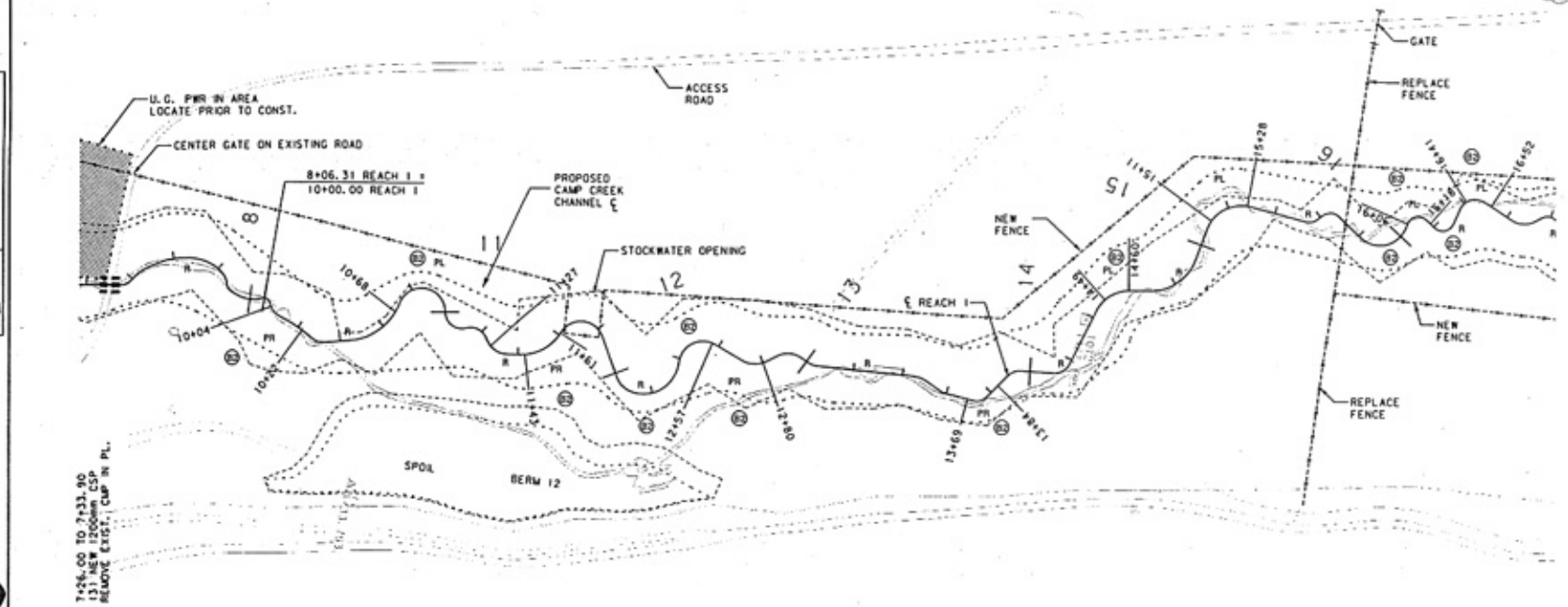
CAMP CREEK RESTORATION





STATE	PROJECT NUMBER	SHEET NO.
MONTANA	NH 41(24)	30

CAMP CREEK RESTORATION



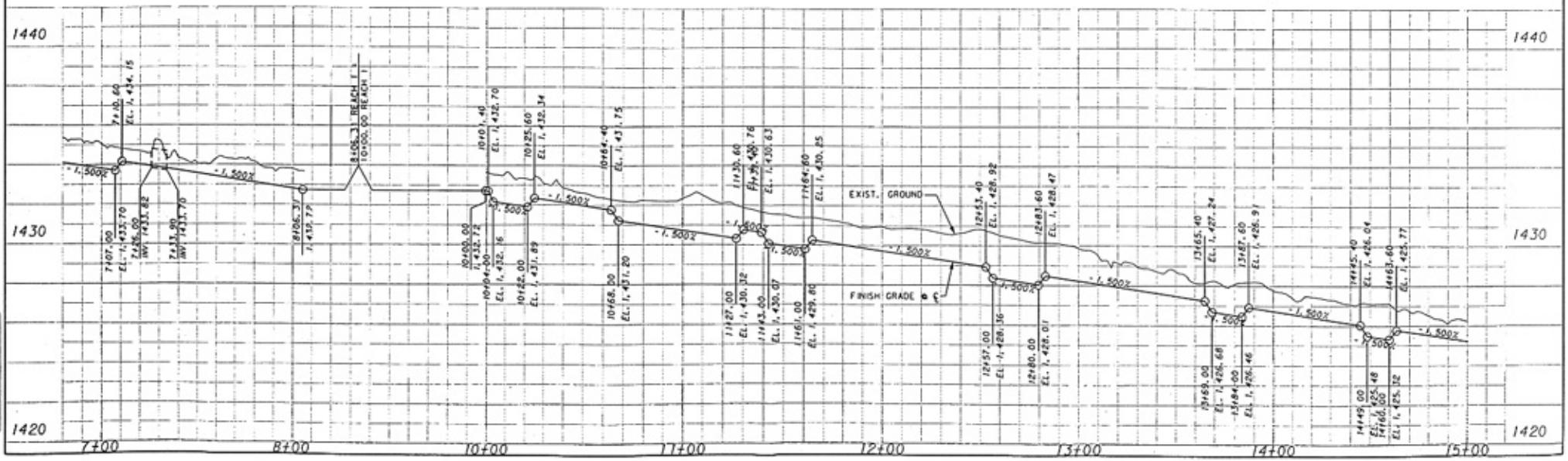
LEGEND

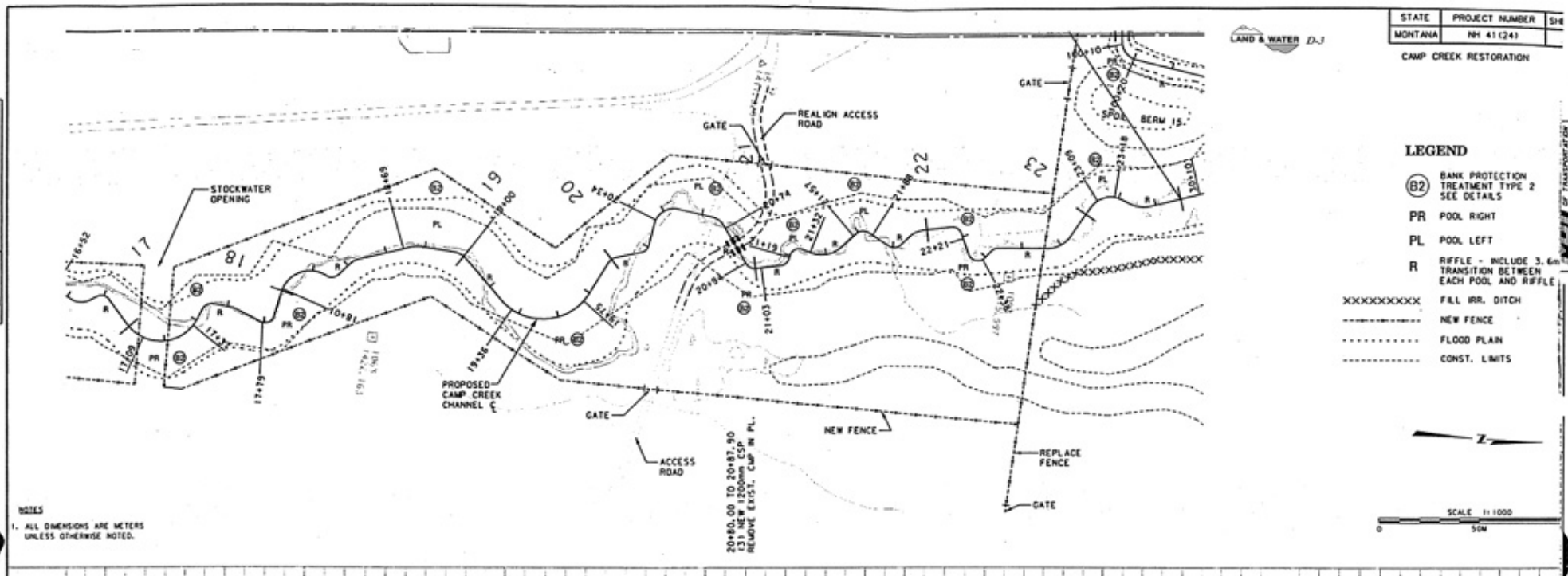
- (B2) BANK PROTECTION TREATMENT TYPE 2 SEE DETAILS
- PR POOL RIGHT
- PL POOL LEFT
- R RIFFLE - INCLUDE 3.6m TRANSITION BETWEEN EACH POOL AND RIFFLE
- XXXXXXXXX F&L WR, DITCH
- ---------- NEW FENCE
- . . . . . FLOOD PLAIN
- ---------- CONST. LIMITS

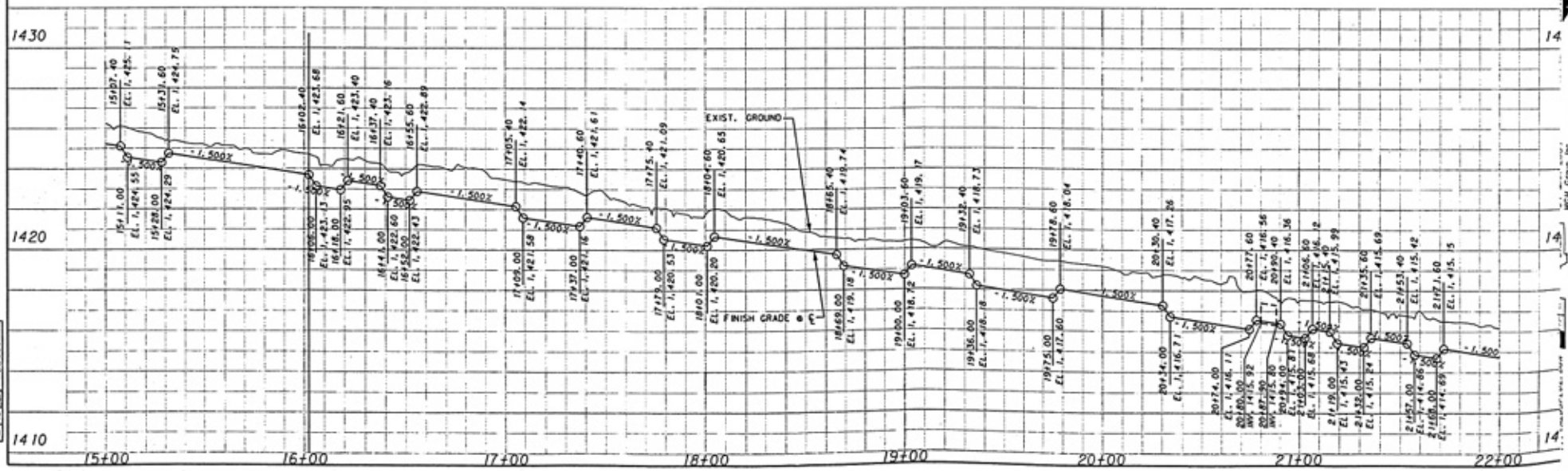
NOTES

1. ALL DIMENSIONS ARE METERS UNLESS OTHERWISE NOTED.

SCALE 1:1000



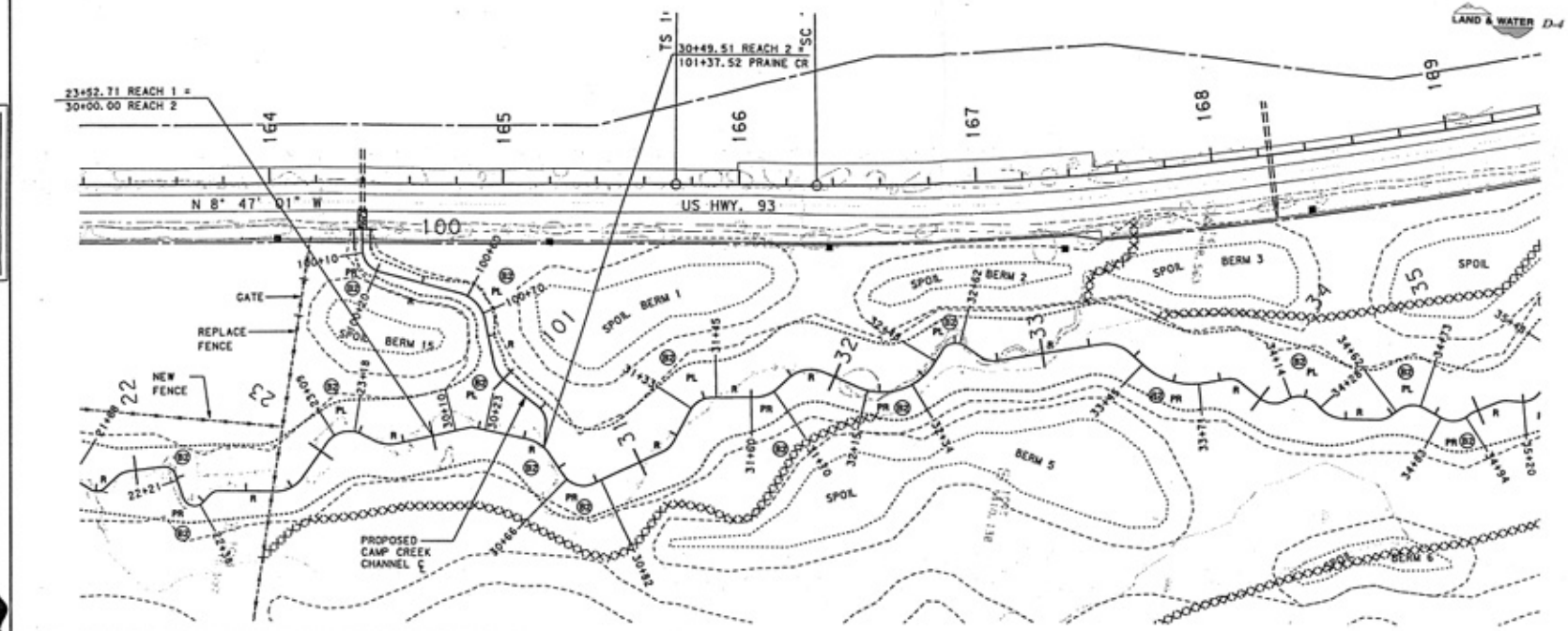




LAND & WATER CONSULTING, INC.
WGM GROUP, INC.
MONTANA DEPARTMENT OF TRANSPORTATION

STATE	PROJECT NUMBER	SHEET NO.
MONTANA	NH 41 (24)	32

CAMP CREEK RESTORATION



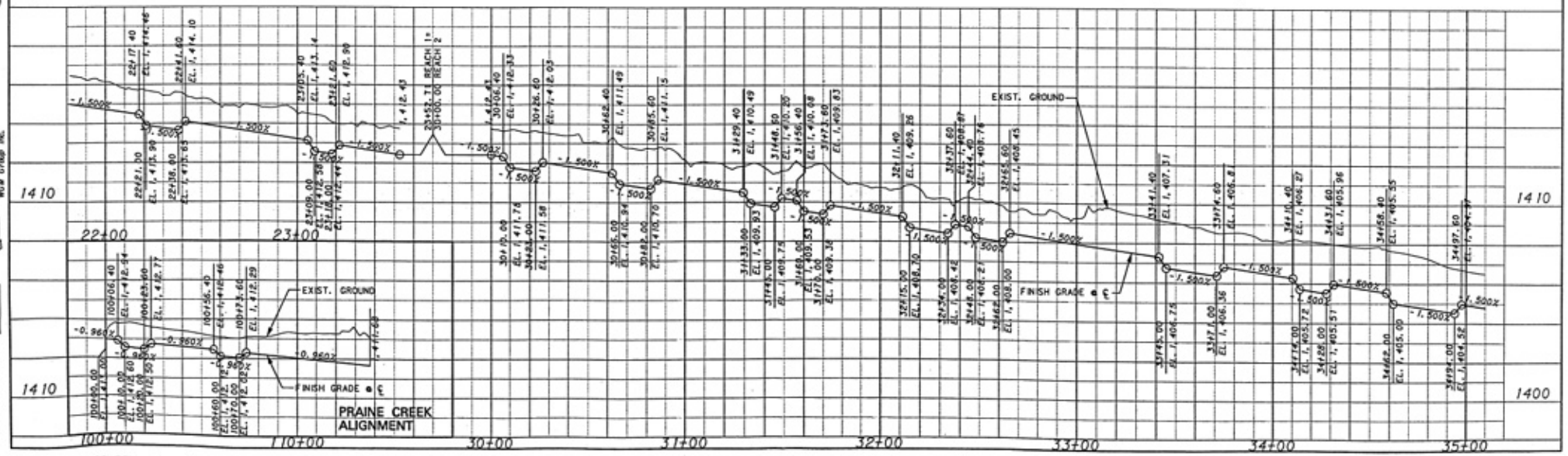
LEGEND

- (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
- XXXXXXXXX FILL BR. DITCH
- NEW FENCE
- FLOOD PLAIN
- CONST. LIMITS

NOTES

1. ALL DIMENSIONS ARE METERS UNLESS OTHERWISE NOTED.

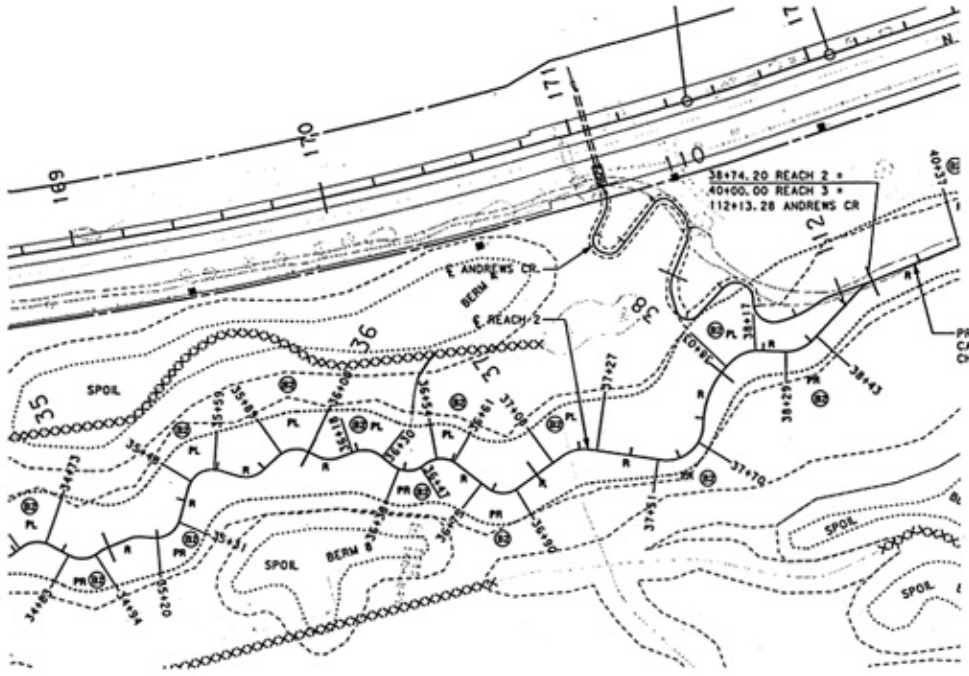
SCALE 1:1000



STATE	PROJECT NUMBER	SHEET NO
MONTANA	NH 41 (24)	33

CAMP CREEK RESTORATION

LAND & WATER D-5



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
- XXXXXXXXX FILL IRR. DITCH
- NEW FENCE
- FLOOD PLAIN
- CONST. LIMITS

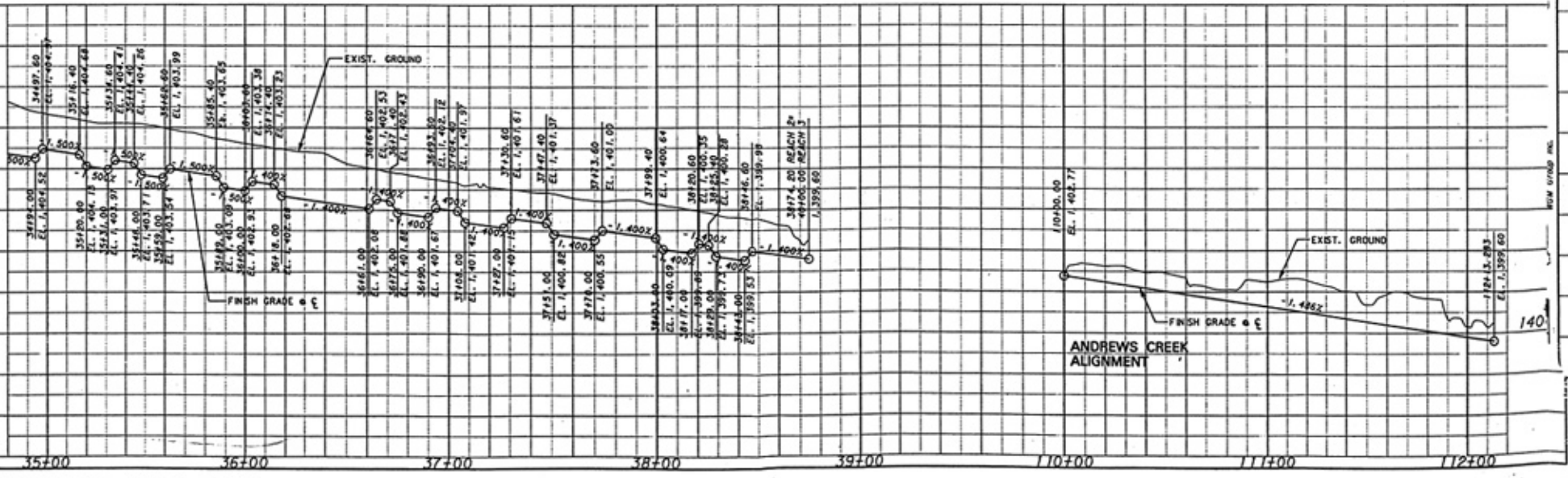
NOTES

1. ALL DIMENSIONS ARE METERS UNLESS OTHERWISE NOTED.

N

SCALE 1:1000

0 50M 100M



Appendix E

BIRD SURVEY PROTOCOL
GPS PROTOCOL

MDT Wetland Mitigation Monitoring
Camp Creek
Sula, Montana

PBSJ

LAND & WATER

BIRD SURVEY PROTOCOL

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

Species Use within the Mitigation Wetland: Survey Method

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

Sites that can be circumambulated or walked throughout.

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

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

Sites that cannot be circumambulated.

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

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

Species Use within the Mitigation Wetland: Data Recording

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

1. Bird Species List

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

2. Bird Density

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

3. Bird Behavior

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

4. Bird Species Habitat Use

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

GPS Mapping and Aerial Photo Referencing Procedure

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

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

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

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

Appendix F

2004 MACROINVERTEBRATE SAMPLING PROTOCOL AND DATA

MDT Wetland Mitigation Monitoring
Camp Creek
Sula, Montana

PBSJ

LAND & WATER

AQUATIC INVERTEBRATE SAMPLING PROTOCOL

Equipment List

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

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

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

Site Selection

Select the sampling site with these considerations in mind:

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

Sampling

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

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

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

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

This step is optional, but it gives you a chance to see that you've collected some invertebrates. Rinse the net out into the bucket, and look for insects, crustaceans, etc. If necessary, repeat the sampling process in a nearby location, and add the net contents to the bucket. Remember to sample all four environments.

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

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

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

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

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

Photograph the sampled site.

Sample Handling/Shipping

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

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

METHODS

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

The method employed to assess these wetlands is based on constructing an index using a battery of 12 bioassessment metrics or attributes (Table1) tested and recommended by Stribling et al. (1995) in a report to the Montana Department of Health and Environmental Science. In that study, it was determined that some of the metrics were of limited use in some geographic regions, and for some wetland types. Despite that finding, all 12 metrics are used in this evaluation of mitigated wetlands, since detailed geographic information and wetland classifications were unavailable.

Scoring criteria for metrics were developed by generally following the tactic used by Stribling et al. Boxplots were generated using a statistical software package, and distributions, median values, ranges, and quartiles for each metric were examined. All sites in all years of sampling were used. Camp Creek, which was sampled in 2002, 2003, and 2004, was assessed using the tested metric battery developed for montane streams of Western Montana (Bollman 1998).The fauna at the Camp Creek site was different from that of the other sites, and suggested montane stream conditions rather than wetland conditions. For the wetlands, “optimal” scores were generally those that fell above the 75th percentile (for those metrics that decrease in value in response to stress) or below the 25th percentile (for metrics that respond to stress by an increase in value) of all scores. Additional scoring ranges were established by bisecting the range below the 75th percentile for decreasing scores (or above the 25th percentile for increasing scores) into “sub-optimal” and “poor” assessment categories. A score of 5, 3, or 1 was assigned to optimal, sub-optimal, and poor metric performance, respectively. In this way, metric values were translated into normalized metric scores, and scores for all metrics were summed to produce a total bioassessment score. Total bioassessment scores were classified according to a similar process, using the ranges and distributions of total scores for all sites studied in all years.

The purpose of constructing an index from biological attributes or metrics is to provide a means of integrating information to facilitate the determination of whether management action is needed. The nature of the action needed is not determined solely by the index score, however, but by consideration of an analysis of the component metrics, the taxonomic composition of the assemblages, and other issues. The diagnostic functions of the metrics and taxonomic data need more study; our understanding of the interrelationships of natural environmental factors and anthropogenic disturbances are tentative. Thus, the further interpretive remarks accompanying the raw taxonomic and metric data are offered cautiously.

Sample processing

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

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

Bioassessment metrics

An index based on the performance of 12 metrics was constructed, as described above. Table 1 lists those metrics, describes their calculation and the expected response of each to increased degradation or impairment of the wetland.

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

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

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

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

RESULTS

In 2001, 29 sites were sampled statewide. Nineteen of these sites were revisited in 2002, and 13 new sites were sampled. In 2003, 17 sites that had been visited in both 2001 and 2002 were re-sampled, and 11 sites sampled for the first time in 2001 were re-visited. In addition, 2 new sites were sampled. In 2004, 25 sites were re-visited, and 6 new sites were sampled. Thus, the 2004 database contains data for 122 sampling events at 50 unique sites. Table 2 summarizes sites and sampling years.

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

Literature cited

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

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

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

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

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

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

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

Table 3a.

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

Table 3b.

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

Table 3d.

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

Aquatic Invertebrate Taxonomic Data

Site Name MDT CAMP CREEK **Date Collected** 8 /17/2004

Order	Family	Taxon	Count	Percent	Unique	BI	FFG
Basommatophora							
	Physidae						
		Physidae	12	11.11%	Yes	8	SC
Coleoptera							
	Dytiscidae						
		Agabus	1	0.93%	Yes	5	PR
		Dytiscidae	1	0.93%	Yes	5	PR
		Stictotarsus	4	3.70%	Yes	5	PR
	Elmidae						
		Cleptelmis	4	3.70%	Yes	4	CG
		Optioservus	5	4.63%	Yes	5	SC
Diptera							
	Chironomidae						
		Brillia	1	0.93%	Yes	4	SH
		Cricotopus (Cricotopus)	2	1.85%	Yes	7	SH
		Cricotopus (Nostococladius)	2	1.85%	Yes	6	SH
		Cricotopus bicinctus	3	2.78%	Yes	7	SH
		Eukiefferiella Brehmi Gr.	5	4.63%	Yes	8	CG
		Eukiefferiella Devonica Gr.	1	0.93%	Yes	8	CG
		Micropsectra	12	11.11%	Yes	4	CG
		Microtendipes	1	0.93%	Yes	6	CF
		Orthocladius	1	0.93%	Yes	6	CG
		Pagastia	3	2.78%	Yes	1	CG
		Rheocricotopus	1	0.93%	Yes	4	CG
		Stempellinella	1	0.93%	Yes	4	CG
		Thienemanniella	2	1.85%	Yes	6	CG
		Tvetenia Bavarica Gr.	6	5.56%	Yes	5	CG
	Simuliidae						
		Simulium	1	0.93%	Yes	6	CF
	Tipulidae						
		Antocha	2	1.85%	Yes	3	CG
Ephemeroptera							
	Baetidae						
		Diphetor hageni	4	3.70%	Yes	5	CG
	Ephemerellidae						
		Drunella grandis	8	7.41%	Yes	2	SC
		Ephemerella inermis	1	0.93%	Yes	4	SH
	Heptageniidae						
		Nixe	3	2.78%	Yes	4	SC
	Leptophlebiidae						
		Paraleptophlebia	3	2.78%	Yes	1	CG
Heteroptera							
	Corixidae						
		Arctocorisa	1	0.93%	Yes	11	UN
Plecoptera							
	Perlodidae						
		Cultus	1	0.93%	Yes	2	PR
	Pteronarcyidae						
		Pteronarcella	1	0.93%	Yes	4	SH
		Pteronarcys	2	1.85%	Yes	2	SH
Trichoptera							
	Apataniidae						
		Apatania	1	0.93%	Yes	3	SC
	Brachycentridae						
		Brachycentrus americanus	7	6.48%	Yes	1	CF
	Hydropsychidae						
		Hydropsyche	4	3.70%	Yes	5	CF
	Uenoidae						
		Neophylax rickeri	1	0.93%	Yes	3	SC
Grand Total			**108**				

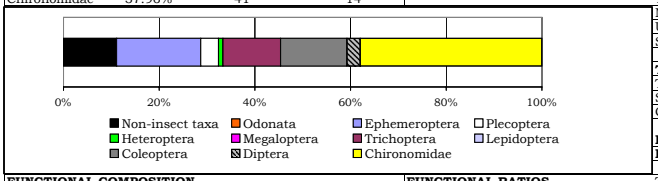
Aquatic Invertebrate Data Summary

Project ID: MDT04LW
Activity ID:
STORET Station ID:
Station Name: MDT CAMP CREEK
Sample Date: 8/17/2004

Sample type	
SUBSAMPLE TOTAL ORGANISMS	108
Portion of sample used	30.00%
Estimated number in total sample	360
Conversion factor	4.483
Estimated number in 1 square meter	484
Sampling effort	
Habitat type	
EPT abundance	36
Taxa richness	35
Number EPT taxa	12
Percent EPT	33.33%

TAXONOMIC COMPOSITION

GROUP	PERCENT	ABUNDANCE	#TAXA
Non-insect taxa	11.11%	12	1
Odonata	0.00%	0	0
Ephemeroptera	17.59%	19	5
Plecoptera	3.70%	4	3
Heteroptera	0.93%	1	1
Megaloptera	0.00%	0	0
Trichoptera	12.04%	13	4
Lepidoptera	0.00%	0	0
Coleoptera	13.89%	15	5
Diptera	2.78%	3	2
Chironomidae	37.96%	41	14



TAXONOMIC RATIOS

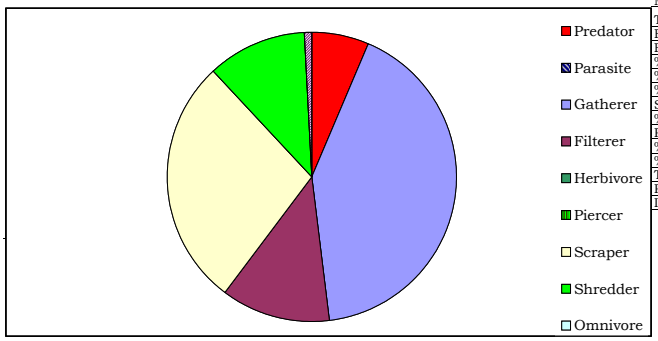
METRIC	VALUE
EPT/Chironomidae	0.88
Baetidae/Ephemeroptera	0.21
Hydropsychidae/Trichopt	0.31

FUNCTIONAL COMPOSITION

GROUP	PERCENT	ABUNDANCE	#TAXA
Predator	6.48%	7	4
Parasite	0.00%	0	0
Gatherer	41.67%	45	13
Filterer	12.04%	13	4
Herbivore	0.00%	0	0
Piercer	0.00%	0	0
Scraper	27.78%	30	6
Shredder	11.11%	12	7
Omnivore	0.00%	0	0
Unknown	0.93%	1	1

FUNCTIONAL RATIOS

METRIC	VALUE
Scraper/Filterer	2.31
Scraper/Scraper + Filtere	0.70



COMMUNITY TOLERANCES

Sediment tolerant taxa	1
Percent sediment tolerant	1.85%
Sediment sensitive taxa	1
Percent sediment sensitive	1.85%
Metals tolerance index (McGuire)	3.10
Cold stenotherm taxa	3
Percent cold stenotherms	3.70%

HABITUS MEASURES

Hemoglobin bearer richness	1
Percent hemoglobin bearers	0.93%
Air-breather richness	4
Percent air-breathers	7.41%
Burrower richness	1
Percent burrowers	0.93%
Swimmer richness	5
Percent swimmers	12.04%

DOMINANCE

TAXON	ABUNDANCE	PERCENT
Physidae	12	11.11%
Micropsectra	12	11.11%
Drunella grandis	8	7.41%
Brachycentrus americanus	7	6.48%
Tvetenia Bavarica Gr.	6	5.56%
SUBTOTAL 5 DOMINANTS	45	41.67%
Optioservus	5	4.63%
Eukiefferiella Brehmi Gr.	5	4.63%
Diphetor hageni	4	3.70%
Hydropsyche	4	3.70%
Stictotarsus	4	3.70%
TOTAL DOMINANTS	67	62.04%

TOLERANCE/CONDITION INDICES

Community Tolerance Quotient (CTQa)	76.08
Hilsenhoff Biotic Index	4.57

DIVERSITY

Shannon H (loge)	5.79
Shannon H (log2)	4.02
Margalef D	7.26
Simpson D	0.04
Evenness	0.11

VOLTINISM

TYPE	ABUNDANCE	# TAXA	PERCENT
Multivoltine	45	15	41.67%
Univoltine	37	11	34.26%
Semivoltine	25	8	23.15%

TAXA CHARACTERS	#TAXA	PERCENT
Tolerant	4	20.37%
Sensitive	3	10.19%
Clinger	18	45.37%

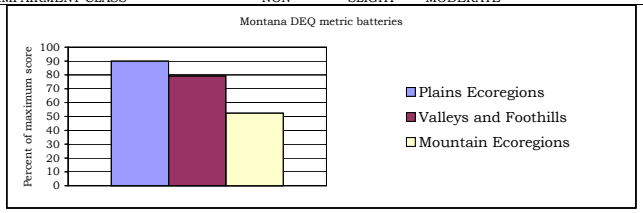
BIOASSESSMENT INDICES

B-IBI (Karr et al.)

METRIC	VALUE	SCORE
Taxa richness	35	3
E richness	5	3
P richness	3	1
T richness	4	1
Long-lived	8	5
Sensitive richness	3	3
%tolerant	20.37%	3
%predators	6.48%	1
Clinger richness	18	3
%dominance (3)	29.63%	5
	TOTAL SCORE	28 56%

MONTANA DEQ INDICES (Bukantis 1998)

METRIC	VALUE	Plains Ecoregions	Valleys and Foothills	Mountain Ecoregions
Taxa richness	35	3	3	3
EPT richness	12	3	1	0
Biotic Index	4.57	3	2	1
%Dominant taxon	11.11%	3	3	3
%Collectors	53.70%	3	3	3
%EPT	33.33%	2	1	0
Shannon Diversity	4.02	3		
%Scrapers +Shredde	38.89%	3	3	1
Predator taxa	4	2		
%Multivoltine	41.67%	2		
%H of T	30.77%		3	
TOTAL SCORES		27	19	11
PERCENT OF MAXIMUM		90.00	79.17	52.38
IMPAIRMENT CLASS		NON	SLIGHT	MODERATE



Montana Valleys and Foothills revised index (Bollman 1998)

Percent max.	55.56%	Impairment class	SLIGHT

Montana Plains ecoregions metrics (Bramblett and Johnson 2002)

Riffle		*Pool*	
EPT richness	12	E richness	5
Percent EPT	33.33%	T richness	4
Percent Oligochaetes and Leeches	0.00%	Percent EPT	33.33%
Percent 2 dominants	22.22%	Percent non-insect	11.11%
Filterer richness	4	Filterer richness	4
Percent intolerant	22.22%	Univoltine richness	11
Univoltine richness	11	Percent supertolerant	17.59%
Percent clingers	45.37%		
Swimmer richness	5		

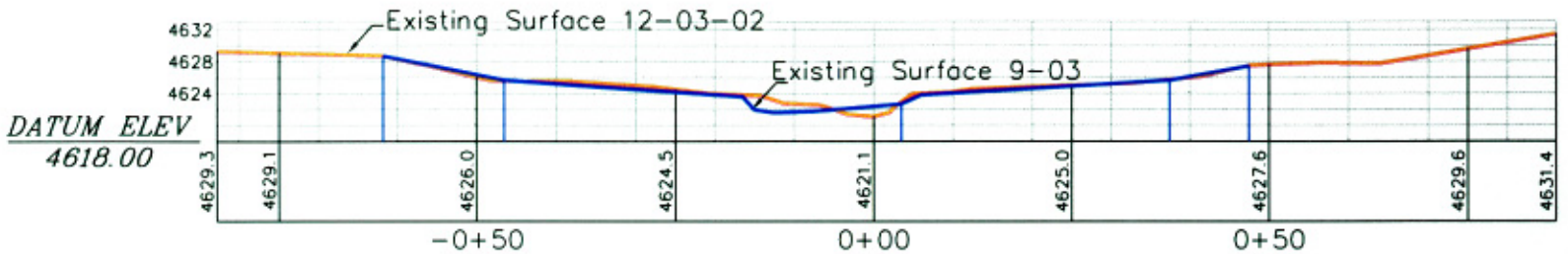
Appendix G

FIGURE 5 - CAMP CREEK CHANNEL CROSS SECTIONS
PLANTING SPECIFICATIONS

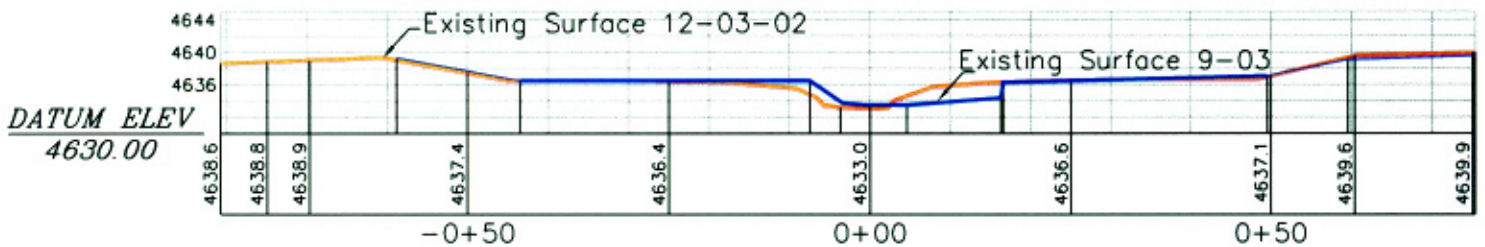
MDT Wetland Mitigation Monitoring
Camp Creek
Sula, Montana

PBSJ

LAND & WATER



Cross Section 3-A



Cross Section 4-A

LAND & WATER CONSULTING, INC. P.O. BOX 8254 Missoula, MT 59807	PROJ NO: 130091T38	DRAWN: RA	PROJECT NAME: MDT Camp Creek Wetland Mitigation	FIGURE 5
	FILE NAME: TASK38BASE.DWG	CHECKED: RA		REV -
	SCALE: 1"=20feet	APPVD: RA	DRAWING TITLE: Channel Cross Sections	DATE: 10-29-03
	LOCATION: Sula,MT	PROJ MGR: J.Bergland		

Nature's Enhancement, Inc.

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

MONITORING

LAND & WATER F-2

SOLD TO:
Department of Transportation
Project No:
NH7-1(58)9 F Sula-North & South
NH41(24) Camp Creek Restoration

SHIPPED TO:
Sula North & South/ Camp Creek Restoration
Project Site
Sula, Montana

INVOICE NUMBER	
PURCHASE ORDER #	
ORDER DATE	
SHIP DATE (EST.)	
TERMS	
DUE DATE	
SALES REP	Greg
SHIP VIA	NE

	CC5: REVEGETATION		
446	Alnus incana	1 Gallon	1-2'
315	Alnus incana	5 Gallon	3-4'
752	Amelanchier alnifolia	1 Gallon	1-2'
374	Betula occidentalis	5 Gallon	3-4'
667	Cornus stolonifera	1 Gallon	2-3'
369	Cornus stolonifera	5 Gallon	4-5'
213	Pinus contorta	1 Gallon	1-2'
89	Pinus contorta	5 Gallon	2-3'
213	Pinus ponderosa	1 Gallon	1-2'
89	Pinus ponderosa	5 Gallon	2-3'
303	Populus tremuloides	1 Gallon	18-24"SS
15	Populus tremuloides	5 Gallon	4-5'SS
791	Populus tremuloides	1 Gallon	18-24"MS
311	Populus tremuloides	5 Gallon	4-5'MS
500	Populus trichocarpa	1 Gallon	2-3'
518	Populus trichocarpa	5 Gallon	5-6'
2025	Potentilla fruticosa	1 Gallon	12-18"
213	Pseudotsuga menziesii	1 Gallon	12-15"
89	Pseudotsuga menziesii	5 Gallon	24-30"
1178	Rosa woodsii	1 Gallon	2-3'
1902	Willox (Salix spp.)	1 Gallon	2-3'MS

LAND & WATER F-3

429	Willox (Salix spp.)	5 Gallon	4-6MS
1178	Syphoricarpos 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 ba 12" x .75 Base of .75 inches(800/Hectare) Includes collection, installation		
	WILLOW SALVAGE		
57	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		

Shipping Charges:

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

$0.00 PAY THIS AMOUNT

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

MAKE ALL CHECKS PAYABLE TO:
Nature's Enhancement, Inc.
2080 Eastside Highway
Stevensville, Montana 59870

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

LAND & WATER F-4

SEED BLENDING REPORT

Dept. of Transportation, Great Falls, MT

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

PROJECT NO.: NH 41(24) TERMINI: CAMP CREEK RESTORATION

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.	~~ACRE~~ Hectare Area 1 1.25 LBS kg Pls per ~~AC.~~ ha	(d) Total ~~kg~~ LBS Pls	(e) Total Bulk Seed Blended For Area 1	MSU Seed Laboratory test results (a) % Purity	(b) % Germ	(c) % Pls	Hectare Area 2 kg Pls Per ha	(d) Total kg Pls	(e) Total Bulk Seed Blended for Area 2	Mat'ls. Bureau Pretest Lab. No	MSU Test Date Expires
MEADOW BARLEY •	NBS-1-053SH	0.5	0.6	0.7	93.59	97	90.78					
BLUEJOINT REEDGRASS •	CACA24204	0.3	0.4	0.6	85.86	77	66.13					
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	93.26					
BLUE WILDRYE •	GBS-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~~ LBS (kg) PER ~~HECTARE~~ ACRE (ha). 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: