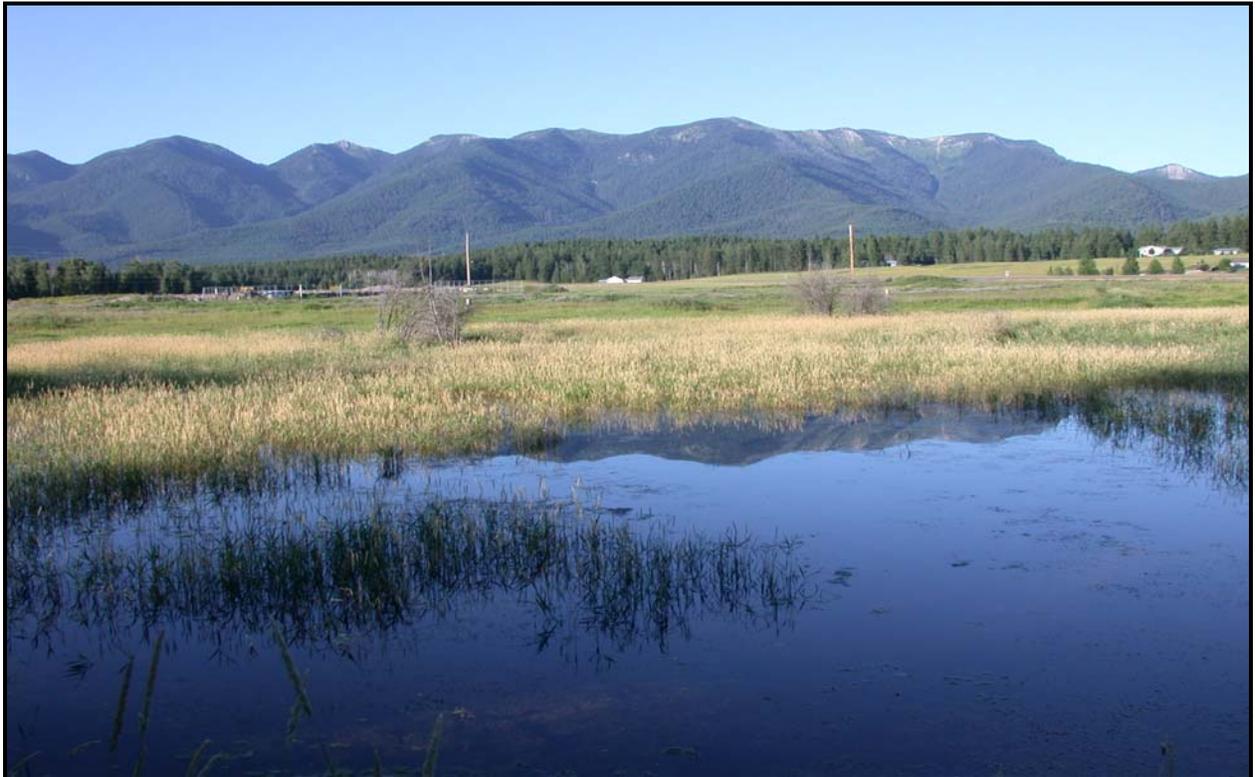


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# MONTANA DEPARTMENT OF TRANSPORTATION FINAL WETLAND MITIGATION MONITORING REPORT: YEAR 2005

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*Creston Site  
Creston, 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

December 2005

Project No: B43054.00 - 0108



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## 1.0 INTRODUCTION

The Creston mitigation site was constructed in 1998 to mitigate wetland impacts associated with three Montana Department of Transportation (MDT) roadway projects; the Flathead River Bridge and Creston North and South projects. The site is located one mile south of the Creston Fish Hatchery adjacent to Highway 35 and Broeder Loop (**Figure 1**). The site consists of 20 acres located in Flathead County within the Flathead River Watershed (No. 4). The site elevation is 2,940 feet above mean sea level.

The site was designed to mitigate for riparian floodplain habitat, rooted emergent wetland, and ditches associated with previous highway construction. The mitigation goal was to enhance approximately two acres of existing wetland and create four acres of wetland. A formal wetland delineation and functional assessment were not performed prior to construction. The site was first monitored in 2001 and 2005 represents the fifth and final year of monitoring.

## 2.0 METHODS

### 2.1 Monitoring Dates and Activities

The site was visited on May 18<sup>th</sup> (spring) and July 21<sup>th</sup> (mid-season) 2005. The primary purpose of the spring visit was to conduct a bird/general wildlife reconnaissance. The May/June period was selected for the spring visit because monitoring between mid-May and early June is likely to detect migrant and early nesting activities for a variety of avian species, as well as maximizing the potential for amphibian detection. In Montana, most amphibian larval stages are present by early June.

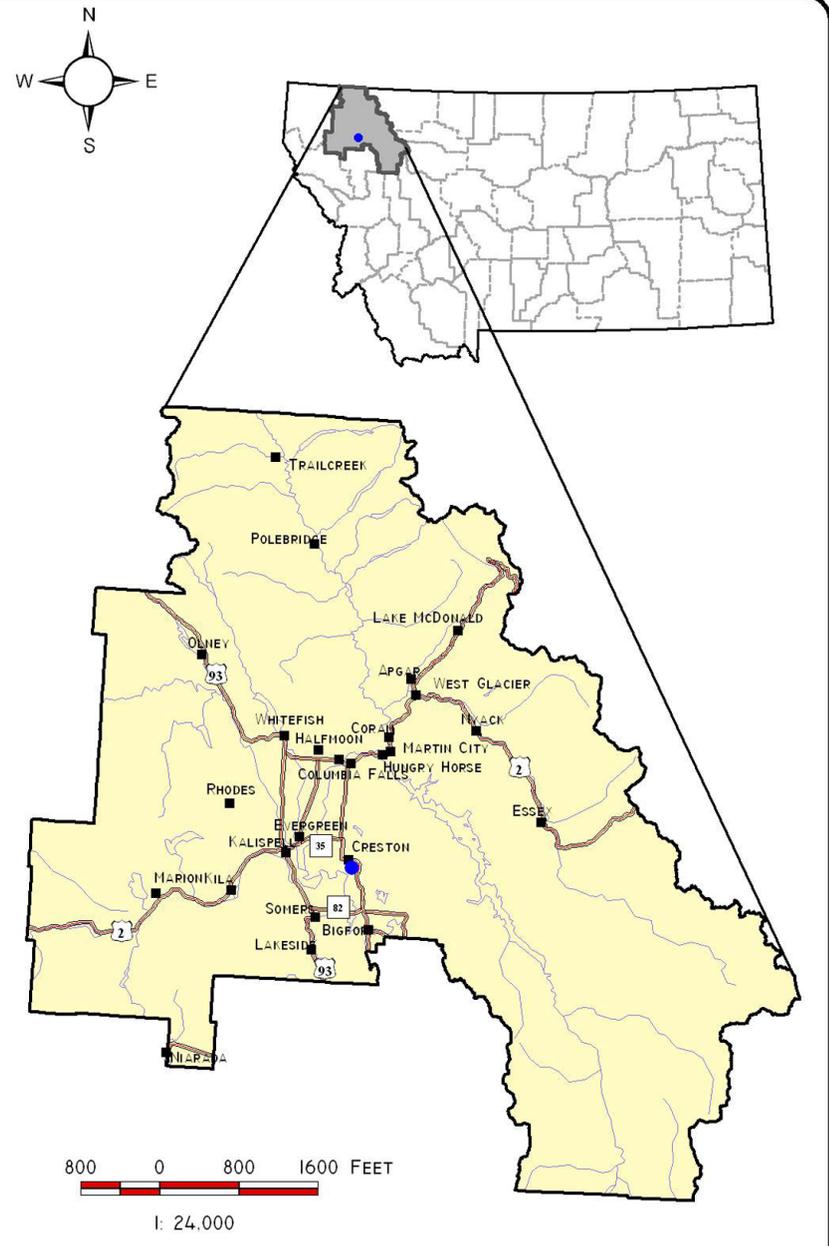
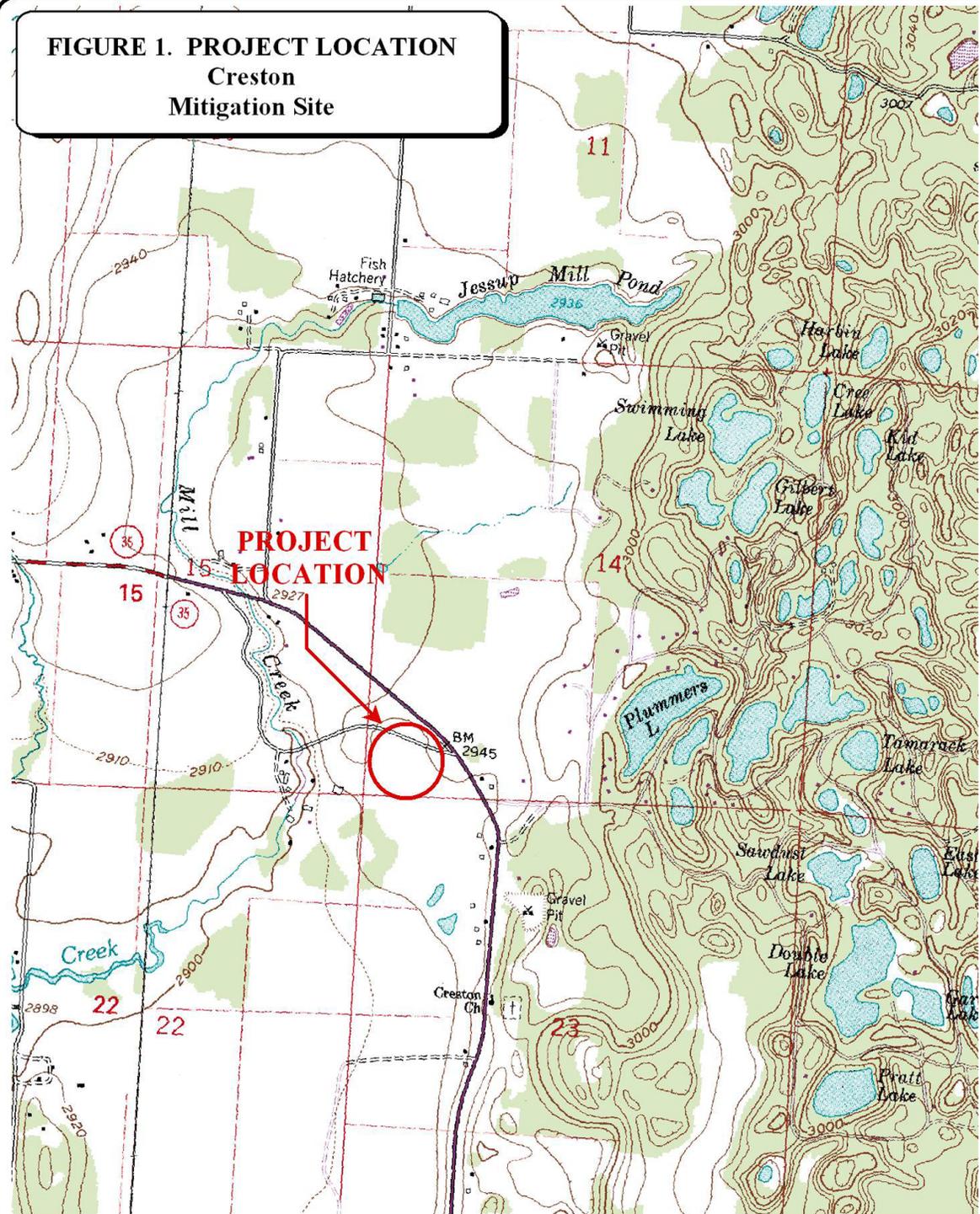
The mid-season visit was conducted between late July and August to document vegetation, soil, and hydrologic conditions used to map jurisdictional wetlands. All information contained on the Wetland Mitigation Site Monitoring Form (**Appendix B**) was collected at this time. Activities and information conducted/collected included: wetland delineation; wetland/open water boundary mapping; vegetation community mapping; vegetation transects; soils data; hydrology data; bird and general wildlife use; photograph points; functional assessment; and (non-engineering) examination of dike structures. Groundwater levels were also recorded at the three monitoring wells during the mid-season visit.

### 2.2 Hydrology

Hydrologic indicators were evaluated at the site during the mid-season visit. Wetland hydrology indicators were recorded using procedures outlined in the Army Corps (COE) 1987 Wetland Delineation Manual. Hydrology data were recorded on COE Routine Wetland Delineation Data Forms (**Appendix B**).

All additional hydrologic data were recorded on the mitigation site monitoring form (**Appendix B**). The boundary between wetlands and open water (no rooted vegetation) aquatic habitats was

**FIGURE 1. PROJECT LOCATION**  
**Creston**  
**Mitigation Site**



<p>PROJECT #: 130091.007          DATE: MAY 2001          LOCATION:          PROJECT MANAGER: B. DUTTON          DRAWN BY: B. NOECKER</p>	<p><b>LAND &amp; WATER CONSULTING, INC.</b>          1120 CEDAR PO BOX 8254 MISSOULA, MT 59807</p>
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mapped on the aerial photograph and an estimate of the average water depth at this boundary was recorded.

Three groundwater-monitoring wells are present on site and groundwater elevations were obtained during the mid-season visit. Groundwater located within 18 inches of the ground surface (soil pit depth for purposes of delineation) was documented on the routine wetland delineation data form at each data point.

## 2.3 Vegetation

General dominant species-based vegetation community types (e.g., *Elymus repens/Phleum pratense*) 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 may not reflect yearly changes. Estimated percent cover of the dominant species in each community type was listed on the site monitoring form (**Appendix B**).

The 10-foot wide belt transect that was established in 2001 was evaluated for the fifth time **Figure 2 (Appendix A)**. Percent cover was estimated for each vegetative species for each successive vegetation community encountered within the “belt” using the following values: + (<1%); 1 (1-5%); 2 (6-10%); 3 (11-20%); 4 (21-50%); and 5 (>50%). The purpose of the transect is to evaluate changes over time, especially the establishment and increase of hydrophytic vegetation. The transect location was marked on the air photo and all data recorded on the mitigation site monitoring form. Transect endpoint locations were recorded with the GPS unit in 2001. Metal stakes were installed in 2001 to physically mark the transect ends.

A comprehensive plant species list for the site was first compiled in 2001 and has been updated with new species encountered. Woody species were planted at this mitigation site. Monitoring relative to the survival of such species was conducted for the fifth time, and recorded on the Planted Woody Vegetation Survival Form in **Appendix B**.

## 2.4 Soils

Soils were evaluated during the mid-season visit according to hydric soils determination procedures outlined in the COE 1987 Wetland Delineation Manual. Soil data were recorded for each wetland determination point on the COE Routine Wetland Delineation Data Form (**Appendix B**). The most current terminology used by NRCS was used to describe hydric soils (USDA 1998).

## 2.5 Wetland Delineation

The wetland delineation conducted during 2001 on the 20-acre mitigation site during the mid-season visit according the 1987 COE Wetland Delineation Manual was verified and changes made, if necessary. Wetland and upland areas within the monitoring area were investigated for the presence of wetland hydrology, hydrophytic vegetation and hydric soils. The indicator status of vegetation was derived from the National List of Plant Species that Occur in Wetlands: Northwest Region 9 (Reed 1988). The information was recorded on COE Routine Wetland

Delineation Data Forms (**Appendix B**). The wetland/upland boundary was delineated on the air photo and recorded with a resource grade GPS unit in 2001. Minor changes to the wetland boundary were visually noted in 2005; however, GPS was not used to redefine the wetland boundary. The wetland/upland boundary in combination with the wetland/open water habitat boundary was used to calculate the wetland area developed at each impoundment.

## 2.6 Mammals, Reptiles, and Amphibians

Mammal and herptile species observations and other positive indicators of use, such as vocalizations, were recorded on the wetland monitoring form during each visit. Indirect use indicators, including tracks; scat; burrows; eggshells; skins; bones; etc., were also recorded. Observations were recorded as the observer traversed the site while conducting other required activities. Direct sampling methods, such as snap traps, live traps, and pitfall traps, were not implemented. A comprehensive list of observed species was compiled for comparison to previous monitoring events.

## 2.7 Birds

Bird observations were recorded during each visit. No formal census plots, spot mapping, point counts, or strip transects were conducted. During the spring visit, observations were recorded in compliance with the bird survey protocol in **Appendix D**. During the mid-season visit, bird observations were recorded incidental to other monitoring activities. During both visits, observations were categorized by species, activity code, and general habitat association (see data forms in **Appendix B**).

## 2.8 Macroinvertebrates

One macro-invertebrate sample was collected from the main impoundment during the mid-season site visit and data recorded on the wetland mitigation monitoring form. Macro-invertebrate sampling procedures are included in **Appendix E**. The approximate location of the sample point is shown on **Figure 2, Appendix A**. The sample was preserved as outlined in the sampling procedure and sent to Rhithron Associates for analysis.

## 2.9 Functional Assessment

A functional assessment form was completed for the site using the 1999 MDT Montana Wetland Assessment Method. Field data necessary for this assessment were generally collected during the mid-season site visit. The remainder of the functional assessment was completed in the office.

## 2.10 Photographs

Photographs were taken during the mid-season visit showing the current land use surrounding the site and the monitored area. Each photograph point location was initially recorded with a resource grade GPS in 2001. The approximate location of photo points is shown on **Figure 2**,

**Appendix A.** All photographs were taken using a 50 mm lens. A description and compass direction for each photograph was recorded on the wetland monitoring form.

### 2.11 GPS Data

During the 2001 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. The method used to collect these points is described in the GPS protocol in **Appendix D**. No new GPS data were collected during the 2005 monitoring year.

### 2.12 Maintenance Needs

The dike structure was examined during site visits for obvious signs of breaching, damage, or other problems. This did not constitute an engineering-level structural inspection, but rather a cursory examination. Bird boxes were also inspected.

## 3.0 RESULTS

### 3.1 Hydrology

Inundation was present in the two large depressions and was estimated to be 15 to 20% of the mitigation site (see **Figure 3, Appendix A**). Emergent vegetation was observed throughout the inundated areas. The water table was elevated relative to previous years apparently due to above normal precipitation levels during the spring and summer months. Precipitation totals for 2005, normally listed online by the Western Regional Climate Center, are not available at this time for the Creston area. Creston yearly precipitation totals for 2001 (15.7 inches), 2002 (17.23), 2003 (16.42), and 2004 (17.72) were 79, 87, 83, and 89 percent, respectively, of the total annual mean precipitation (19.79 inches) in this area.

The upper pond was approximately  $\frac{3}{4}$  full in mid-July, which was a stark contrast to the previous two years when it was nearly dry. The artesian well that discharges to the upper pond was flowing but the discharge rate was low and estimated at approximately one-gallon per minute. Three groundwater wells are located on the site and were measured during the mid-season visit. Static water levels are presented in **Table 1** and in the monitoring data form provided in **Appendix B**. Static water levels ranged from approximately 4.77 to 5.29 feet below the ground surface compared to 5.23 to 5.81 feet below the ground surface in 2004.

**Table 1: July 2005 - static water levels.**

Well ID (USGS label)	Static Water Level (from top of steel casing)	Stick-up*	Static Water Level (from ground surface)
West-1 (C94-11)	7.82	3.05	4.77
West-2 (C94-12)	8.06	2.77	5.29
East (C94-10)	7.00	1.98	5.01

\* Stick-up was initially measured by the USGS and is recorded on the well cover.

### 3.2 Vegetation

Vegetation species identified on the site are presented in **Table 2** and on the attached data form. Six community types were identified and mapped on the mitigation area (**Figure 3, Appendix A**). These included Type 1: *Elymus repens/Phleum pratense*; Type 2: *Typha latifolia*; Type 3: *Typha latifolia/Agrostis stolonifera*; Type 4: *Phalaris arundinacea*; Type 5: *Potamogeton pectinatus*; and Type 6: *Alopecurus pratensis*. Dominant species within each of these communities are listed on the attached data form (**Appendix B**).

**Table 2: 2001 - 2005 Creston vegetation species list.**

Species	Region 9 (Northwest) Wetland Indicator
<i>Agrostis stolonifera</i>	FAC+
<i>Alopecurus pratensis</i>	FACW
<i>Amelanchier alnifolia</i>	FACU
<i>Artemisia absinthium</i>	--
<i>Arctium minus</i>	--
<i>Astragalus cicer</i>	--
<i>Barbarea vulgaris</i>	FAC-
<i>Beckmannia syzigachne</i>	OBL
<i>Bromus inermis</i>	--
<i>Carex arcta</i>	FACW+
<i>Carex bebbii</i>	OBL
<i>Carex aurea</i>	FACW+
<i>Carex flava</i>	OBL
<i>Carex lasiocarpa</i>	OBL
<i>Carex microptera</i>	FAC
<i>Centaurea maculosa</i>	--
<i>Ceratophyllum demersum</i>	OBL
<i>Chenopodium album</i>	FAC
<i>Chrysanthemum leucanthemum</i>	--
<i>Chenopodium rubrum</i>	FACW+
<i>Cirsium arvense</i>	FAC-
<i>Cirsium vulgare</i>	FACU
<i>Cynoglossum officinale</i>	FACU
<i>Dactylis glomerata</i>	FACU
<i>Elaeagnus commutata</i>	NI
<i>Eleocharis palustris</i>	OBL
<i>Elymus repens</i>	FACU
<i>Elymus smithii</i>	--
<i>Epilobium ciliatum</i>	FACW-
<i>Equisetum arvense</i>	FAC
<i>Erigeron acris</i>	FACW
<i>Festuca arundinacea</i>	FAC-
<i>Galium aparine</i>	FACU
<i>Gnaphalium palustre</i>	FAC+
<i>Juncus articulatus</i>	OBL
<i>Juncus balticus</i>	FACW+
<i>Juncus regelii</i>	FACW
<i>Juncus tenuis</i>	FAC
<i>Lactuca serriola</i>	FACU
<i>Lamium amplexicaule</i>	--
<i>Linum perenne</i>	--
<i>Lotus corniculatus</i>	FACW+
<i>Medicago lupulina</i>	FAC
<i>Melilotus alba</i>	FACU
<i>Melilotus officinale</i>	FACU

**Table 2 (continued): 2001 - 2005 Creston vegetation species list.**

Species	Region 9 (Northwest) Wetland Indicator
<i>Myosotis laxa</i>	OBL
<i>Phalaris arundinacea</i>	FACW
<i>Phleum pratense</i>	FAC-
<i>Plantago lanceolatum</i>	FACU+
<i>Plantago major</i>	FAC+
<i>Poa compressa</i>	FACU+
<i>Poa palustris</i>	FAC
<i>Poa pratensis</i>	FAC
<i>Polygonum convolvulus</i>	FACU-
<i>Populus balsamifera</i>	FAC
<i>Potamogeton natans</i>	OBL
<i>Potamogeton pectinatus</i>	OBL
<i>Potentilla anserina</i>	OBL
<i>Prunella vulgaris</i>	FACU+
<i>Ranunculus aquatilis</i>	OBL
<i>Ranunculus sceleratus</i>	OBL
<i>Rumex crispus</i>	FACW
<i>Salix bebbiana</i>	FACW
<i>Scirpus acutus</i>	OBL
<i>Silene latifolia</i>	--
<i>Sitanion hystrix</i>	FACU-
<i>Sparganium emersum</i>	OBL
<i>Stipa nelsonii</i>	--
<i>Taraxacum officinale</i>	FACU
<i>Thlaspi arvense</i>	NI
<i>Tragopogon dubius</i>	UPL
<i>Trifolium hybridum</i>	FACU+
<i>Trifolium pratense</i>	FACU
<i>Typha latifolia</i>	OBL
<i>Verbascum thapsus</i>	UPL
<i>Veronica americana</i>	OBL

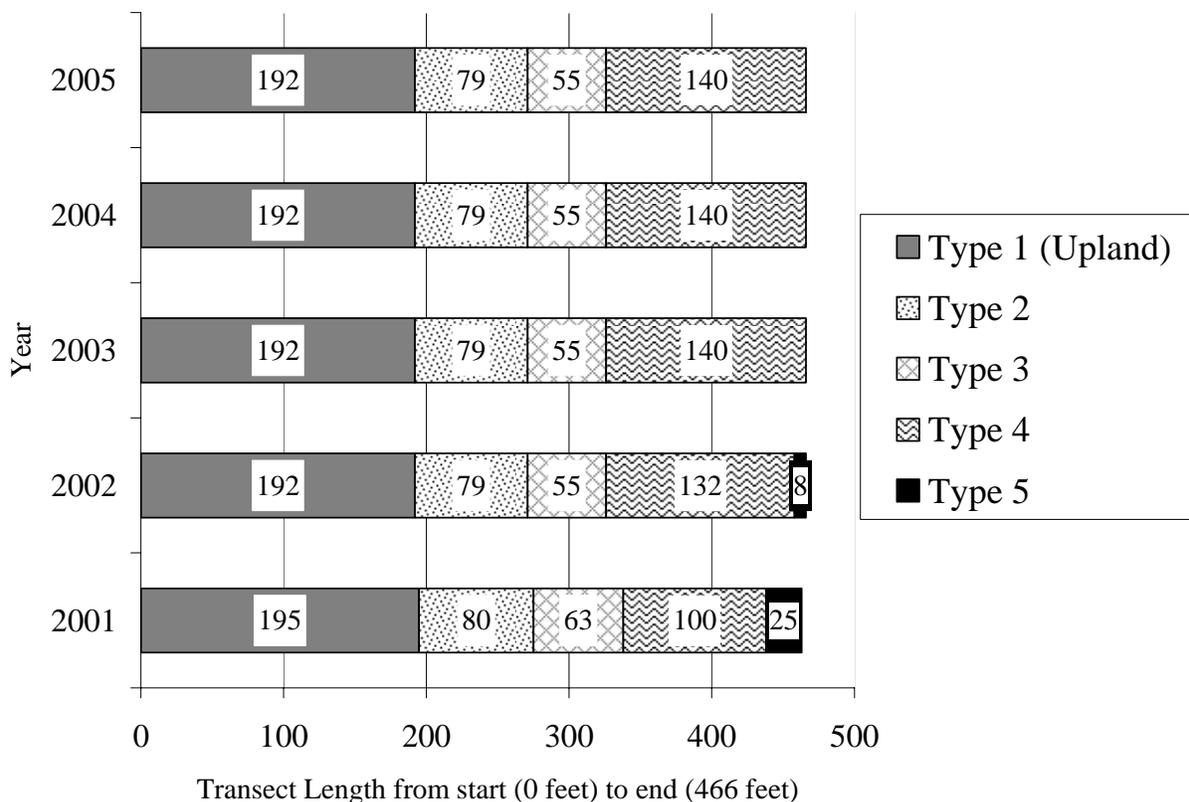
Type 1 occurred in the upland and consisted primarily of *Elymus repens* with an even distribution of *Phleum pratense*, *Agrostis stolonifera*, and *Cirsium arvense*. This community type was weedy and included a trace of *Cynoglossum officinale* (common hound's tongue), which is classified as a noxious weed in Flathead County. This community type was relatively unchanged from the previous year. Type 2 was present around the pond edges, particularly the upper pond and consisted primarily of *Typha latifolia*, *Ceratophyllum demersum*, *Scirpus acutus* and *Phalaris arundinacea*.

Type 3 was present in small depressions with less frequent inundation and consisted of *Typha latifolia* mixed with weedy grasses. Changes were observed in this type, with *Typha latifolia* continuing to decrease and a substantial increase in *Populus balsamifera*. It appeared that *Typha latifolia* was not reproducing well in this community. Type 4 was dominated by *Phalaris arundinacea* and was encroaching on the large pond as it dried out and in some of the small depressions.

Type 5 consisted of aquatic bed communities dominated by *Potamogeton pectinatus*. This community was unchanged in composition, however, its lateral extent increased in 2005 due to the elevated water levels in the lower pond. Type 6 was a minor upland community that was dominated by *Alopecurus pratensis*. It appeared unchanged from the previous monitoring year.

Vegetation transect results are detailed in the attached data form (**Appendix B**), and are summarized in **Table 3** and **Charts 1** and **2** below. With regard to the vegetation transect, it should be noted that the final 25 feet contained standing water to a depth of 24 inches at the transect end; however, reed canary grass was the dominant vegetative species. With consecutive years of normal precipitation, this portion of the transect would likely convert back to Type 5 as was the case in 2001 and 2002.

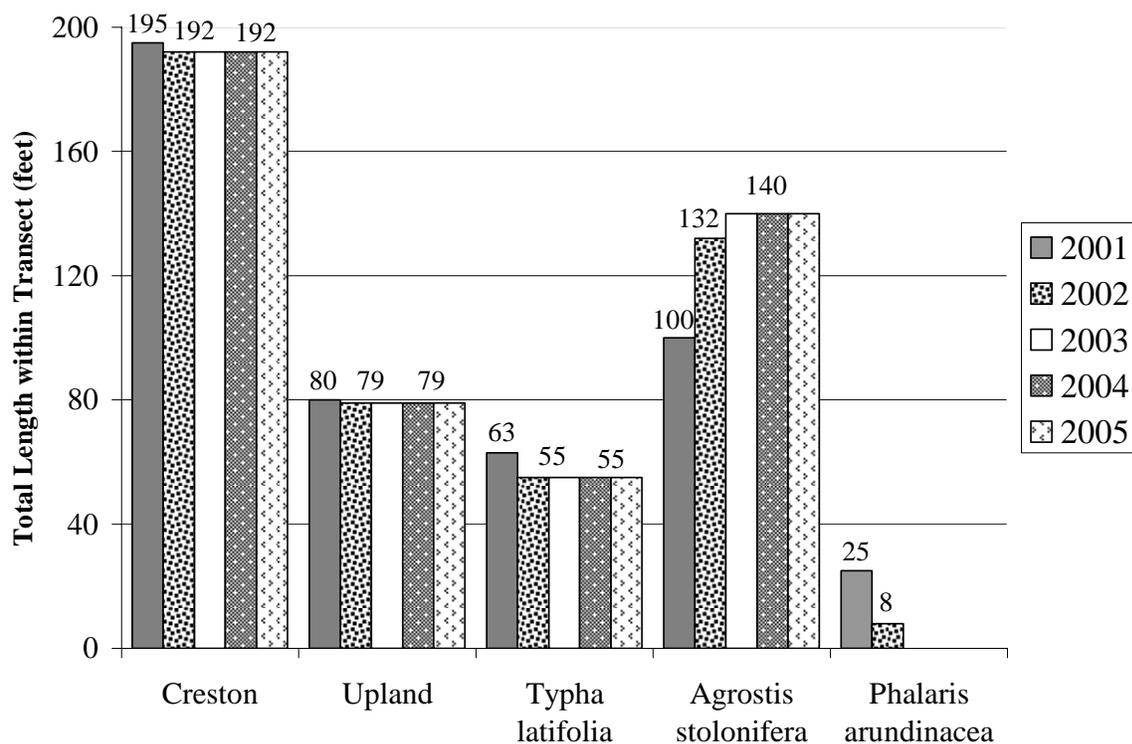
**Chart 1: Transect maps showing vegetation types from the start of transect (0 feet) to the end of transect (466 feet) for each year monitored.**



**Table 3: Vegetation transect data summary.**

Monitoring Year	2001	2002	2003	2004	2005
Transect Length (feet)	465	465	465	465	465
# Vegetation Community Transitions along Transect	5	5	4	4	4
# Vegetation Communities along Transect	5	5	4	4	4
# Hydrophytic Vegetation Communities along Transect	4	4	3	3	3
Total Vegetative Species	37	49	49	49	49
Total Hydrophytic Species	21	26	26	26	26
Total Upland Species	16	23	23	23	23
Estimated % Total Vegetative Cover	75	80	85	85	85
% Transect Length Comprised of Hydrophytic Vegetation Communities	58	59	59	59	59
% Transect Length Comprised of Upland Vegetation Communities	42	41	41	41	41
% Transect Length Comprised of Unvegetated Open Water	0	0	0	0	0

**Chart 2: Length of vegetation communities within Transect 1 for each year monitored.**



As part of the project design, woody species were planted in rows at various locations across the site. For monitoring purposes, the rows were labeled alphabetically (Rows A-M). The rows are labeled on **Figure 2** in **Appendix A** and the observed mortality of planted woody vegetation species is summarized below in **Table 4**. Overall survival is moderate across the site, with rodents and competition from more aggressive herbaceous species being the primary problems.

**Table 4: 2005 observed mortality of planted woody species.**

Row/Species	Estimated # Originally Planted	# Live Observed	Comments
A – <i>Pyrus</i> spp. (crab apple)	16	2	7 additional plants died between 2004 and 2005 monitoring.
B – <i>Pyrus</i> spp.	20	14	Several re-sprouting from base
C – <i>Prunus</i> spp.	30	15	Small – unhealthy. Rodents.
D – <i>Prunus</i> spp.	150	111	Small – unhealthy. Rodents.
E – <i>Prunus</i> spp.	25	14	Competition from grasses.
F – <i>Elaeagnus commutata</i> and <i>Rosa woodsii</i>	145	60	Competition and rodents.
G – <i>Sheperdia</i> spp.	30	13	
H – <i>Sheperdia</i> spp.	60	29	
I – <i>Sheperdia</i> spp.	30	15	
J – <i>Rosa woodsii</i>	115	110	Doing very well.
K – <i>Elaeagnus commutata</i>	75	63	Doing very well.
L – <i>Rosa woodsii</i>	55	20	Competition
M – <i>Rosa woodsii</i>	40	35	Doing very well.

Weedy species most commonly noted onsite include spotted knapweed (*Centaurea maculosa*), Canada thistle (*Cirsium arvense*), common hound's tongue (*Cynoglossum officinale*), and common mullein (*Verbascum thapsus*). The parking area has substantial knapweed, with other infestations occurring in upland areas that were heavily disturbed during construction. Canada thistle is common along the dike. It does not appear that any weed management has occurred onsite since project construction.

### 3.3 Soils

According to the Upper Flathead Valley Area soil survey (Soil Conservation Service 1960), soils in the mitigation site are classified as poorly drained alluvial land (Aa) and the Swims silt loam (So). The poorly drained alluvial land soil has poor surface and internal drainage, mottling in the subsurface and typically consists of loam or silty loam. The Swims soil consists of silt loam and tends to occupy low terraces along the Flathead River.

These characteristics were generally confirmed during monitoring. Three test pits were excavated and described in 2005 using the ACE routine wetland monitoring form. The TP1 located adjacent to the pond consisted of 16-inches of organic detritus overlying a mottled silt loam. Hydric soil characteristics were well developed including a histic epipedon. TP2 was classified as a poorly developed hydric soil. A thin (1-inch) layer of organic detritus was present. A low-chroma (7.5 YR 2.5/2) A-horizon was present from 1 to 9-inches and mottles were observed below 9-inches. These soil characteristics indicated an oxygen-depleted environment with a fluctuating water table. TP3 was a loam representative of the upland soil, which did not exhibit hydric characteristics in the A horizon (7.5 YR 2.5/2) or B horizon (7.5 YR 4/3).

### 3.4 Wetland Delineation

Delineated wetland boundaries are illustrated on **Figure 3**. Completed wetland delineation forms are included in **Appendix B**. Soils, vegetation, and hydrology are discussed in preceding sections. Delineation results indicated acreage that increased slightly from 2004, with wetland vegetation becoming prevalent within the small stormwater ditch that flows from the highway into the upper pond. A total of 5.4 acres of wetland occurs on the site.

The original mitigation goal was to enhance two acres of existing wetland and create four acres for a total of six acres. As of 2005, it appears that 90% of the original goal has been met at this site. If and when hydrology is restored to pre-drought conditions through natural precipitation and runoff, the site would like meet or exceed project goals.

### 3.5 Wildlife

Wildlife species, or evidence of wildlife, observed on the site during 2005 monitoring efforts are listed in **Table 5** in bold, with the remaining listed species having been seen during previous years monitoring. Specific evidence observed and activity codes pertaining to birds are provided on the completed monitoring form in **Appendix B**. Five mammal and numerous bird species have been noted using the mitigation site.

**Table 5: Fish and wildlife species observed at the Creston Mitigation Site 2001-2005.**

<b>FISH</b>	
None	
<b>AMPHIBIANS</b>	
None observed	
<b>REPTILES</b>	
None observed	
<b>BIRDS</b>	
American Goldfinch ( <i>Carduelis tristis</i> )	Hummingbird ( <i>Selasphorus</i> sp.)
<b>American Kestrel</b> ( <i>Falco sparverius</i> )	<b>Killdeer</b> ( <i>Charadrius vociferous</i> )
American Robin ( <i>Turdus migratorius</i> )	<b>Mallard</b> ( <i>Anas platyrhynchos</i> )
<b>Blue-winged Teal</b> ( <i>Anas discors</i> )	Northern Flicker ( <i>Colaptes auratus</i> )
Bohemian Waxwing ( <i>Bombycilla garrulus</i> )	Northern Rough-Winged Swallow
Calliope Hummingbird ( <i>Stellula calliope</i> )	<b>(Stelgidopteryx serripennis)</b>
<b>Canada Goose</b> ( <i>Branta Canadensis</i> )	Northern Shoveler ( <i>Anas clypeata</i> )
<b>Cedar Waxwing</b> ( <i>Bombycilla cedrorum</i> )	Osprey ( <i>Pandion haliaetus</i> )
Cinnamon Teal ( <i>Anas cyanoptera</i> )	Pintail ( <i>Anas acuta</i> )
Cliff Swallow ( <i>Petrochelidon pyrrhonota</i> )	<b>Red-Winged Blackbird</b> ( <i>Agelaius phoeniceus</i> )
Common Goldeneye ( <i>Bucephala clangula</i> )	<b>Ring-Necked Duck</b> ( <i>Aythya collaris</i> )
Common Raven ( <i>Corvus corax</i> )	<b>Ring-Necked Pheasant</b> ( <i>Phasianus colchicus</i> )
<b>Common Snipe</b> ( <i>Gallinago gallinago</i> )	Song Sparrow ( <i>Melospiza melodia</i> )
<b>Eastern Kingbird</b> ( <i>Tyrannus tyrannus</i> )	Spotted Sandpiper ( <i>Actitis macularia</i> )
European Starling ( <i>Sturnus vulgaris</i> )	<b>Tree Swallow</b> ( <i>Tachycineta bicolor</i> )
Great Blue Heron ( <i>Ardea herodias</i> )	Violet-Green Swallow ( <i>Tachycineta thalassina</i> )
<b>Gull</b> (spp.)	Wood Duck ( <i>Aix sponsa</i> )
Hooded Merganser ( <i>Lophodytes cucullatus</i> )	Yellow-Headed Blackbird ( <i>Xanthocephalus xanthocephalus</i> )
	<b>Yellow Warbler</b> ( <i>Dendroica petechia</i> )
<b>MAMMALS</b>	
Coyote ( <i>Canis latrans</i> ) or dog sign	
<b>Meadow vole</b> ( <i>Microtus pennsylvanicus</i> )	
Muskrat ( <i>Ondatra zibethicus</i> )	
Northern pocket gopher ( <i>Thomomys talpoides</i> )	
<b>White-tailed Deer</b> ( <i>Odocoileus virginianus</i> )	

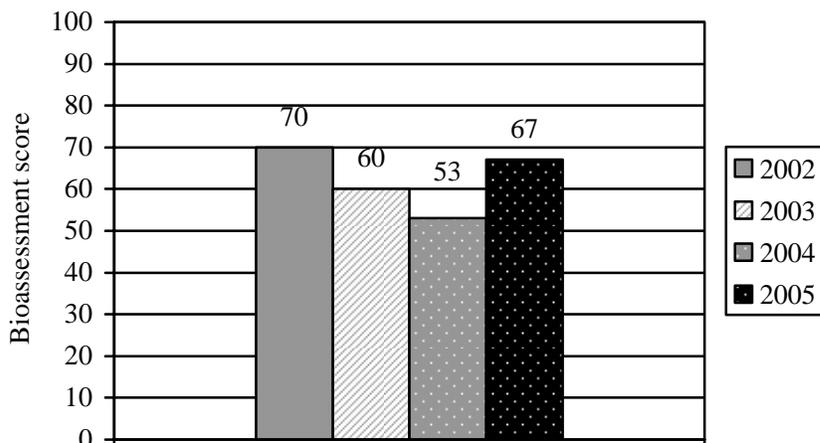
Bolded species were documented during the 2005 monitoring. All other species were documented during one or more of the previous monitoring seasons.

### 3.6 Macroinvertebrates

Macroinvertebrate sampling results are provided in **Appendix F** and were summarized by Rhithron Associates in the italicized sections below (Bollman 2005).

*Loss of all POET taxa, a drop in taxa richness, and an increase in the biotic index value contradict overall bioassessment index performance at the Creston site (Chart 3). Although 2005 scores indicate sub-optimal conditions, an improvement over scores in 2004, there is little evidence in the taxonomic composition of the invertebrate assemblage to support this. The 2005 assemblage is more tolerant than the one supported at the site in 2004. Biting midges were common, suggesting cattle influence at the site. The water column was apparently the dominant habitat; a few macrophytes may also have eased the monotony here.*

**Chart 3: Macroinvertebrate bioassessment scores for 2002-2005.**



### 3.7 Functional Assessment

Completed functional assessment forms are presented in **Appendix B**. Functional assessment results are summarized in **Table 6**. The site was evaluated as a single assessment area and rated as a Category II wetland. Wildlife habitat and groundwater discharge were the primary functions of the site. The site provided a total of 36.7 functional units, up slightly from 2004 due to minor increase in wetland area and achieved 76% of possible points, which was unchanged from the 2001 assessment. A functional assessment was not conducted prior to site construction and therefore cannot be used for comparison.

### 3.8 Photographs

Representative photos taken from photo-points are provided in **Appendix C**. A presentation of 2000-2005 aerial photographs for the site is also provided in **Appendix C**.

### 3.9 Maintenance Needs/Recommendations

The berm was in good condition during the spring and mid-season visits and the bird boxes also appeared to be in good condition. The one recommendation at this time would be implementation of weed control on the entire site.

**Table 6: Summary of 2005 wetland function/value ratings and functional points<sup>1</sup> at the Creston Mitigation Project.**

<b>Function and Value Parameters From the 1999 MDT Montana Wetland Assessment Method</b>	<b>2004 Assessment</b>	<b>2005 Assessment</b>
Listed/Proposed T&E Species Habitat	Mod (0.7)	Mod (0.7)
MNHP Species Habitat	Low (0.1)	Low (0.1)
General Wildlife Habitat	High (0.9)	High (0.9)
General Fish/Aquatic Habitat	NA	NA
Flood Attenuation	NA	NA
Short and Long Term Surface Water Storage	High (0.8)	High (0.8)
Sediment, Nutrient, Toxicant Removal	Mod (0.7)	Mod (0.7)
Sediment/Shoreline Stabilization	NA	NA
Production Export/Food Chain Support	High (1.0)	High (1.0)
Groundwater Discharge/Recharge	High (1)	High (1)
Uniqueness	Mod (0.6)	Mod (0.6)
Recreation/Education Potential	High (1)	High (1)
Actual Points/Possible Points	6.8 / 9	6.8 / 9
% of Possible Score Achieved	76%	76%
Overall Category	II	II
<b>Total Acreage of Assessed Wetlands within Easement (ac)</b>	<b>5.2</b>	<b>5.4</b>
<b>Functional Units (acreage x actual points) (fu)</b>	<b>35.44</b>	<b>36.72</b>
<b>Net Acreage Gain</b>	<b>3.2</b>	<b>3.4</b>
<b>Net Functional Unit Gain</b>	<b>21.76<sup>2</sup></b>	<b>23.12<sup>2</sup></b>

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

<sup>2</sup> Does not account for functional gain at pre-existing 2 acres, for which baseline functional assessment was not conducted.

### 3.10 Current Credit Summary

As of 2005, approximately 5.4 acres of wetlands are present on the mitigation site. Based on pre-construction goals, 2.0 acres were to be enhanced and 4.0 acres created for a total of 6.0 acres. The 2.0 acres of enhancement in the lower pond was successful in that hydrology was restored to this portion of the site that was previously drying out and converting to upland before project construction. The 3.4 acres of created wetland is close to the original goal. Based on current site conditions, it is expected that additional wetland acres will develop in the future if hydrology is restored to pre-drought conditions; however, continued drought in this part of Montana could result in the temporary or permanent loss of wetland acreage over time.

#### 4.0 REFERENCES

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## Appendix A

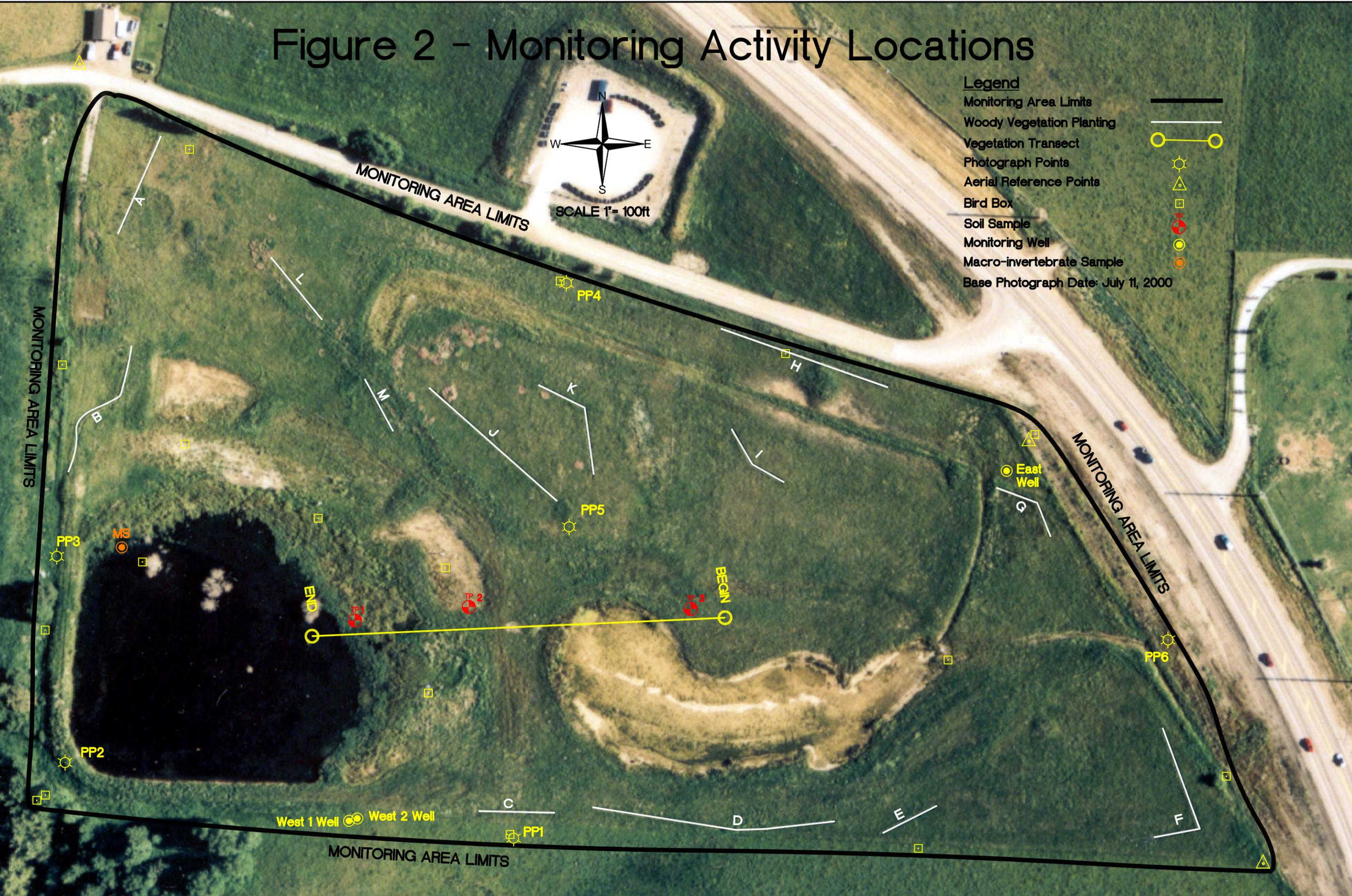
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### FIGURES 2 & 3

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*MDT Wetland Mitigation Monitoring  
Creston  
Creston, Montana*

# Figure 2 - Monitoring Activity Locations



- Legend**
- Monitoring Area Limits
  - Woody Vegetation Planting
  - Vegetation Transect
  - Photograph Points
  - Aerial Reference Points
  - Bird Box
  - Soil Sample
  - Monitoring Well
  - Macro-invertebrate Sample
- Base Photograph Date: July 11, 2000

<small>PROJECT NAME</small>	MDT Creston Wetland Mitigation	
<small>PROJECT NO.</small>	330054.108	<small>DRAWN BY</small>
<small>FILE NAME</small>	TASK7BASE.dwg	<small>CHECKED BY</small>
<small>SCALE</small>	1" = 100ft	<small>APPVD BY</small>
<small>LOCATION</small>	Creston	<small>PROJ. MGR.</small>
<small>PROJ. INC.</small>	LAND & WATER CONSULTING, INC. P.O. BOX 8254 Missoula, MT 59807	
<small>SHEET NUMBER</small>	2	<small>OF</small>
<small>REV</small>		<small>DATE</small>
		3-23-05

# Figure 3 - Mapped Site Features 2005



### Legend

- Monitoring Area Limits
- Woody Vegetation Planting
- Wetland Boundary
- Vegetation Community Boundary

Net Wetland Area 5.40 Acres

### Vegetation Types:

- ① *Elymus repens*/*Phleum pratense*
- ② *Typha latifolia*/*Phalaris arundinacea*/*Eleocharis palustris*
- ③ *Typha latifolia*/*Phalaris arundinacea*/*Argostis stolonifera*
- ④ *Phalaris arundinacea*
- ⑤ *Potamogeton pectinatus*
- ⑥ *Alopecurus pratensis*

MONITORING AREA LIMITS

MONITORING AREA LIMITS

MONITORING AREA LIMITS

MONITORING AREA LIMITS

PROJECT NAME MDT Creston Wetland Mitigation	
DRAWING TITLE Mapped Site Features 2005	
PROJ. NO.: 330054.108	DRAWN: RA
FILE NAME: TASK7BASE.dwg	CHECKED: BD
SCALE: 1"= 100ft	APPVD: BD
LOCATION: Creston	PROJ. MGR: BD
 LAND & WATER CONSULTING, INC. P.O. BOX 8254 Missoula, MT 59807	
SHEET NUMBER <b>3</b> OF .	
REV - DATE: 11-10-05	

## **Appendix B**

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**2005 WETLAND MITIGATION SITE MONITORING FORM**  
**2005 BIRD SURVEY FORMS**  
**2005 WETLAND DELINEATION FORMS**  
**2005 FUNCTIONAL ASSESSMENT FORMS**

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*MDT Wetland Mitigation Monitoring*  
*Creston*  
*Creston, Montana*

# LWC / MDT WETLAND MITIGATION SITE MONITORING FORM

Project Name: Creston Project Number: B43054.00.0108 Assessment Date: 7/21/05  
 Location: Creston MDT District: Missoula Milepost: \_\_\_\_\_  
 Legal description: T28N R20W Section 14 Time of Day: 1900-2100  
 Weather Conditions: Sunny/Clear approx. 80 degrees Person(s) conducting the assessment: Traxler  
 Initial Evaluation Date: 7 / 25 / 01 Visit #: 2 Monitoring Year: 2005 (year 5)  
 Size of evaluation area: 20 acres Land use surrounding wetland: Rural Residential, Agriculture

## HYDROLOGY

**Surface Water** Source: Runoff  
 Inundation: Present  Absent \_\_\_\_\_ Average depths: 2-3 ft Range of depths: 0 - 6 ft  
 Assessment area under inundation: 30%  
 Depth at emergent vegetation-open water boundary: 2-3 ft  
 If assessment area is not inundated are the soils saturated w/in 12" of surface: Yes  No \_\_\_\_\_  
 Other evidence of hydrology on site (drift lines, erosion, stained vegetation etc.): Water levels in 2005 were substantially higher in 2005 than in the previous three years due to improved precipitation levels.

### Groundwater

Monitoring wells: Present  Absent \_\_\_\_\_  
 Record depth of water below ground surface

Well #	Depth	Well #	Depth	Well #	Depth
West 1 (C94-11)	4.77				
West 2 (C94-12)	5.29				
East (C94-10)	5.01				

### Additional Activities Checklist:

- Map emergent vegetation-open water boundary on air photo
- Observe extent of surface water during each site visit and look for evidence of past surface water elevations (drift lines, erosion, vegetation staining etc.)
- NA GPS survey groundwater monitoring wells locations if present

**COMMENTS/PROBLEMS:** Water levels in 2005 were the highest they've been since monitoring began in 2001.

VEGETATION COMMUNITIES - CRESTON

Community No.: 1 Community Title (main species): Elymus repens/Phleum pratense weedy upland

Dominant Species	% Cover	Dominant Species	% Cover
Elymus repens	40%	Linum perenne	3%
Phleum pratense	10%	Trifolium hybridum	5%
Agrostis stolonifera	10%	Taraxacum officinale	10%
Cirsium arvense	10%	Medicago lupulina	5%
Astragalus cicer & purple legume combined	15%	Poa pratensis	2%

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

Community No.: 2 Community Title (main species): Typha latifolia – pond edges

Dominant Species	% Cover	Dominant Species	% Cover
Typha latifolia (also in water)	50%	Juncus articulatus (also in water)	2%
Phalaris arundinacea	30%	Epilobium ciliatum	Trace
Eleocharis palustris (also in water)	20%	Ceratophyllum demersum (in water)	50%
Alopecurus pratensis	5%	Sparganium emersum (in water)	1%
Agrostis stolonifera	1%	Scirpus acutus (in water)	1%

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

Community No.: 3 Community Title (main species): Depressions: mixed Typha latifolia and weedy grasses

Dominant Species	% Cover	Dominant Species	% Cover
Typha latifolia	10%	Medicago lupulina	10%
Phalaris arundinacea	10%	Populus balsamifera	30%
Agrostis stolonifera	20%	Taraxacum officinale	2%
Alopecurus pratensis	5%	Trifolium hybridum	15%
Eleocharis palustris	5%	Juncus tenuis & J. articulatus & J. regelii	5%

COMMENTS/PROBLEMS: young Populus colonizing this community.

\_\_\_\_\_  
 \_\_\_\_\_

**VEGETATION COMMUNITIES - CRESTON**

Community No.: 4 Community Title (main species): Phalaris arundinacea

Dominant Species	% Cover	Dominant Species	% Cover
Phalaris arundinacea	95%	Juncus articulatus & J. tenuis	1%
Agrostis stolonifera	1%	Alopecurus pratensis	trace
Equisetum arvense	trace	Cirsium arvense	trace
Carex bebbii	trace	Carex lasiocarpa	trace
Eleocharis palustris	1%	Plantago major	trace

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

Community No.: 5 Community Title (main species): Potamogeton pectinatus

Dominant Species	% Cover	Dominant Species	% Cover
Potamogeton pectinatus	98%	Plantago major	trace
Ranunculus scleratus	trace	Phalaris arundinacea	5%
Potamogeton natans	trace		
Barbarea vulgaris	trace		
Ceratophyllum demersum	1%		

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

Community No.: 6 Community Title (main species): Alopecurus pratensis

Dominant Species	% Cover	Dominant Species	% Cover
Alopecurus pratensis	70%	Agrostis stolonifera	2%
Phalaris arundinacea	10%	Taraxacum officinale	trace
Cirsium arvense	2%	Lactuca serriola	1%
Medicago lupulina	trace	Trifolium hybridum	trace
Trifolium pratensis	trace	Erigeron acris	trace

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

**Additional Activities Checklist:**

\_\_\_\_ Record and map vegetative communities on air photo

## COMPREHENSIVE VEGETATION LIST

Species	Vegetation Community Number(s)	Species	Vegetation Community Number(s)
<i>Elymus repens</i>	1,2,3	<i>Juncus articulatus</i>	2,3,4
<i>Astragalus cicer</i>	1,3	<i>Juncus regelii</i>	3
<i>Linum perenne</i>	1	<i>Ranunculus scleratus</i>	5
<i>Poa pratensis</i>	1,3,4	<i>Beckmannia syzigachne</i>	2
<i>Rumex crispus</i>	1	<i>Ceratophyllum demersum</i>	2,5
<i>Cirsium arvense</i>	1,2,3,4,6	<i>Carex bebbii</i>	3,4
<i>Taraxacum officinale</i>	1,2,3,6	<i>Erigeron acris</i>	3,6
<i>Phleum pratense</i>	1,3	<i>Scirpus acutus</i>	2,3
<i>Dactylis glomerata</i>	1	<i>Populus balsamifera</i>	3
<i>Chrysanthemum leucanthemum</i>	1	<i>Equisetum arvense</i>	3,4
<i>Alopecurus pratensis</i>	1,2,3,4,6	<i>Poa palustris</i>	2,4
<i>Silene latifolia</i>	1	<i>Galium aparine</i>	1
<i>Melilotus alba</i>	1,3	<i>Lamium amplexicaule</i>	1
<i>Melilotus officinale</i>	1,3	<i>Carex flava</i>	3,6
<i>Agrostis stolonifera</i>	1,2,3,4,6	<i>Ranunculus aquatilis</i>	5
<i>Poa spp.</i>	1	<i>Barbarea vulgaris</i>	5
<i>Medicago lupulina</i>	1,3,4,6	<i>Sparganium emersum</i>	2
<i>Trifolium hybridum</i>	1,3,6	<i>Potamogeton pectinatus</i>	5
<i>Lactuca serriola</i>	1,2,3,4,6	<i>Lotus corniculatus</i>	1
<i>Trifolium pratense</i>	1,3,6	<i>Carex arcta</i>	3
<i>Verbascum thapsus</i>	1,4	<i>Potamogeton natans</i>	5
<i>Tragopogon dubius</i>	1	<i>Poa compressa</i>	1,3,4
<i>Bromus inermis</i>	1	<i>Arctium minus</i>	1
<i>Cynoglossum officinale</i>	1,4	<i>Carex aurea</i>	3
<i>Thlaspi arvense</i>	1	<i>Carex lasiocarpa</i>	3,4
<i>Cirsium vulgare</i>	1,3	<i>Artemisia absinthium</i>	3
<i>Centaurea maculosa</i>	1	<i>Amelanchier alnifolia</i>	4
<i>Plantago major</i>	1,2,3,4,5	<i>Prunella vulgaris</i>	4
Purple legume ( <i>Astragalus?</i> )	1	<i>Stipa nelsonii</i>	1
<i>Phalaris arundinacea</i>	1,2,3,4,5,6	<i>Elymus smithii</i>	1
<i>Epilobium ciliatum</i>	1,2,3,4	<i>Salix bebbiana</i>	3,4
<i>Typha latifolia</i>	2,3	<i>Carex microptera</i>	4
<i>Eleocharis palustris</i>	2,3,4,5	<i>Juncus balticus</i>	3
<i>Juncus tenuis</i>	2,3,4	<i>Festuca arundinacea</i>	3
<i>Eleagnus commutata</i>	1	<i>Elymus elymoides</i>	3

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

### PLANTED WOODY VEGETATION SURVIVAL – CRESTON 2005







## PHOTOGRAPHS

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

Checklist:

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

Location	Photo Frame #	Photograph Description	Compass Reading
A		See photo sheets and field notes	
B			
C			
D			
E			
F			
G			
H			

**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 not used during 2005; minor changes in wetland borders were hand-adjusted using aerial photograph and 2002 delineation.

\_\_\_\_\_  
 \_\_\_\_\_

**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
- NA Survey wetland-upland boundary with a resource grade GPS survey

**COMMENTS/PROBLEMS:** See attached completed delineation forms.

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**FUNCTIONAL ASSESSMENT**

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

**COMMENTS/PROBLEMS:** See attached completed functional assessment forms.

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**MAINTENANCE**

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

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

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

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

YES X NO \_\_\_

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

If no, describe the problems below.

**COMMENTS/PROBLEMS:**

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**MDT WETLAND MONITORING – VEGETATION TRANSECT**

Site: Creston Date: 7/21/05 Examiner: Traxler Transect # 1

Approx. transect length: 465 feet Compass Direction from Start (Upland): \_\_\_\_\_

<b>Vegetation type A:</b> Type 1 upland			
Length of transect in this type:	192 (3 sections)	feet	
<i>Elymus repens</i>	4	<i>Cirsium vulgare</i>	+
<i>Astragalus cicer</i>	4	<i>Dactylis glomerata</i>	+
<i>Agrostis stolonifera</i>	2	<i>Phalaris arundinacea</i>	+
<i>Cirsium arvense</i>	2	<i>Stipa nelsonii</i>	+
<i>Medicago lupulina</i>	1	<i>Trifolium hybridum</i>	+
<i>Poa spp.</i>	+	<i>Melilotus officinale</i>	+
<i>Phleum pratense</i>	1	<i>Silene latifolia</i>	+
<i>Poa pratensis</i>	+	<i>Tragopogon dubius</i>	+
<i>Alopecurus pratensis</i>	+	<i>Poa compressa</i>	+
<i>Taraxacum officinale</i>	+	<i>Elymus smithii</i>	+
<i>Rumex crispus</i>	+	<i>Arctium minus</i>	+
<i>Linum perenne</i>	1	<i>Lactuca serriola</i>	+
Total Vegetative Cover:	90%		

<b>Vegetation type B:</b> <i>Typha latifolia</i> - Type 2			
Length of transect in this type:	79	feet	
<i>Typha latifolia</i>	5		
<i>Phalaris arundinacea</i>	4		
<i>Eleocharis palustris</i>	3		
<i>Alopecurus pratensis</i>	1+		
<i>Agrostis stolonifera</i>	+		
<i>Lactuca serriola</i>	+		
<i>Epilobium ciliatum</i>	+		
<i>Plantago major</i>	+		
<i>Juncus articulatus</i>	+		
<i>Cirsium arvense</i>	+		
<i>Juncus tenuis</i>	+		
<i>Elymus repens</i>	+		
Total Vegetative Cover:	80%		

<b>Vegetation type C:</b> mixed TYPLAT/grasses – Type 3			
Length of transect in this type:	55	feet	
<i>Typha latifolia</i>	1 (3)	<i>Erigeron acris</i>	+
<i>Agrostis stolonifera</i>	3	<i>Medicago lupulina</i>	+
<i>Eleocharis palustris</i>	1+	<i>Taraxacum officinale</i>	+
<i>Juncus tenuis</i>	1+	<i>Cirsium vulgare</i>	+
<i>Juncus regelii</i>	1	<i>Carex flava</i>	+
<i>Juncus articulatus</i>	1	<i>Carex aurea</i>	+
<i>Alopecurus pratensis</i>	1	<i>Salix bebbiana</i>	+
<i>Melilotus officinale</i>	+	<i>Phleum pratense</i>	+
<i>Cirsium arvense</i>	+	<i>Trifolium hybridum</i>	+
<i>Equisetum arvense</i>	1-	<i>Trifolium pratense</i>	+
<i>Phalaris arundinacea</i>	3 (1)	<i>Populus balsamifera</i>	+
<i>Plantago major</i>	+		
Total Vegetative Cover:	75%		

<b>Vegetation type D:</b> <i>Phalaris arundinacea</i> – Type 4			
Length of transect in this type:	140	feet	
<i>Phalaris arundinacea</i>	5	<i>Amelanchier alnifolia</i>	+
<i>Eleocharis palustris</i>	+	<i>Verbascum thapsus</i>	+
<i>Equisetum arvense</i>	+	<i>Epilobium ciliatum</i>	+
<i>Agrostis stolonifera</i>	+	<i>Medicago lupulina</i>	+
<i>Plantago major</i>	+		
<i>Lactuca serriola</i>	+		
<i>Cirsium arvense</i>	+		
<i>Carex bebbii</i>	+		
<i>Juncus tenuis</i>	+		
<i>Salix bebbiana</i>	+		
<i>Poa pratensis</i>	+		
<i>Carex microptera</i>	+		
Total Vegetative Cover:	90%		







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

Project / Site: <b><u>Creston Mitigation Site</u></b> Applicant / Owner: <b><u>MDT</u></b> Investigator: <b><u>PBSJ - Traxler</u></b>	Date: <b><u>July 21, 2005</u></b> County: <b><u>Flathead</u></b> State: <b><u>Montana</u></b>
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Do Normal Circumstances exist on the site? <b><u>Yes</u></b> Is the site significantly disturbed (Atypical Situation)? <b><u>No</u></b> Is the area a potential Problem Area? <b><u>No</u></b> (If needed, explain on reverse side)	Community ID: <b><u>EM</u></b> Transect ID: _____ Plot ID: <b><u>1</u></b>
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**VEGETATION (USFWS Region 9: Northwest, 1988)**

Dominant Species	Stratum	Indicator	Dominant Species	Stratum	Indicator
1. <i>Phalaris arundinacea</i>	Herb	FACW	11.		
2.			12.		
3.			13.		
4.			14.		
5.			15.		
6.			16.		
7.			17.		
8.			18.		
9.			19.		
10.			20.		
Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-): <b>1 / 1 = 100%</b>			FAC Neutral: <b>1 / 1 = 100%</b>		
Remarks: <b>Water levels were higher in 2005; however aquatic bed habitat was not present at this plot.</b>					

**HYDROLOGY**

<b><u>No</u></b> Recorded Data (Describe in Remarks): <b><u>N/A</u></b> Stream, Lake, or Tide Gauge <b><u>Yes</u></b> Aerial Photographs <b><u>N/A</u></b> Other  <b><u>No</u></b> No Recorded Data	Wetland Hydrology Indicators Primary Indicators: <b><u>YES</u></b> Inundated <b><u>YES</u></b> Saturated in Upper 12 Inches <b><u>YES</u></b> Water Marks <b><u>NO</u></b> Drift Lines <b><u>NO</u></b> Sediment Deposits <b><u>YES</u></b> Drainage Patterns in Wetland Secondary Indicators (2 or more required): <b><u>NO</u></b> Oxidized Root Channels in Upper 12 inches <b><u>NO</u></b> Water-Stained Leaves <b><u>YES</u></b> Local Soil Survey Data <b><u>YES</u></b> FAC-Neutral Test <b><u>NO</u></b> Other (Explain in Remarks)
Field Observations: Depth of Surface Water = <b><u>3</u></b> (in.) Depth to Free Water in Pit = <b><u>0</u></b> (in.) Depth to Saturated Soil <b><u>N/A</u></b> _____ (in.)	
Remarks: <b>Surface water present at this plot during 2005 monitoring.</b>	

**SOILS**

Map Unit Name (Series and Phase): **Muck and Peat**  
 Map Symbol: **Ms** Drainage Class: **unknown** Mapped Hydric Inclusion? **\_**  
 Taxonomy (Subgroup): **Histosol / Histic Epipedon** Field Observations confirm Mapped Type? **Yes**

<b>Profile Description</b>					
<b>Depth (inches)</b>	<b>Horizon</b>	<b>Matrix Color (Munsell Moist)</b>	<b>Mottle Color(s) (Munsell Moist)</b>	<b>Mottle Abundance/Contrast</b>	<b>Texture, Concretions, Structure, etc.</b>
16	O	5 YR 2.5/1	4/6 /	N/A N/A	Loam
>16	B	7.5 YR 6/1	7.5 YR 6/3 /	Common Distinct	Silt Loam
		/	/	N/A	
		/	/	N/A	
		/	/	N/A	
		/	/	N/A	

Hydric Soil Indicators:

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

Remarks:

**WETLAND DETERMINATION**

Hydrophytic Vegetation Present? <b><u>YES</u></b>	Is this Sampling Point within a Wetland? <b><u>YES</u></b>
Wetland Hydrology Present? <b><u>YES</u></b>	
Hydric Soils Present? <b><u>YES</u></b>	

Remarks: **Plot was taken in an existing wetland (prior to project construction) in the southern portion of the site.**

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

Project / Site: <b><u>Creston Mitigation Site</u></b> Applicant / Owner: <b><u>MDT</u></b> Investigator: <b><u>PBSJ - Traxler</u></b>	Date: <b><u>July 21, 2005</u></b> County: <b><u>Flathead</u></b> State: <b><u>Montana</u></b>
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Do Normal Circumstances exist on the site? <b><u>Yes</u></b> Is the site significantly disturbed (Atypical Situation)? <b><u>No</u></b> Is the area a potential Problem Area? <b><u>No</u></b> (If needed, explain on reverse side)	Community ID: <b><u>EM</u></b> Transect ID: _____ Plot ID: <b><u>2</u></b>
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**VEGETATION (USFWS Region 9: Northwest, 1988)**

Dominant Species	Stratum	Indicator	Dominant Species	Stratum	Indicator
1. <i>Phalaris arundinacea</i>	Herb	FACW	11.		
2.			12.		
3.			13.		
4.			14.		
5.			15.		
6.			16.		
7.			17.		
8.			18.		
9.			19.		
10.			20.		
Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-): <b>1 / 1 = 100%</b>			FAC Neutral: <b>1 / 1 = 100%</b>		
Remarks: <b>Monotypic stand of reed canary grass along veg. transect - common at site.</b>					

**HYDROLOGY**

<b><u>No</u></b> Recorded Data (Describe in Remarks): <u>N/A</u> Stream, Lake, or Tide Gauge <u>Yes</u> Aerial Photographs <u>N/A</u> Other  <b><u>No</u></b> No Recorded Data	Wetland Hydrology Indicators Primary Indicators: <u>NO</u> Inundated <u>NO</u> Saturated in Upper 12 Inches <u>NO</u> Water Marks <u>YES</u> Drift Lines <u>NO</u> Sediment Deposits <u>YES</u> Drainage Patterns in Wetland Secondary Indicators (2 or more required): <u>YES</u> Oxidized Root Channels in Upper 12 inches <u>NO</u> Water-Stained Leaves <u>NO</u> Local Soil Survey Data <u>YES</u> FAC-Neutral Test <u>NO</u> Other (Explain in Remarks)
Field Observations: Depth of Surface Water <u>N/A</u> _____ (in.) Depth to Free Water in Pit > <b><u>14</u></b> (in.) Depth to Saturated Soil > <b><u>14</u></b> (in.)	
Remarks:	

## SOILS

Map Unit Name (Series and Phase): **Alluvial Land poorly drained**  
 Map Symbol: **Aa** Drainage Class: **Poorly drained** Mapped Hydric Inclusion? **\_**  
 Taxonomy (Subgroup): \_\_\_\_\_ Field Observations confirm Mapped Type? **Yes**

Profile Description					
Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Color(s) (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
9	A	7.5 YR 2.5/2	/	N/A	Loam
16	B	7.5 YR 2.5/1	7.5 YR 5/3	Common	Silt Loam
		/	/	N/A	
		/	/	N/A	
		/	/	N/A	
		/	/	N/A	

Hydric Soil Indicators:

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

## WETLAND DETERMINATION

Hydrophytic Vegetation Present? <b><u>YES</u></b>	Is this Sampling Point within a Wetland? <b><u>YES</u></b>
Wetland Hydrology Present? <b><u>YES</u></b>	
Hydric Soils Present? <b><u>YES</u></b>	

Remarks:

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

Project / Site: <b><u>Creston Mitigation Site</u></b> Applicant / Owner: <b><u>MDT</u></b> Investigator: <b><u>PBSJ - Traxler</u></b>	Date: <b><u>July 21, 2005</u></b> County: <b><u>Flathead</u></b> State: <b><u>Montana</u></b>
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Do Normal Circumstances exist on the site? <b><u>Yes</u></b> Is the site significantly disturbed (Atypical Situation)? <b><u>No</u></b> Is the area a potential Problem Area? <b><u>No</u></b> (If needed, explain on reverse side)	Community ID: <b><u>Upland</u></b> Transect ID: _____ Plot ID: <b><u>3</u></b>
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**VEGETATION (USFWS Region 9: Northwest, 1988)**

Dominant Species	Stratum	Indicator	Dominant Species	Stratum	Indicator
1. <i>Agropyron repens</i>	Herb	FACU	11.		
2. <i>Phleum pratense</i>	Herb	FACU	12.		
3. <i>Agrostis stolonifera</i>	Herb	FAC+	13.		
4. <i>Cirsium arvense</i>	Herb	FACU+	14.		
5.			15.		
6.			16.		
7.			17.		
8.			18.		
9.			19.		
10.			20.		
Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-): <b>1 / 4 = 25%</b>			FAC Neutral: <b>0 / 3 = 0%</b>		
Remarks: <b>Monotypic stand of reed canary grass along veg. transect - common at site.</b>					

**HYDROLOGY**

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

## SOILS

Map Unit Name (Series and Phase): **Swims silt loam**  
 Map Symbol: **So** Drainage Class: \_\_\_\_\_ Mapped Hydric Inclusion? **\_**  
 Taxonomy (Subgroup): \_\_\_\_\_ Field Observations confirm Mapped Type? **No**

Profile Description					
Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Color(s) (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
5	A	7.5 YR 2.5/2	/	N/A	Loam
			/	N/A	
16	B	7.5 YR 4/3	/	N/A	Loam
			/	N/A	
		/	/	N/A	
		/	/	N/A	
		/	/	N/A	
		/	/	N/A	

Hydric Soil Indicators:

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

Remarks: **soil dry at this location**

## WETLAND DETERMINATION

Hydrophytic Vegetation Present? <b><u>YES</u></b>	Is this Sampling Point within a Wetland? <b><u>YES</u></b>
Wetland Hydrology Present? <b><u>YES</u></b>	
Hydric Soils Present? <b><u>YES</u></b>	

Remarks: **Plot is beginning of veg transect in upland habitat.**



**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 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	---	---	---	.7 (M)	---	---	---

If documented, list the source (e.g., observations, records, etc.): \_\_\_\_\_

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

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

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

- Primary or Critical habitat (list species)  D  S \_\_\_\_\_
- Secondary habitat (list species)  D  S \_\_\_\_\_
- Incidental habitat (list species)  D  S western toad, northern leopard frog, Peregrine Falcon, Black Tern
- 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	---	---	---	---	---	.1 (L)	---

If documented, list the source (e.g., observations, records, etc.): \_\_\_\_\_

**14C. GENERAL WILDLIFE HABITAT RATING**

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

Substantial (based on any of the following)

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

Low (based on any of the following)

- few or no wildlife observations during peak use periods
- little to no wildlife sign
- sparse adjacent upland food sources
- interviews with local biologists with knowledge of AA

Moderate (based on any of the following)

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

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

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

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

Evidence of Wildlife Use from 14C(i)	Wildlife Habitat Features Rating from 14C(ii)			
	<input checked="" type="checkbox"/> Exceptional	<input type="checkbox"/> High	<input type="checkbox"/> Moderate	<input type="checkbox"/> Low
Substantial	--	--	--	--
Moderate	.9 (H)	--	--	--
Low	--	--	--	--

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Applies to wetlands that flood or pond from overbank or in-channel flow, precipitation, upland surface flow, or groundwater flow.

If no wetlands in the AA are subject to flooding or ponding, then check NA above.

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

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

Estimated maximum acre feet of water contained in wetlands within the AA that are subject to periodic flooding or ponding.	<input type="checkbox"/> >5 acre feet			<input checked="" type="checkbox"/> <5, >1 acre feet			<input type="checkbox"/> ≤1 acre foot		
	P/P	S/I	T/E	P/P	S/I	T/E	P/P	S/I	T/E
Duration of surface water at wetlands within the AA									
Wetlands in AA flood or pond ≥ 5 out of 10 years	--	--	--	.8 (H)	--	--	--	--	--
Wetlands in AA flood or pond < 5 out of 10 years	--	--	--	--	--	--	--	--	--

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

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

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

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

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

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

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

**14H. SEDIMENT/ShORELINE STABILIZATION**

NA (proceed to 14I)

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

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

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

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

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

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

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

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

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

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

i.  Discharge Indicators

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

ii.  Recharge Indicators

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

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

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

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

**14K. UNIQUENESS**

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

Replacement Potential	AA contains fen, bog, warm springs or mature (>80 yr-old) forested wetland or plant association listed as "S1" by the MTNHP.			AA does not contain previously cited rare types and structural diversity (#13) is high or contains plant association listed as "S2" by the MTNHP.			AA does not contain previously cited rare types or associations and structural diversity (#13) is low-moderate.		
	<input type="checkbox"/> rare	<input type="checkbox"/> common	<input type="checkbox"/> abundant	<input type="checkbox"/> rare	<input checked="" type="checkbox"/> common	<input type="checkbox"/> abundant	<input type="checkbox"/> rare	<input type="checkbox"/> common	<input type="checkbox"/> abundant
Estimated Relative Abundance from 11									
Low disturbance at AA (12i)	--	--	--	--	.6M	--	--	--	--
Moderate disturbance at AA (12i)	--	--	--	--	--	--	--	--	--
High disturbance at AA (12i)	--	--	--	--	--	--	--	--	--

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

**14L. RECREATION / EDUCATION POTENTIAL**

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

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

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

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

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

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

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

**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	0.70	1	
B. MT Natural Heritage Program Species Habitat	low	0.10	1	
C. General Wildlife Habitat	high	0.90	1	
D. General Fish/Aquatic Habitat	N/A		--	
E. Flood Attenuation	N/A		--	
F. Short and Long Term Surface Water Storage	high	0.80	1	
G. Sediment/Nutrient/Toxicant Removal	moderate	0.70	1	
H. Sediment/Shoreline Stabilization	N/A		--	
I. Production Export/Food Chain Support	high	1.00	1	
J. Groundwater Discharge/Recharge	high	1.00	--	
K. Uniqueness	moderate	0.60	1	
L. Recreation/Education Potential	high	1.00	1	
<b>Total:</b>		<b>6.80</b>	<b>9.00</b>	
<b>Percent of Total Possible Points:</b>			<b>76%</b> (Actual / Possible) x 100 [rd to nearest whole #]	

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

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

I       II       III       IV

## Appendix C

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**REPRESENTATIVE PHOTOGRAPHS**  
**2005 AERIAL PHOTOGRAPH**  
**2000-2005 AERIAL PHOTOGRAPHS**

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*MDT Wetland Mitigation Monitoring*  
*Creston*  
*Creston, Montana*



Photo Point No. 1: View looking north; the Flathead County green bins are located in the distance.



Photo Point No. 2: View looking northeast; Highway 35 is visible in the background.



Photo Point No. 3: View looking east. The photo is taken near the north perimeter of the impoundment.



Vegetation transect from East end looking west.



Photo Point No. 5: View looking south and taken from the center of the mitigation site.



View looking east from west end of upper pond. This impoundment held water through the summer.

# CRESTON 2005 AERIAL PHOTOGRAPH



CRESTON WETLAND MITIGATION SITE



Photo 1: July 11, 2000



Photo 2: July 2002



Photo 3: July 24, 2003



Photo 4: July 24, 2004



Photo 5: July 5, 2005

## **Appendix D**

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

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*MDT Wetland Mitigation Monitoring  
Creston  
Creston, Montana*

## BIRD SURVEY PROTOCOL

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

### **Species Use within the Mitigation Wetland: Survey Method**

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

#### ***Sites that can be circumambulated or walked throughout.***

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

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

#### ***Sites that cannot be circumambulated.***

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

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

### **Species Use within the Mitigation Wetland: Data Recording**

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

#### ***1. Bird Species List***

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

#### ***2. Bird Density***

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

#### ***3. Bird Behavior***

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

#### ***4. Bird Species Habitat Use***

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

## **GPS Mapping and Aerial Photo Referencing Procedure**

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

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

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

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

## **Appendix E**

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

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*MDT Wetland Mitigation Monitoring*  
*Creston*  
*Creston, Montana*

# AQUATIC INVERTEBRATE SAMPLING PROTOCOL

## Equipment List

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

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

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

## Site Selection

Select the sampling site with these considerations in mind:

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

## Sampling

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

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

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

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

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

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

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

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

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

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

Photograph the sampled site.

### **Sample Handling/Shipping**

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

## MDT Mitigated Wetland Monitoring Project

### Aquatic Invertebrate Monitoring Summary 2001 - 2005

#### METHODS

Among other monitoring activities, aquatic invertebrate assemblages were collected at a number of mitigated wetlands throughout Montana. This report summarizes data generated from five years of collection. 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. In 2005, an additional 2 sites were added. Over all years of sampling, a total of 151 sites were sampled for invertebrates. Table 2 summarizes sites and sampling years.

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

Scoring criteria for metrics were developed by generally following the tactic used by Stribling et al. Boxplots were generated using a statistical software package (Statistica), and distributions, median values, ranges, and quartiles for each metric were examined. All sites in all years of sampling were used. Camp Creek, which was sampled in 2002, 2003, 2004, and 2005, and Kleinschmidt Creek, sampled in 2003, 2004, and 2005, were assessed using the tested metric battery developed for montane streams of Western Montana (Bollman 1998). Invertebrate assemblages at these sites were different from that of the other sites, and suggested montane or foothill stream conditions rather than wetland conditions. For the wetland sites, "optimal" scores were generally those that fell above the 75<sup>th</sup> percentile (for those metrics that decrease in value in response to stress) or below the 25<sup>th</sup> percentile (for metrics that respond to stress by an increase in value) of all scores. Additional scoring ranges were established by bisecting the range below the 75<sup>th</sup> percentile for decreasing scores (or above the 25<sup>th</sup> percentile for increasing scores) into "sub-optimal" and "poor" assessment categories. A score of 5, 3, or 1 was assigned to optimal, sub-optimal, and poor metric performance, respectively. In this way, metric values were translated into normalized metric scores, and scores for all metrics were summed to produce a total bioassessment score. 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.

**Table 1.** Montana Department of Transportation Mitigated Wetlands Monitoring Project sites, 2001 – 2005.

2001	2002	2003	2004	2005
Beaverhead 1	Beaverhead 1	Beaverhead 1	Beaverhead 1	Beaverhead 1
Beaverhead 2	Beaverhead 2			
Beaverhead 3	Beaverhead 3		Beaverhead 3	Beaverhead 3
Beaverhead 4	Beaverhead 4	Beaverhead 4		
Beaverhead 5	Beaverhead 5	Beaverhead 5	Beaverhead 5	Beaverhead 5
Beaverhead 6	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	Big Spring
Vince Ames				
Ryegate				
Lavinia				
Stillwater	Stillwater	Stillwater	Stillwater	Stillwater
Roundup	Roundup	Roundup	Roundup	Roundup
Wigeon	Wigeon	Wigeon	Wigeon	Wigeon
Ridgeway	Ridgeway	Ridgeway	Ridgeway	Ridgeway
Musgrave – Rest. 1	Musgrave – Rest. 1			
Musgrave – Rest. 2	Musgrave – Rest. 2			
Musgrave – Enh. 1	Musgrave – Enh. 1			
Musgrave – Enh. 2				
	Hoskins Landing	Hoskins Landing	Hoskins Landing	Hoskins Landing
	Peterson - 1	Peterson – 1	Peterson – 1	Peterson – 1
	Peterson – 2		Peterson – 2	Peterson – 2
	Peterson – 4	Peterson – 4	Peterson – 4	Peterson – 4
	Peterson – 5	Peterson – 5	Peterson – 5	Peterson – 5
	Jack Johnson - main	Jack Johnson - main		
	Jack Johnson - SW	Jack Johnson - SW		
	Creston	Creston	Creston	Creston
	Lawrence Park			
	Perry Ranch			Perry Ranch
	SF Smith River	SF Smith River	SF Smith River	SF Smith River
	Camp Creek	Camp Creek	Camp Creek	Camp Creek
	Kleinschmidt	Kleinschmidt – pond	Kleinschmidt – pond	Kleinschmidt – pond
		Kleinschmidt – stream	Kleinschmidt – stream	Kleinschmidt – stream
		Ringling - Galt		
			Circle	
			Cloud Ranch Pond	Cloud Ranch Pond
			Cloud Ranch Stream	
			Colloid	Colloid
			Jack Creek	Jack Creek
			Norem	Norem
				Rock Creek Ranch
				Wagner Marsh

## Sample Processing

Aquatic invertebrate samples were collected at mitigation wetland sites in the summer months of 2001, 2002, 2003, 2004, and 2005 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 2 lists those metrics, describes their calculation and the expected response of each to increased degradation or impairment of the wetland.

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

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

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

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

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

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

<b>Metric</b>	<b>Metric calculation</b>	<b>Expected response to degradation or impairment</b>
Total taxa	Count of unique taxa identified to lowest recommended taxonomic level	Decrease
POET	Count of unique Plecoptera, Trichoptera, Ephemeroptera, and Odonata taxa identified to lowest recommended taxonomic level	Decrease
Chironomidae taxa	Count of unique midge taxa identified to lowest recommended taxonomic level	Decrease
Crustacea taxa + Mollusca taxa	Count of unique Crustacea taxa and Mollusca taxa identified to lowest recommended taxonomic level	Decrease
% Chironomidae	Percent abundance of midges in the subsample	Increase
Orthoclaadiinae/Chironomidae	Number of individual midges in the sub-family Orthoclaadiinae / total number of midges in the subsample.	Decrease
% Amphipoda	Percent abundance of amphipods in the subsample	Increase
%Crustacea + %Mollusca	Percent abundance of crustaceans in the subsample plus percent abundance of molluscs in the subsample	Increase
HBI	Relative abundance of each taxon multiplied 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

## RESULTS

*(Note: Individual site discussions were removed from this report by Land & Water Consulting / PBS&J and are included in the Macro-Invertebrate sections of individual reports. Summary tables are provided on the following pages.)*

**Table 3a.** Metric values and scores for Montana Department of Transportation mitigated wetland sites in 2005.

	BEAVERHEAD #1	BEAVERHEAD #3	BEAVERHEAD #5	BEAVERHEAD #6	BIG SPRING CREEK	STILLWATER	ROUNDUP	WIDGEON
Total taxa	22	9	14	18	28	17	7	19
POET	2	0	0	2	4	4	0	0
Chironomidae taxa	7	4	4	4	9	5	3	11
Crustacea + Mollusca	4	3	1	4	7	5	2	4
% Chironomidae	59.80%	7.55%	50.00%	16.67%	33.65%	9.43%	22.22%	76.47%
Orthocladinae/Chir	0.197	0.625	0.059	0.067	0.457	0.500	0.000	0.205
% Amphipoda	1.96%	0.94%	0.00%	1.11%	18.27%	7.55%	0.00%	10.78%
% Crustacea + % Mollusca	10.78%	90.57%	2.94%	55.56%	33.65%	53.77%	72.65%	15.69%
HBI	7.71	7.88	7.88	7.98	7.55	7.28	8.33	8.25
% Dominant taxon	34.31%	76.42%	35.29%	25.56%	18.27%	33.02%	71.79%	44.12%
% Collector-Gatherers	56.86%	93.40%	47.06%	21.11%	70.19%	64.15%	82.05%	26.47%
% Filterers	0.00%	0.00%	0.00%	0.00%	0.96%	3.77%	0.00%	6.86%
Total taxa	5	1	1	3	5	3	1	3
POET	1	1	1	1	5	5	1	1
Chironomidae taxa	5	3	3	3	5	3	3	5
Crustacea + Mollusca	3	1	1	3	5	3	1	3
% Chironomidae	1	5	1	5	3	5	3	1
Orthocladinae/Chir	3	5	1	1	5	5	1	3
% Amphipoda	5	5	5	5	3	3	5	3
% Crustacea + % Mollusca	5	1	5	3	3	3	1	5
HBI	1	1	1	1	3	3	1	1
% Dominant taxon	3	1	3	5	5	5	1	3
% Collector-Gatherers	3	5	3	1	3	3	5	1
% Filterers	3	3	3	3	3	3	3	1
<b>Total score</b>	<b>38</b>	<b>32</b>	<b>28</b>	<b>34</b>	<b>48</b>	<b>44</b>	<b>26</b>	<b>30</b>
<b>Percent of maximum score</b>	<b>0.633333</b>	<b>0.533333</b>	<b>0.466667</b>	<b>0.566667</b>	<b>0.8</b>	<b>0.733333</b>	<b>0.433333</b>	<b>0.5</b>
<b>Impairment classification</b>	<b>sub-optimal</b>	<b>poor</b>	<b>poor</b>	<b>sub-optimal</b>	<b>optimal</b>	<b>optimal</b>	<b>poor</b>	<b>poor</b>

**Table 3b.** Metric values and scores for Montana Department of Transportation mitigated wetland sites in 2005.

	<b>RIDGEWAY</b>	<b>MUSGRAVE REST. 1</b>	<b>MUSGRAVE REST. 2</b>	<b>MUSGRAVE ENH. 1</b>	<b>HOSKINS LANDING</b>	<b>PETERSON RANCH 1</b>	<b>PETERSON RANCH 2</b>	<b>PETERSON RANCH 4</b>	<b>PETERSON RANCH 5</b>
<b>Total taxa</b>	19	19	23	19	27	29	16	25	16
POET	3	1	3	1	5	4	2	4	4
Chironomidae taxa	6	6	8	3	6	11	6	8	7
Crustacea + Mollusca	5	5	3	7	6	6	5	6	2
% Chironomidae	9.26%	14.55%	22.00%	2.80%	17.58%	17.48%	13.91%	24.55%	16.96%
Orthoclaadiinae/Chir	0.600	0.750	0.136	0.667	0.188	0.556	0.563	0.630	0.632
% Amphipoda	6.48%	3.64%	0.00%	0.93%	0.00%	0.97%	7.83%	1.82%	8.04%
% Crustacea + % Mollusca	22.22%	30.91%	38.00%	58.88%	27.47%	31.07%	72.17%	20.00%	8.93%
HBI	7.71	7.22	7.77	7.16	6.81	7.16	7.43	7.65	8.08
% Dominant taxon	53.70%	21.82%	35.00%	28.04%	14.29%	26.21%	33.04%	18.18%	31.25%
% Collector-Gatherers	68.52%	40.00%	15.00%	11.21%	31.87%	59.22%	28.70%	43.64%	68.75%
% Filterers	0.00%	0.00%	0.00%	2.80%	0.00%	4.85%	33.91%	5.45%	1.79%
<b>Total taxa</b>	3	3	5	3	5	5	3	5	3
POET	3	1	3	1	5	5	1	5	5
Chironomidae taxa	3	3	5	3	3	5	3	5	5
Crustacea + Mollusca	3	3	1	5	5	5	3	5	1
% Chironomidae	5	5	3	5	5	5	5	3	5
Orthoclaadiinae/Chir	5	5	1	5	3	5	5	5	5
% Amphipoda	3	5	5	5	5	5	3	5	3
% Crustacea + % Mollusca	5	5	3	3	5	5	1	5	5
HBI	1	3	1	3	5	3	3	1	1
% Dominant taxon	1	5	3	5	5	5	5	5	5
% Collector-Gatherers	3	1	1	1	1	3	1	1	3
% Filterers	3	3	3	3	3	3	1	3	3
<b>Total score</b>	<b>38</b>	<b>42</b>	<b>34</b>	<b>42</b>	<b>50</b>	<b>54</b>	<b>34</b>	<b>48</b>	<b>44</b>
<b>Percent of maximum score</b>	<b>0.633333</b>	<b>0.7</b>	<b>0.566667</b>	<b>0.7</b>	<b>0.833333</b>	<b>0.9</b>	<b>0.566667</b>	<b>0.8</b>	<b>0.733333</b>
<b>Impairment classification</b>	<b>sub-optimal</b>	<b>optimal</b>	<b>sub-optimal</b>	<b>optimal</b>	<b>optimal</b>	<b>optimal</b>	<b>sub-optimal</b>	<b>optimal</b>	<b>optimal</b>

**Table 3c.** Metric values and scores for Montana Department of Transportation mitigated wetland sites in 2005.

	CRESTON	PERRY RANCH	SOUTH FORK SMITH RIVER	CAMP CREEK	KLEINSCH MIDT POND	KLEINSCH MIDT STREAM	CLOUD RANCH POND	COLLOID	JACK CREEK
Total taxa	16	18	19	36	27	23	22	9	16
POET	0	0	4	14	6	5	2	1	1
Chironomidae taxa	4	8	6	13	6	9	11	4	9
Crustacea + Mollusca	6	4	5	0	2	3	3	1	4
% Chironomidae	27.62%	43.69%	21.67%	45.54%	8.85%	45.08%	37.50%	25.83%	29.41%
Orthoclaadiinae/Chir	0.931	0.622	0.192	0.804	0.200	0.473	0.256	0.000	0.467
% Amphipoda	0.00%	0.00%	29.17%	0.00%	5.31%	0.82%	0.00%	0.00%	0.98%
% Crustacea + % Mollusca	52.38%	38.83%	62.50%	0.00%	7.96%	3.28%	7.69%	67.50%	41.18%
HBI	7.52	7.31	7.54	5.06	7.40	5.83	6.96	8.53	7.39
% Dominant taxon	25.71%	25.24%	29.17%	18.81%	30.09%	32.79%	41.35%	67.50%	35.29%
% Collector-Gatherers	64.76%	47.57%	65.00%	47.52%	37.17%	50.82%	75.96%	88.33%	91.18%
% Filterers	6.67%	27.18%	8.33%	5.94%	0.88%	2.46%	2.88%	0.00%	2.94%
Total taxa	3	3	3	5	5	5	5	1	3
POET	1	1	5	5	5	5	1	1	1
Chironomidae taxa	3	5	3	5	3	5	5	3	5
Crustacea + Mollusca	5	3	3	1	1	1	1	1	3
% Chironomidae	3	1	3	1	5	1	3	3	3
Orthoclaadiinae/Chir	5	5	3	5	3	5	3	1	1
% Amphipoda	5	5	1	5	3	5	5	5	5
% Crustacea + % Mollusca	3	3	3	5	5	5	5	1	3
HBI	3	3	3	5	3	5	3	1	3
% Dominant taxon	5	5	5	5	5	5	3	1	3
% Collector-Gatherers	3	3	3	3	1	3	3	5	5
% Filterers	1	1	1	3	3	3	3	3	3
<b>Total score</b>	<b>40</b>	<b>38</b>	<b>36</b>	<b>48</b>	<b>42</b>	<b>48</b>	<b>40</b>	<b>26</b>	<b>38</b>
<b>Percent of maximum score</b>	<b>0.666667</b>	<b>0.633333</b>	<b>0.6</b>	<b>0.8</b>	<b>0.7</b>	<b>0.8</b>	<b>0.666667</b>	<b>0.433333</b>	<b>0.633333</b>
<b>Impairment classification</b>	<b>sub-optimal</b>	<b>sub-optimal</b>	<b>sub-optimal</b>	<b>optimal</b>	<b>optimal</b>	<b>optimal</b>	<b>sub-optimal</b>	<b>poor</b>	<b>sub-optimal</b>

**Table 3d.** Metric values and scores for Montana Department of Transportation mitigated wetland sites in 2005.

	<b>NOREM</b>	<b>ROCK CREEK RANCH</b>	<b>WAGNER MARSH</b>
Total taxa	4	24	23
POET	0	2	5
Chironomidae taxa	2	8	8
Crustacea + Mollusca	2	4	5
% Chironomidae	37.50%	22.00%	24.00%
Orthoclaadiinae/Chir	0.000	0.318	0.167
% Amphipoda	0.00%	3.00%	7.00%
% Crustacea + % Mollusca	62.50%	40.00%	19.00%
HBI	7.50	7.61	8.58
% Dominant taxon	56.25%	18.00%	38.00%
% Collector-Gatherers	6.25%	57.00%	40.00%
% Filterers	0.00%	0.00%	3.00%
Total taxa	1	5	5
POET	1	1	5
Chironomidae taxa	1	5	5
Crustacea + Mollusca	1	3	3
% Chironomidae	3	3	3
Orthoclaadiinae/Chir	1	3	1
% Amphipoda	5	5	3
% Crustacea + % Mollusca	3	3	5
HBI	3	1	1
% Dominant taxon	1	5	3
% Collector-Gatherers	1	3	1
% Filterers	3	3	3
<b>Total score</b>	<b>24</b>	<b>40</b>	<b>38</b>
<b>Percent of maximum score</b>	<b>0.4</b>	<b>0.666667</b>	<b>0.633333</b>
<b>Impairment classification</b>	<b>poor</b>	<b>sub-optimal</b>	<b>sub-optimal</b>

### **Literature Cited**

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

# Taxa Listing

Project ID: MDT05LW  
RAI No.: MDT05LW003

RAI No.: MDT05LW003

Sta. Name: CRESTON

Client ID:

Date Coll.: 7/21/2005

No. Jars: 1

STORET ID:

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
<b>Non-Insect</b>							
Cladocera	5	4.76%	Yes	Unknown		8	CF
Copepoda	27	25.71%	Yes	Unknown		8	CG
Ostracoda	13	12.38%	Yes	Unknown		8	CG
Erpobdellidae							
Erpobdellidae	1	0.95%	Yes	Immature	Immature	8	PR
<i>Mooreobdella</i> sp.	4	3.81%	Yes	Unknown		8	PR
Lymnaeidae							
<i>Stagnicola</i> sp.	3	2.86%	Yes	Unknown		6	SC
Physidae							
Physidae	6	5.71%	Yes	Unknown		8	SC
Planorbidae							
Planorbidae	1	0.95%	Yes	Immature	Immature	6	SC
<b>Heteroptera</b>							
Notonectidae							
<i>Notonecta</i> sp.	1	0.95%	Yes	Adult		5	PR
<b>Coleoptera</b>							
Hydrophilidae							
<i>Tropisternus</i> sp.	1	0.95%	Yes	Adult		5	PR
<b>Diptera</b>							
Ceratopogonidae							
Ceratopogoninae	13	12.38%	Yes	Larva	Larva	6	PR
Ephydriidae							
Ephydriidae	1	0.95%	Yes	Larva	Damaged	6	CG
<b>Chironomidae</b>							
Chironomidae							
<i>Acricotopus</i> sp.	13	12.38%	Yes	Larva		10	CG
Orthoclaadiinae	9	8.57%	No	Larva	Early Instar	6	CG
<i>Psectrocladius</i> sp.	5	4.76%	Yes	Larva		8	CG
Tanytarsini	2	1.90%	Yes	Larva	Early Instar	6	CF
	<b>Sample Count</b>	<b>105</b>					

# Metrics Report

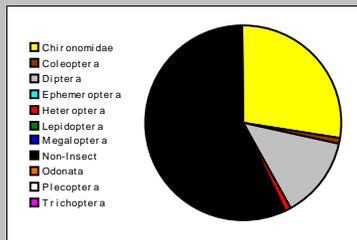
Project ID: MDT05LW  
 RAI No.: MDT05LW003  
 Sta. Name: CRESTON  
 Client ID:  
 STORET ID  
 Coll. Date: 7/21/2005

## Abundance Measures

Sample Count: 105  
 Sample Abundance: 2,100.00 5.00% of sample used  
 Total Abundance: 2,824.50  
 Coll. Procedure:  
 Sample Notes:

## Taxonomic Composition

Category	R	A	PRA
Non-Insect	8	60	57.14%
Odonata			
Ephemeroptera			
Plecoptera			
Heteroptera	1	1	0.95%
Megaloptera			
Trichoptera			
Lepidoptera			
Coleoptera	1	1	0.95%
Diptera	2	14	13.33%
Chironomidae	3	29	27.62%

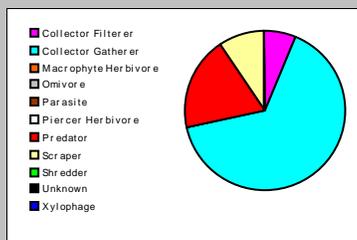


## Dominant Taxa

Category	A	PRA
Copepoda	27	25.71%
Ostracoda	13	12.38%
Ceratopogoninae	13	12.38%
Acricotopus	13	12.38%
Orthocladinae	9	8.57%
Physidae	6	5.71%
Psectrocladius	5	4.76%
Cladocera	5	4.76%
Mooreobdella	4	3.81%
Staenicola	3	2.86%
Tanytarsini	2	1.90%
Tropisternus	1	0.95%
Planorbidae	1	0.95%
Notonecta	1	0.95%
Ephydriidae	1	0.95%

## Functional Composition

Category	R	A	PRA
Predator	5	20	19.05%
Parasite			
Collector Gatherer	5	68	64.76%
Collector Filterer	2	7	6.67%
Macrophyte Herbivore			
Piercer Herbivore			
Xylophage			
Scraper	3	10	9.52%
Shredder			
Omnivore			
Unknown			



## Metric Values and Scores

Metric	Value	BIBI	MTP	MTV	MTM
<i>Composition</i>					
Taxa Richness	15	1	1		0
Non-Insect Percent	57.14%				
E Richness	0	1		0	
P Richness	0	1		0	
T Richness	0	1		0	
EPT Richness	0		0		0
EPT Percent	0.00%		0		0
Oligochaeta+Hirudinea Percent	4.76%				
Baetidae/Ephemeroptera	0.00%				
Hydropsychidae/Trichoptera	0.00%				
<i>Dominance</i>					
Dominant Taxon Percent	25.71%		3		2
Dominant Taxa (2) Percent	38.10%				
Dominant Taxa (3) Percent	50.48%	3			
Dominant Taxa (10) Percent	93.33%				
<i>Diversity</i>					
Shannon H (loge)	2.209				
Shannon H (log2)	3.187		3		
Margalef D	3.067				
Simpson D	0.138				
Evenness	0.092				
<i>Function</i>					
Predator Richness	5		2		
Predator Percent	19.05%	3			
Filterer Richness	2				
Filterer Percent	6.67%			2	
Collector Percent	71.43%		2		1
Scraper+Shredder Percent	9.52%		1		0
Scraper/Filterer	1.429				
Scraper/Scraper+Filterer	0.588				
<i>Habit</i>					
Burrower Richness	1				
Burrower Percent	12.38%				
Swimmer Richness	2				
Swimmer Percent	1.90%				
Clinger Richness	0	1			
Clinger Percent	0.00%				
<i>Characteristics</i>					
Cold Stenotherm Richness	0				
Cold Stenotherm Percent	0.00%				
Hemoglobin Bearer Richness	2				
Hemoglobin Bearer Percent	1.90%				
Air Breather Richness	1				
Air Breather Percent	0.95%				
<i>Voltinism</i>					
Univoltine Richness	7				
Semivoltine Richness	1	1			
Multivoltine Percent	70.48%		1		
<i>Tolerance</i>					
Sediment Tolerant Richness	2				
Sediment Tolerant Percent	3.81%				
Sediment Sensitive Richness	0				
Sediment Sensitive Percent	0.00%				
Metals Tolerance Index	3.560				
Pollution Sensitive Richness	0	1		0	
Pollution Tolerant Percent	14.29%	5		1	
Hilsenhoff Biotic Index	7.638		0		0
Intolerant Percent	0.00%				
Supertolerant Percent	70.48%				
CTQa	103.500				

## Bioassessment Indices

BioIndex	Description	Score	Pct	Rating
BIBI	B-IBI (Karr et al.)	18	36.00%	
MTP	Montana DEQ Plains (Bukantis 1998)	13	43.33%	Moderate
MTV	Montana Revised Valleys/Foothills (Bollman 1998)	3	16.67%	Severe
MTM	Montana DEQ Mountains (Bukantis 1998)	3	14.29%	Severe

