MONTANA DEPARTMENT OF TRANSPORTATION
WETLAND MITIGATION MONITORING REPORT: YEAR 2005

South Fork Smith River
Ringling, Montana

Prepared for:

MONTANA DEPARTMENT OF TRANSPORTATION
2701 Prospect Avenue
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 - 0216

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LAND & WATER

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1.0 INTRODUCTION

In conjunction with its Ringling – North highway reconstruction project, in 2001 the Montana Department of Transportation (MDT) shifted a portion of the South Fork Smith River from its channelized location on the east side of U.S. Highway 89 to its historic channel on the west side of the roadway. It is estimated from aerial photos and topographic maps that approximately 2,700 meters (8,900 feet) of river channel length was eliminated with the relocation of the South Fork to the east side of the highway in 1910 (1998, MDT Hydraulics Report). The MDT, with restoration of the river to its former channel, is anticipating that various lost functions such as floodplain, fisheries and wetland habitat will be restored to previous conditions.

Located in Watershed #7 (Missouri-Sun-Smith) and the MDT Butte District, the approximate 3.2 km (2-mile) stream restoration is located approximately 11 km (7 miles) north of Ringling in Meagher County **(Figure 1)**. The site occurs on private land (Galt Ranch) located west of U.S. Highway 89.

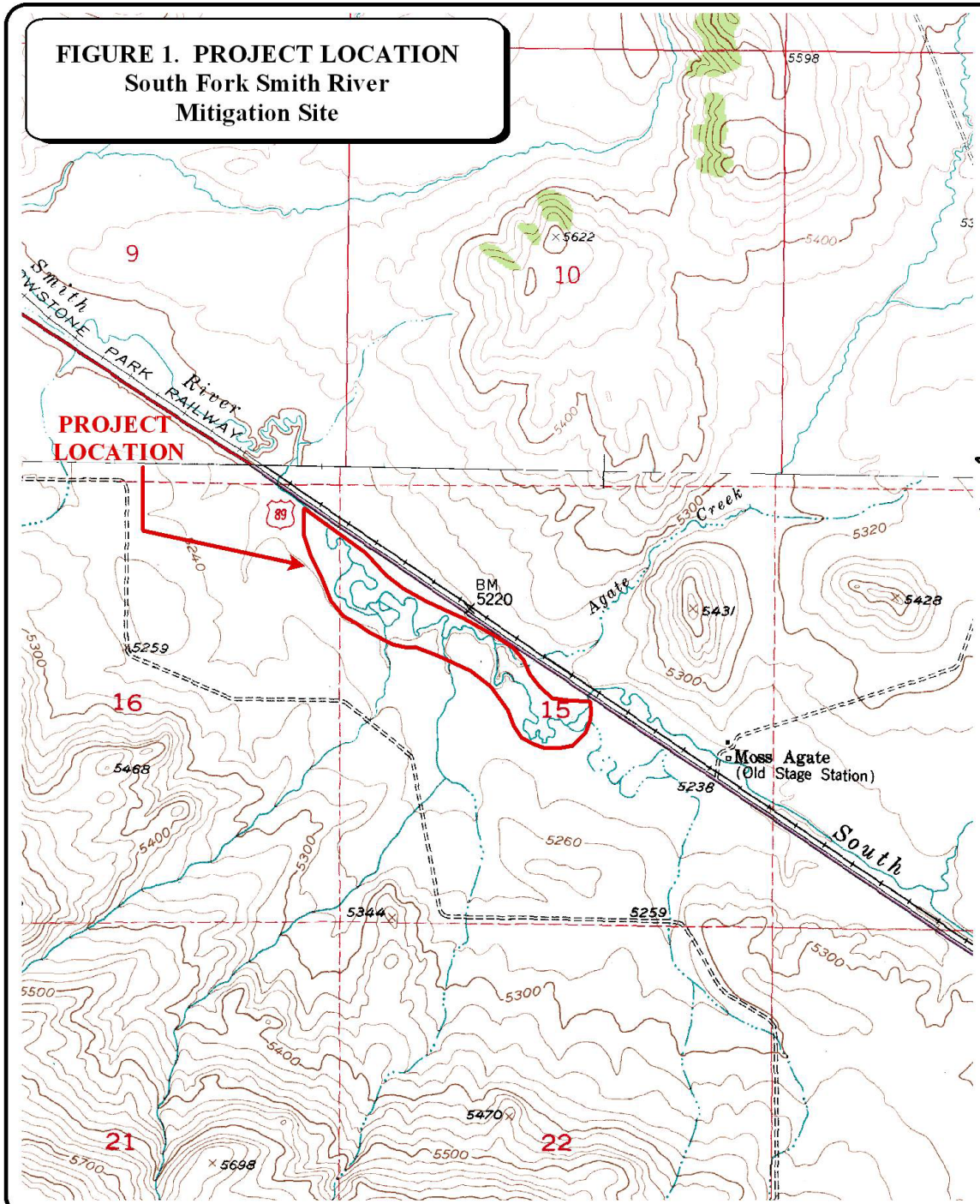
Highway reconstruction was completed during the 2001 field season, and water was returned to the historic channel in early fall 2001. The MDT did not propose or conduct any in-stream or bank construction prior to returning water to the channel, but rather elected to allow the stream to reach its own equilibrium through natural processes over time.

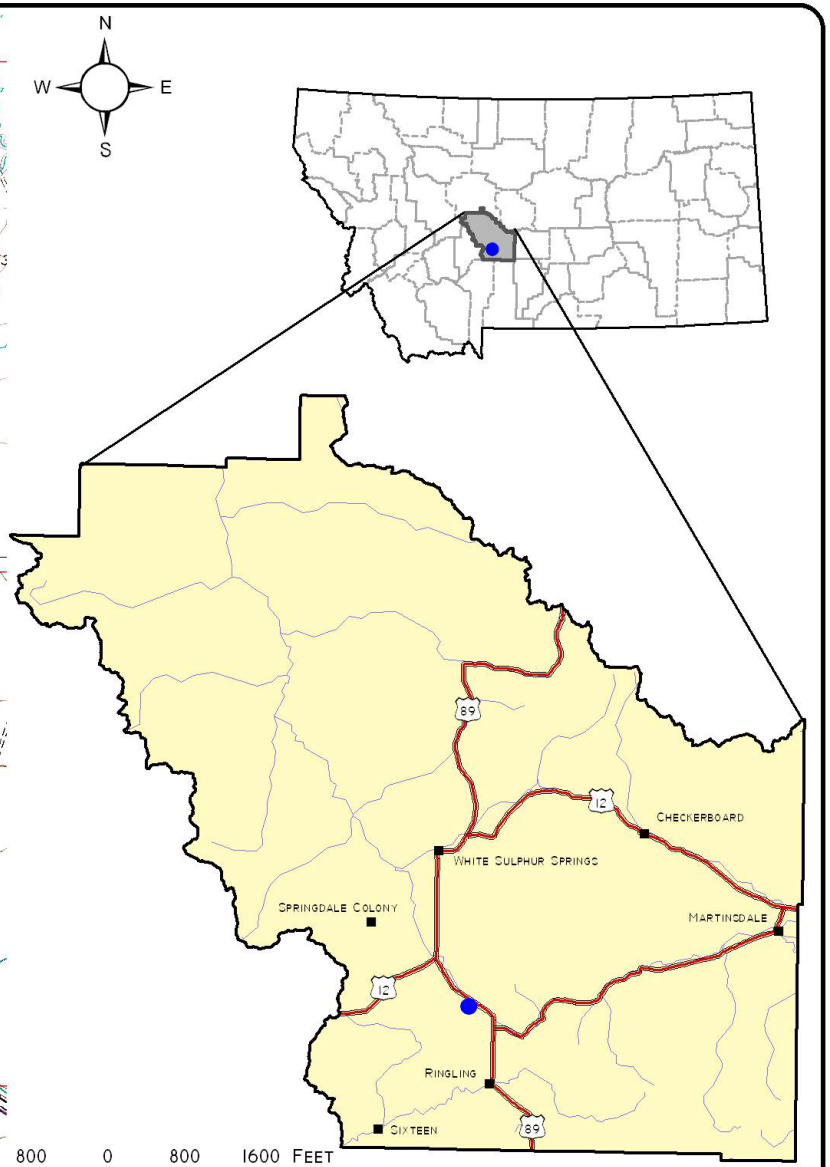
A baseline wetland delineation and functional assessment was completed during the 2001 field season prior to reactivation of the historic channel. MDT not only anticipates the restoration of high quality in-stream fish habitat, but the restoration of moderate to high quality floodplain wetlands as well, which will be monitored through this contract over time. Target wetland communities to be produced at the site include shallow marsh/wet meadow and shrub/scrub. Target wetland functions to be provided at the site include habitat diversity, flood control & storage, general wildlife habitat, fish habitat, sediment filtration, and nutrient cycling.

The historic channel and adjacent habitats have been heavily grazed in recent years, thus limiting the establishment of woody riparian vegetation. MDT anticipates that many woody species would establish with protective fencing and/or planting by MDT forces. At this time, no formal revegetation plan is proposed. Prior to project construction, MDT approached the landowner about enacting a conservation easement along the entire corridor. The landowner originally agreed, in concept, to fencing and placing the area within an easement, but rescinded late in the planning process (Urban pers. comm.).

In May 2000, the U.S. Army Corps of Engineers (COE) suggested in the 404 permit for the Ringling – North project that MDT monitor and quantify the development of wetlands in the areas adjacent to the stream restoration. If a perpetual conservation easement can be obtained, the COE would approve wetlands that develop at these locations as mitigation for construction-related wetland impacts. Monitoring commenced in 2001; this report documents the fourth year of monitoring activities. The monitoring area is illustrated on **Figure 2** (**Appendix A**).

FIGURE 1. PROJECT LOCATION
South Fork Smith River
Mitigation Site





PROJECT #: 130091.016
DATE: MAY 2001
LOCATION:
PROJECT MANAGER: B. DUTTON
DRAWN BY: B. NOECKER

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1120 CEDAR PO BOX 8254 MISSOULA, MT 59807

The 404 permit also requires MDT to provide the COE with an annual inspection report documenting signs of lateral and vertical instability of the river as well as the restoration of aquatic habitat. During the annual monitoring, changes to the channel cross-section, meander patterns, and riparian vegetation are documented. These changes are documented through yearly ground and aerial photo analysis and inspection of bank pins installed during the spring of 2001.

2.0 METHODS

2.1 Monitoring Dates and Activities

The site was visited on July 20, 2005. All information contained on the Wetland Mitigation Site Monitoring Form (**Appendix B**) was collected during this visit. The vegetation transect established in 2003 was revisited for the second time in 2005 (see **Figure 2**). Other activities and information conducted/collected included: photograph points; wetland delineation; wetland/open water aquatic habitat boundary mapping; vegetation community mapping; soils data; hydrology data; bird and general wildlife use; macroinvertebrate sampling; functional assessment; (non-engineering) examination of the stream channel; and examination of the previously installed bank pins.

2.2 Hydrology

Hydrologic indicators were evaluated during the July visit. Wetland hydrology indicators were recorded on COE Routine Wetland Delineation Data Forms (**Appendix B**), using procedures outlined in the COE 1987 Wetland Delineation Manual (Environmental Laboratory 1987). All additional hydrologic data were recorded on the mitigation site monitoring form (**Appendix B**).

Two bank pins established in 2001 were examined for signs of lateral instability of the stream channel. Both pins were placed on outside bends with high probability for erosion due to trampling and overgrazing of the stream bank.

There are no groundwater monitoring wells at the site. If located within 18 inches of the ground surface (soil pit depth for purposes of delineation), groundwater depths were documented on the routine wetland delineation data form.

2.3 Vegetation

General dominant species-based vegetation community types (e.g., *Typha latifolia/Scirpus acutus*) were documented during the mid-season visit, and mapped onto aerial photographs. Standardized community mapping was not employed as many of these systems are geared towards climax vegetation and may not reflect annual changes. Estimated percent cover of the dominant species in each community type was recorded on the site monitoring form (**Appendix B**).

A single 10-foot wide belt transect established at the site in 2003 (no transect sampling occurred in 2002) was revisited in 2005. The purpose of the transect is to evaluate changes over time,

especially the establishment and increase of hydrophytic vegetation. Percent cover was estimated for each vegetative species encountered at each successive vegetation community within the "belt" using the following values: + (<1%); 1 (1-5%); 2 (6-10%); 3 (11-20%); 4 (21-50%); and 5 (>50%).

2.4 Soils

Soils were evaluated according to procedures outlined in the COE 1987 Wetland Delineation Manual. Soil data were recorded on the COE Routine Wetland Delineation Data Form (**Appendix B**). The most current Natural Resources Conservation Service (NRCS) terminology was used to describe hydric soils (USDA 1998). The Meagher County soil survey has not yet been published by the NRCS; however, a draft copy of preliminary mapping completed in 2001 was obtained from the NRCS (NRCS 2001). Map units and associated properties listed in this draft survey were used in describing project area soils.

2.5 Wetland Delineation

A baseline wetland delineation of the mitigation site was conducted during the 2001 mid-season visit according to the 1987 COE of Engineers Wetland Delineation Manual. The delineated boundaries were verified and changes made as necessary during 2005 monitoring. 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 1997).

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 in the wetland boundary were noted in 2005. The wetland/upland boundary in combination with the wetland/open water habitat boundary was used to calculate the wetland area developed within the monitoring area.

2.6 Mammals, Reptiles, and Amphibians

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

2.7 Birds

Bird observations were also recorded during the site visit. No formal census plots, spot mapping, point counts, or strip transects were conducted. Bird observations were recorded incidental to other monitoring activities observations, using the bird survey protocol (**Appendix D**) as a general guideline. Observations were categorized by species, activity code, and general habitat

association (see data forms in **Appendix B**). A comprehensive bird list was compiled using these observations.

2.8 Macroinvertebrates

A single macroinvertebrate sample was collected during the site visit and data recorded on the wetland mitigation monitoring form. Macroinvertebrate sampling procedures are provided in **Appendix E**. The approximate location of this sample point is shown on **Figure 2 (Appendix A)**. Samples were preserved as outlined in the sampling procedure and sent to Rhithron Associates for analysis.

2.9 Functional Assessment

Functional assessment forms were completed for various assessment areas within the monitoring area 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, the upland buffer, the monitored area, transect endpoints, and macroinvertebrate sampling location. Each photograph point location was recorded with a resource grade GPS in 2001. The approximate location of photo points is shown on **Figure 2**, **Appendix A**.

2.11 GPS Data

During the 2001 baseline wetland delineation, a resource grade GPS unit was used to record the wetland/upland boundaries across the monitoring area. Bank pin and photo point locations were also recorded. The GPS unit was used not utilized during the 2005 monitoring effort.

3.0 RESULTS

3.1 Hydrology

The historic channel of the South Fork Smith River was primarily influenced by groundwater prior to reactivation in the fall of 2001. Flowing surface water was present in all reaches of the stream within the analysis area during the 2005 monitoring effort. Water depths varied within the channel depending upon channel geometry. The water tends to be shallow (1”-6”) as it spreads out across widened sections of channel and deeper (6”-36”) in narrow sections of channel and in pools.

Drift lines, on fences adjacent to and across the stream, indicated that the S.F. Smith River received substantial flood flows during the spring of 2003 for the first and only time since the historic channel was re-activated. Similar evidence was not noted during 2004 or 2005

monitoring. Examination of the streambanks and bank pins showed no lateral movement of the banks in these areas. No other signs of instability of the stream channel were noted.

3.2 Vegetation

Vegetation species identified on the site are presented in **Table 1** and on the attached data form. Three wetland community types were identified in the monitoring area. These include Type 1: *Typha latifolia/Carex nebrascensis*, Type 2: *Hordeum jubatum/Iris missouriensis*, and Type 3: *Potamogeton/Myriophyllum*. Dominant species within each of these communities are listed on the attached data form (**Appendix B**). Vegetation Type 4 represents the surrounding upland communities in the analysis area.

Table 1: ***2001 - 2005 South Fork Smith River Mitigation Site vegetation species list.***

Scientific Name	Region 9 (Northwest) Wetland Indicator
Achillea millefolium	FACU
Agropyron smithii	--
Agropyron spicatum	FACU
Agrostis alba	FACW
Arnica amplexicaulis	FACW
Artemisia tridentata	--
Beckmannia syzigachne	OBL
Bouteloua gracilis	--
Carex nebrascensis	OBL
Carex utriculata	OBL
Chrysothamnus viscidiflorus	UPL
Cirsium arvense	FAC-
Cynoglossum officinale	--
Eleocharis palustris	OBL
Glyceria elata	FACW+
Glycyrrhiza lepidota	FAC+
Hippuris vulgaris	OBL
Hordeum jubatum	FAC-
Iris missouriensis	FACW+
Juncus balticus	FACW+
Juncus effusus	FACW
Lemna minor	OBL
Ligusticum sp.	FACW
Lupinus sp.	FACU
Melilotus officinalis	FACU
Myriophyllum spicatum	OBL
Polygonum sp.	OBL
Potamogeton sp.	OBL
Rosa woodsii	FACU
Rumex crispus	FAC+
Salix exigua	OBL
Scirpus acutus	OBL
Solidago canadensis	FACU
Stipa comata	--
Taraxacum officinale	FACU
Typha latifolia	OBL

Type 1 occurs commonly along the channel bottom throughout the site and is the dominant community within the project area. This community has changed somewhat since the original delineation because of the hydrologic alteration that occurred when the stream was returned to the channel. Some areas have transitioned to open water (i.e. the thalweg of the channel), while some Type 1 communities have transitioned to Type 3. Type 2 occurs along the banks of the historic channel and extends onto the floodplain in some locations. Type 3 consists of aquatic bed communities, which occur within the channel, especially towards the western end of the analysis area, which has a larger surface water component and thus more aquatic bed communities.

Adjacent upland communities (Type 4) are comprised of rangeland habitats. Common species include big sagebrush *(Artemesia tridentata)*, bluebunch wheatgrass *(Agropyron spicatum)*, western wheatgrass *(Agropyron smithii)*, blue gramma *(Bouteloua gracilis)*, needle-and-thread grass *(Stipa comata)*, lupine *(Lupinus sp.)*, common yarrow *(Achillea millefolium)*, licorice *(Glycyrrhiza lepidota)*, iris, and hound's-tongue *(Cynoglossum officinale)*.

As previously mentioned, a vegetation transect was established during the 2003 monitoring season (See **Figure 2** for transect location). The transect was sampled in 2004 and again in 2005 with no changes noted. Wetland vegetation Types 1 and 2 are both represented in the transect along with upland habitat. Vegetation transect results are detailed in the attached data form, and are summarized in the transect map (**Chart 1**). Grazing was light along the stream in 2005 for the third consecutive year.

Table 2: ***Vegetation transect data summary.***

Monitoring Year	2003	2004	2005
Transect Length (feet)	400	400	400
# Vegetation Community Transitions along Transect	4	4	4
# Vegetation Communities along Transect	3	3	3
# Hydrophytic Vegetation Communities along Transect	2	2	2
Total Vegetative Species	20	20	20
Total Hydrophytic Species	8	8	8
Total Upland Species	12	12	12
Estimated % Total Vegetative Cover	95	95	95
% Transect Length Comprised of Hydrophytic Vegetation Communities	34	34	34
% Transect Length Comprised of Upland Vegetation Communities	66	66	66
% Transect Length Comprised of Unvegetated Open Water	0	0	0

Chart 1: ***Transect maps showing vegetation types from start of transect (0 feet) to end of transect (400 feet) for each year monitored.***

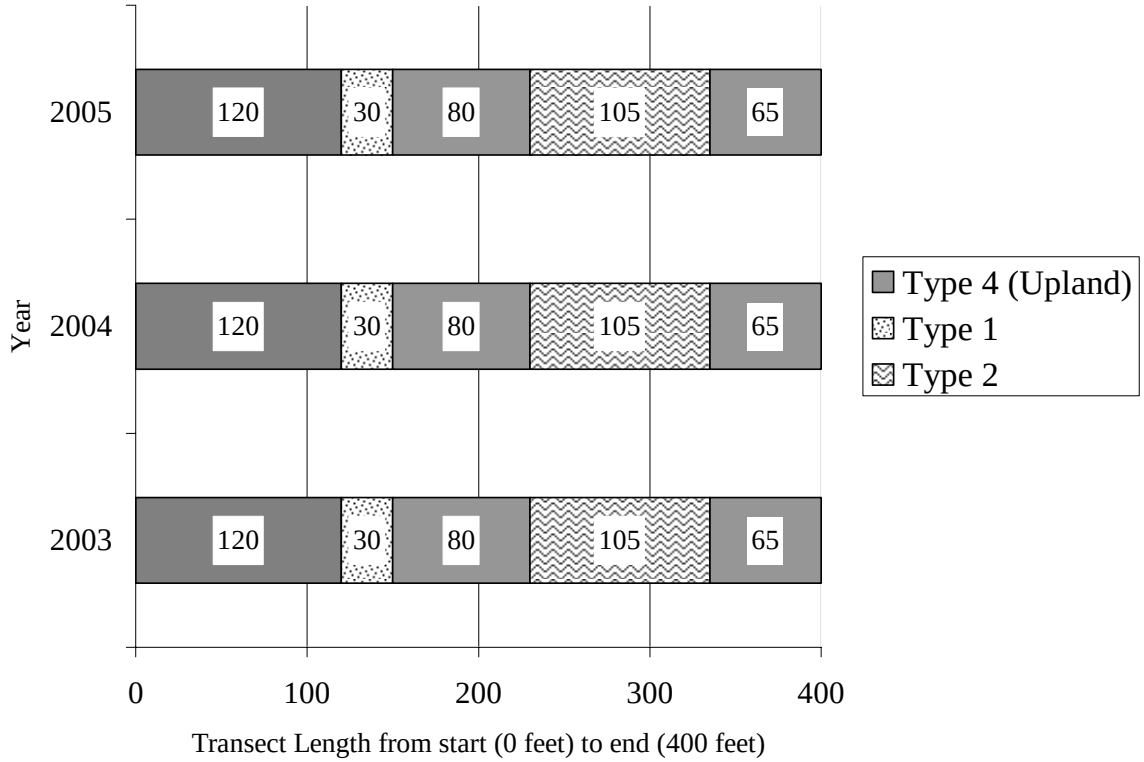
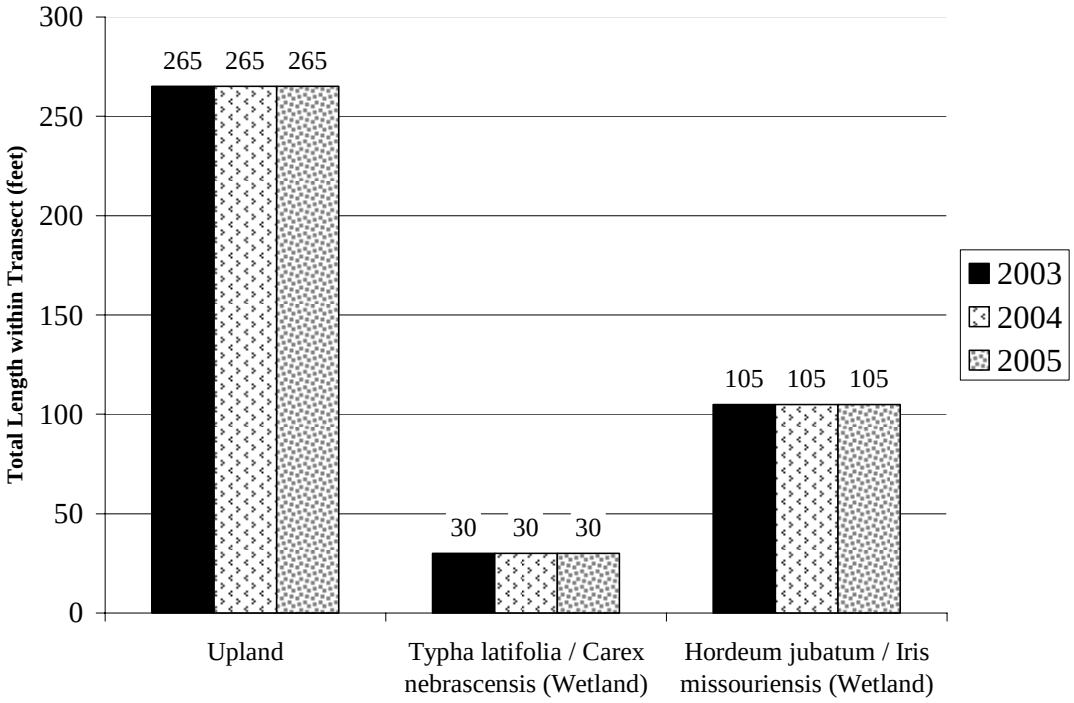


Chart 2: ***Length of vegetation communities within transect for each year monitored.***



3.3 Soils

According to the draft Meagher County soil survey (NRCS 2001), soils at the site are comprised of clay loam Fluvaquentic Haplaquolls. This hydric soil has a permanent high water table and a very slow infiltration rate. This soil type is mapped along the current and historic channel of the South Fork Smith River.

Soils examined within or adjacent to the historic channel closely resemble the description provided in the soil survey referenced above. Soils near the surface are a dark loam, with clay/loam from 6-18". Wetland soils were inundated or saturated within 12 inches of the ground surface during the July 2005 monitoring.

3.4 Wetland Delineation

Delineated wetland boundaries are illustrated on **Figure 3** (**Appendix A**). The completed wetland delineation form is included in **Appendix B**. Soils, vegetation, and hydrology are discussed in preceding sections. Minor wetland expansion was noted in 2005. Delineation results show that there are 8.76 acres of wetland and 0.57 acres of open water, thereby, providing a total of 9.30 acres of aquatic habitat. The wetland boundaries may continue to expand over time and will be documented in future monitoring efforts.

3.5 Wildlife

Wildlife species, or evidence of wildlife, observed on the site during 2005 monitoring effort are listed in **Table 3**. Specific evidence observed, as well as activity codes pertaining to birds, are provided on the completed monitoring form in **Appendix B**. Ground squirrels (*Spermophilus richardsonii*) are prevalent in the monitoring area, while elk (*Cervus elaphus*) and mule deer (*Odocoileus hemionus*) use the area on a seasonal basis. One common garter snake (*Thamnophis sirtalis*) and a mule deer (*Odocoileus hemionus*) doe were observed within the analysis area.

Fish (primarily brook trout) returned to the analysis area with the return of the creek back into its historic channel. At least 100 small trout were utilizing deep pool habitat at the highway box culvert on the east and west ends of the analysis area, and several small schools of fish were seen at various locations within the creek.

3.6 Macroinvertebrates

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

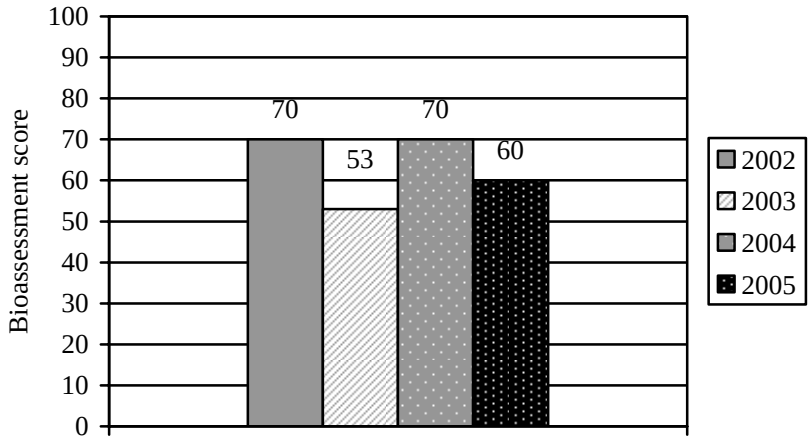
Bioassessment scores fell between 2004 and 2005 at the South Fork Smith River site. There was a moderate decrease in taxa richness and fewer POET taxa in the latter year. The biotic index value increased, suggesting a diminishment of water quality. The dominant taxon was the amphipod Hyalella sp., and tolerant snails were also common. Aquatic habitats appear to have consisted mainly of the water column, a few macrophytes, and a small amount of filamentous algae. Sub-optimal conditions are indicated.

Table 3: ***Fish and wildlife species observed on the South Fork Smith River Mitigation Site from 2001-2005.***

FISH	
Brook Trout (*Salvelinus fontinalis*)	
AMPHIBIANS	
Spotted Frog (*Rana pretiosa*)	
REPTILES	
Common Garter Snake (*Thamnophis sirtalis*)	
BIRDS	
American Wigeon (*Anas americana*)	**Mallard (*Anas platyrhynchos*)**
Blue-winged Teal (*Anas discors*)	Red-tailed Hawk (*Buteo jamaicensis)*
Cinnamon Teal (*Anas cyanoptera*)	**Red-winged Blackbird (*Agelaius phoeniceus*)**
Cliff Swallow (*Petrochelidon pyrrhonota*)	Sharp-shinned Hawk (*Accipiter striatus*)
Common Snipe (*Gallinago gallinago*)	Sora (*Porzana Carolina*)
Green-winged Teal (*Anas crecca*)	**Western Meadowlark (*Sturnella neglecta*)**
Killdeer (*Charadrius vociferous*)	
MAMMALS	
Mule Deer (*Odocoileus hemionus*)	
Elk (*Cervus elaphus*) (scat only)	
Richardson's Ground Squirrel (*Spermophilus richardsonii*)	
American Badger (*Taxidea taxus*)	
Pronghorn Antelope (*Antelocapra Americana*)	

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

Chart 3: ***Bioassessment scores at the South Fork Smith River Mitigation Site.***



3.7 Functional Assessment

A completed functional assessment form is presented in **Appendix B**. Functional assessment results are summarized in **Table 4**. The wetland habitat associated with the South Fork Smith River rated as a Category III (moderate value), primarily due to high ratings for surface water storage, food chain support and groundwater discharge. All other ratings were low or moderate. Actual functional points increased slightly over the baseline (see **Table 3**), as perennial flow was reintroduced to the site as well as a fisheries resource.

Table 4: ***Summary of 2001 and 2005 wetland function/value ratings and functional points*** [1] ***at the South Fork Smith River Mitigation Project.***

Function and Value Parameters From the 1999 MDT Montana Wetland Assessment Method	Wetland Site	
	Historic Channel S.F. Smith River - 2001	Reactivated Channel S.F. Smith River - 2005
Listed/Proposed T&E Species Habitat	Low (0.3)	Low (0.3)
MNHP Species Habitat	Low (0.1)	Low (0.1)
General Wildlife Habitat	Low (0.3)	Mod (0.5)
General Fish/Aquatic Habitat	Low (0.1)	Mod (0.4)
Flood Attenuation	Mod (0.4)	Mod (0.4)
Short and Long Term Surface Water Storage	High (0.9)	High (1.0)
Sediment, Nutrient, Toxicant Removal	Mod (0.4)	Mod (0.4)
Sediment/Shoreline Stabilization	Low (0.2)	Mod (0.7)
Production Export/Food Chain Support	High (0.8)	High (0.9)
Groundwater Discharge/Recharge	High (1.0)	High (1.0)
Uniqueness	low (0.3)	low (0.2)
Recreation/Education Potential	Low (0.1)	Low (0.1)
Actual Points/Possible Points	4.9 / 12	6.0/ 12
% of Possible Score Achieved	41%	50%
Overall Category	III	III
Total Acreage of Assessed Wetlands and Other Aquatic Habitats within Site Boundaries (ac)	**8.9**	**9.3**
Functional Units (acreage x actual points) (fu)	**43.61**	**55.80**

[1] See completed MDT functional assessment forms in Appendix B for further detail.

3.8 Photographs

Representative photographs taken from photo-points are provided in **Appendix C**. A 2005 aerial photograph is also provided in **Appendix C**.

3.9 Maintenance Needs/Recommendations

At this time, cattle grazing within the South Fork Smith River channel, it banks, and the surrounding uplands is limiting the extent to which restoration can occur on the site. Fencing of the stream corridor would allow for the re-establishment of woody vegetation along the creek, help protect stream banks from trampling, and improve the overall health of the system. Function and value ratings would also increase substantially, thus generating considerably more functional units from the site.

3.10 Current Credit Summary

Prior to reactivation of the historic channel through the project area, wetland habitat was groundwater fed, with 8.32 acres of wetland habitat and 0.57 acre of open water occurring on-site. Wetland expansion was noted in 2005 in several locations as a result of normal or above normal precipitation in the project area, resulting in a net gain of 0.44 acre across the site. Additionally, minor shifts in vegetation community types are occurring, as emergent habitat transitions to aquatic bed within the channel. Additional wetland expansion seems probable over time, but will be limited by the deeply incised S.F. Smith River channel. A full delineation of the site using resource grade GPS may be useful in future monitoring efforts to detect minor wetland expansion that may be too subtle to detect otherwise.

4.0 REFERENCES

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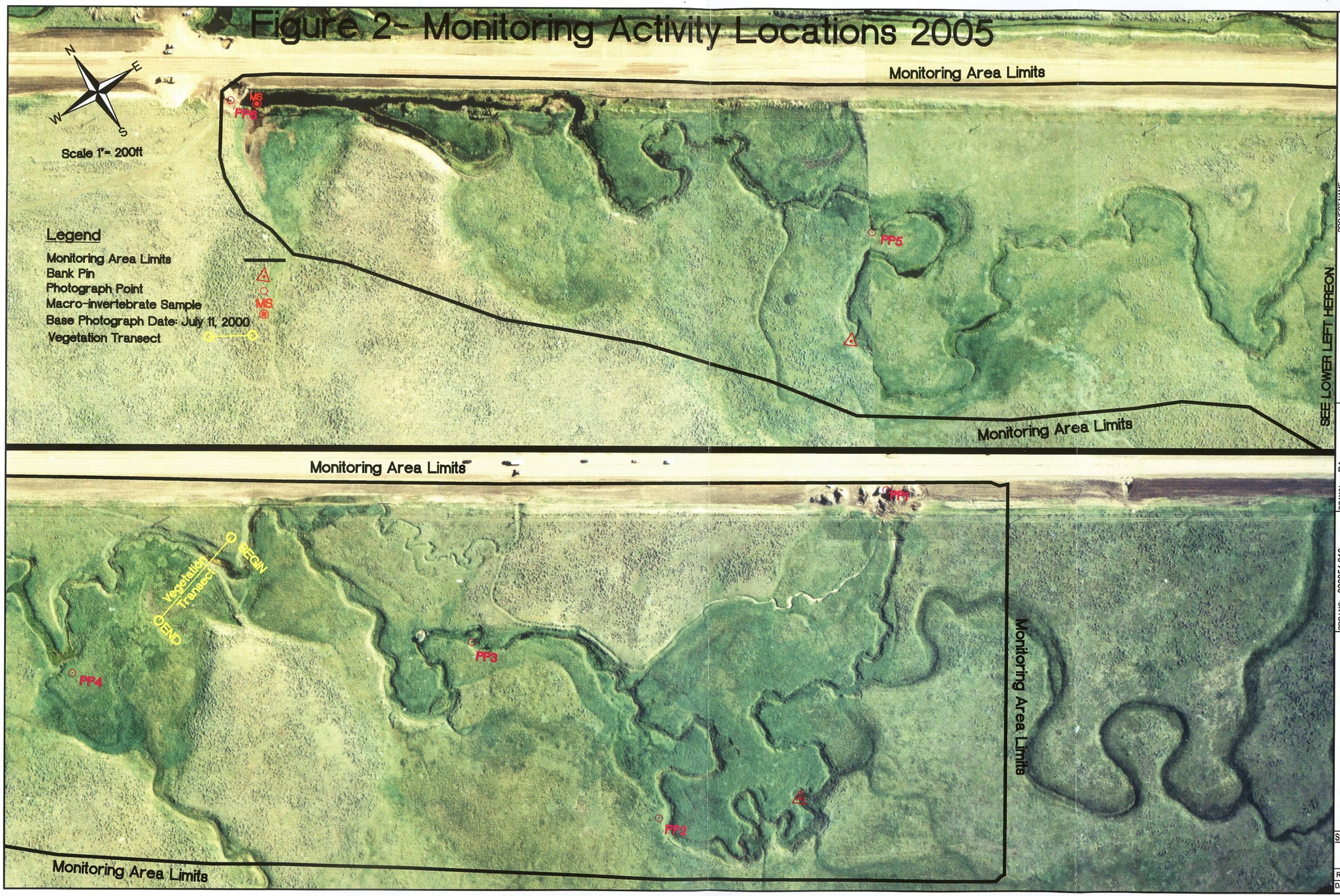
Appendix A

FIGURES 2 & 3

MDT Wetland Mitigation Monitoring
South Fork Smith River
Ringling, Montana

Figure 2- Monitoring Activity Locations 2005



PROJECT NAME: MDT South Fork Smith River Wetland Mitigation

DRAWING TITLE: Monitoring Activity Locations 2005

PROJ NO: 330054.216	DRAWN: RA
FILE NAME: TASK16BASE.dwg	CHECKED:
SCALE: 1"= 200ft	APPVD: BD
LOCATION: South Fork Smith River	PROJ MGR: BD

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P.O. BOX 8254
Missoula, MT 59807

SHEET NUMBER 2 OF

REV -

DATE: 11-10-05

Figure 3- Mapped Site Features 2005

Scale 1"= 200ft

Legend

- Monitoring Area Limits
- Wetland Boundary
- Open Water Boundary
- Vegetation Community Boundary

Base Photograph Date: July 11, 2000

Wetland Area:

Gross Wetland Area	= 9.33 Acres
Open Water Area	= 0.574 Acres
Net Wetland Area	= 8.756 Acres

Vegetation Community Types:

① Carex nebraskensis/ Typha latifolia/Scirpus acutus

② Iris/ Agrostis /Hordeum

Surrounding upland Community includes:
Sagebrush/Lupine/Wheatgrass

Monitoring Area Limits

SEE LOWER LEFT HEREON

Monitoring Area Limits

Monitoring Area Limits

SEE UPPER RIGHT HEREON

Monitoring Area Limits

Monitoring Area Limits

Scale 1"= 200ft

PROJECT NAME
MDT South Fork Smith River Wetland Mitigation

DRAWING TITLE
Mapped Site Features

PROJ NO: B43054.00 0216	DRAWN: RAA
LOCATION: S. Fork Smith River	PROJ MGR: J.Berglund
SCALE: 1"=200ft	CHECKED: MT APP'VD: JB
FILE NAME:L:\B43054.216SF-Smith\dwg\B43054SF-Smith2005.dwg	

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FIGURE
3 OF

REV -
Nov/17/2005

Appendix B

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

MDT Wetland Mitigation Monitoring
South Fork Smith River
Ringling, Montana

LWC / MDT WETLAND MITIGATION SITE MONITORING FORM

Project Name: **SF Smith River** Project Number: **B43054.00.0216** Assessment Date: **7/20/05**
Location: **7 miles N of Ringling** MDT District: **Butte** Milepost: _____
Legal description: T**7N** R**7E** Section **15** Time of Day: **1430-1730**
Weather Conditions: **Partly cloudy approx. 90 degrees** Person(s) conducting the assessment: **Traxler**
Initial Evaluation Date: **5 / 29 / 01** Visit #: **1** Monitoring Year: **2005 (year 5)**
Size of evaluation area: **15+ acres** Land use surrounding wetland: **Agriculture, grazing, highway**

HYDROLOGY

Surface Water Source: **South Fork Smith River**
Inundation**:** Present **X** Absent____ Average depths: **0.5 ft** Range of depths: **0 - 3** ft
Assessment area under inundation: **60%**
Depth at emergent vegetation-open water boundary: **0.5 ft**
If assessment area is not inundated are the soils saturated w/in 12" of surface**:** Yes **X** No_____
Other evidence of hydrology on site (drift lines, erosion, stained vegetation etc.):

Groundwater
Monitoring wells: Present_____ Absent **X**
Record depth of water below ground surface

Well #	Depth	Well #	Depth	Well #	Depth

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

COMMENTS/PROBLEMS: Flow from the South Fork Smith River was turned into the assessment area between the 2001 baseline assessment and the 2002 monitoring effort. During the 2003 monitoring, evidence of spring flooding was noted within the analysis area as substantial debris was hung up on fencing over the river. The stream did not appear to experience spring flooding in 2004 or 2005. There was no evidence of bank erosion. All vegetated banks and instream vegetation was moderately grazed in 2003, 2004, and 2005 as apposed to heavy grazing in previous years.

VEGETATION COMMUNITIES

Community No.: **_1_** Community Title (main species): **TYP LAT / CAR NEB / SCI ACU**_____

Dominant Species	% Cover	Dominant Species	% Cover
TYP LAT	11-20		
SCI ACU	11-20		
CAR NEB	21-50		

COMMENTS/PROBLEMS:

_____

_____

_____

Community No.: **__2_** Community Title (main species): **_IRI MIS / AGR ALB / HOR JUB _____**

Dominant Species	% Cover	Dominant Species	% Cover
IRI MIS	6-10		
AGR ALB	21-50		
HOR JUB	21-50		

COMMENTS/PROBLEMS:__ _____

_____

_____

_____

Community No.: **_3__** Community Title (main species): **_*Potamogeton/Myriophyllum* _____**

Dominant Species	% Cover	Dominant Species	% Cover
Potamogeton sp.	21-50		
MYRSPI	11-20		
HIPVUL	21-50		

COMMENTS/PROBLEMS:

–

_____

_____

_____

Additional Activities Checklist:

_X__ Record and map vegetative communities on air photo

VEGETATION COMMUNITIES

Community No.: **4** Community Title (main species): **Upland**

Dominant Species	% Cover	Dominant Species	% Cover
ART TRI	21-50		
LUP ARB	11-20		
AGR SPI	21-50		
AGR SMI	21-50		

COMMENTS/PROBLEMS:

Community No.: ___ Community Title (main species): _____

Dominant Species	% Cover	Dominant Species	% Cover

COMMENTS/PROBLEMS:

Community No.: ___ Community Title (main species): _____

Dominant Species	% Cover	Dominant Species	% Cover

COMMENTS/PROBLEMS:

–

Additional Activities Checklist:

X Record and map vegetative communities on air photo

COMPREHENSIVE VEGETATION LIST

Species	Vegetation Community Number(s)	Species	Vegetation Community Number(s)
Achillea millefolium	4		
Agropyron smithii	4		
Agropyron spicatum	4		
Agrostis alba	2		
Arnica amplexicaulus	1		
Artemisia tridentata	4		
Beckmannia syzigachne	1		
Bouteloua gracilis	4		
Carex nebrascensis	1		
Carex utriculata	1		
Chrysothamnus viscidiflorus	4		
Cirsium arvense	4		
Cynoglossum officinale	4		
Eleocharis palustris	1,2		
Glyceria elata	1,2		
Glycyrrhiza lepidota	4		
Hippuris vulgaris	1,3		
Hordeum jubatum	2		
Iris missouriensis	2		
Juncus balticus	1,2		
Juncus effusus	1		
Lemna minor	1,2		
Ligusticum sp.	4		
Lupinus sp.	4		
Melilotus officinalis	4		
Myriophyllum spicatum	3		
Polygonum sp.	1,2		
Potamogeton sp.	1		
Rosa woodsii	4		
Rumex crispus	1,2		
Salix exigua	1		
Scirpus acutus	1		
Solidago canadensis	4		
Stipa comata	4		
Taraxacum officinale	4		
Typha latifolia	1		

COMMENTS/PROBLEMS: **<u>Bolded species are new in 2005</u>**

PLANTED WOODY VEGETATION SURVIVAL

Species	Percent Survival	Mortality Causes
NA		

COMMENTS/PROBLEMS: NA

WILDLIFE

BIRDS

(Attach Bird Survey Field Forms)

Were man made nesting structures installed? Yes ___ No__x__Type: _____ How many? _____ Are the nesting structures being utilized? Yes ___ No ___ Do the nesting structures need repairs? Yes __ No___

MAMMALS AND HERPTILES

Species	Number Observed	Indirect indication of use			
		Tracks	Scat	Burrows	Other
Mule deer	1	yes	yes		
Antelope	0		yes		
Elk	0	yes	yes		
Badger	0			yes	
Richardson's ground squirrel	>50	yes		yes	
Common garter snake	1				

Additional Activities Checklist:

__X__Macroinvertebrate sampling (if required)

COMMENTS/PROBLEMS:

PHOTOGRAPHS

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

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

Location	Photo Frame #	Photograph Description	Compass Reading
A		See photo sheets	
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 unit was not utilized during the 2005 monitoring.

WETLAND DELINEATION

(Attach Corps of Engineers delineation forms)

At each site conduct the items on the checklist below:
__X__ Delineate wetlands according to the 1987 Army Corps manual.
__X__ Delineate wetland-upland boundary on the air photo
__NA__ Survey wetland-upland boundary with a resource grade GPS survey

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

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.**

MAINTENANCE

Were man-made nesting structures installed at this site? YES __ NO__**X**__
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 ___ NO__**X**__
If yes, are the structures working properly and in good working order? YES ___ NO___
If no, describe the problems below.

COMMENTS/PROBLEMS: .

MDT WETLAND MONITORING – VEGETATION TRANSECT

Site: S.F. Smith River Date: 7/20/05 Examiner: MT Transect # 1

Approx. transect length: 400 feet Compass Direction from Start (Upland): 260 degrees west

Vegetation type A:	Type 4 - Upland	
Length of transect in this type:	120	feet
Species:		Cover:
SOLCAN		1
Lupine (sp.)		2
ACHMIL		1
ARTTRI		2
AGRSPI		2
AGRSMI		2
MELOFF		1
CHRVIS		1
TAROFF		1
ROSWOO		+
CIRARV		+
Total Vegetative Cover:		85%

Vegetation type B:	Type 1 (Includes stream channel)	
Length of transect in this type:	30	feet
Species:		Cover:
AGRALB		3
JUNEFF		2
CARNEB		2
CARROS		2
Total Vegetative Cover:		70%

Vegetation type C:	Type 4 - Upland	
Length of transect in this type:	80	feet
Species:		Cover:
SOLCAN		1
IRIMIS		3
ACHMIL		1
AGRSPI		2
AGRSMI		2
TAROFF		1
CIRARV		1
MELOFF		1
Total Vegetative Cover:		80%

Vegetation type D:	Type 2	
Length of transect in this type:	105	feet
Species:		Cover:
IRIMIS		3
HORJUB		3
CARROS		1
AGRALB		1
CIRARV		+
RUMCRI		+
Total Vegetative Cover:		75%

MDT WETLAND MONITORING – VEGETATION TRANSECT

Site: S.F. Smith River Date: 7/20/05 Examiner: MT Transect # 1

Approx. transect length: 400 feet Compass Direction from Start (Upland): 260 degrees west

Vegetation type E:	Type 4 - Upland
Length of transect in this type:	65 feet

Species:	Cover:
SOLCAN	1
IRIMIS	3
ACHMIL	1
AGRSPI	2
AGRSMI	2
TAROFF	1
CIRARV	+
MELOFF	+
JUNBAL	1
Total Vegetative Cover:	80%

Vegetation type F:	
Length of transect in this type:	feet

Species:	Cover:
Total Vegetative Cover:	

Vegetation type G:	
Length of transect in this type:	feet

Species:	Cover:
Total Vegetative Cover:	

Vegetation type H:	
Length of transect in this type:	feet

Species:	Cover:
Total Vegetative Cover:	

MDT WETLAND MONITORING – VEGETATION TRANSECT (back of form)

Cover Estimate		**Indicator Class:**	**Source:**
+ = <1%	3 = 11-20%	+ = Obligate	P = Planted
1 = 1-5%	4 = 21-50%	- = Facultative/Wet	V = Volunteer
2 = 6-10%	5 = >50%	0 = Facultative	

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

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

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

Notes:

No changes within the vegetation transect were noted in 2005

BIRD SURVEY – FIELD DATA SHEET

Page **1** of **1**
Date: 7/20/05
Survey Time: 1430

SITE: South Fork Smith River

Bird Species	#	Behavior	Habitat	Bird Species	#	Behavior	Habitat
Blue-winged Teal	8	L, N	OW				
Cliff Swallow	3	F	OW				
Common Snipe	2	F	MA				
Mallard	7	L, N	OW				
Red-winged Blackbird	3	L	MA				
Western Meadowlark	1	F	UP				

Notes: Conditions: Partly Cloudy with strong wind, approximately 90 degrees.
Many fish at box culverts on both ends.
Cattle grazing of channel light in 2005.
Hen Mallard with 6 young
Blue-winged Teal with 7 young

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

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

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

Project / Site: **S.F. Smith River Mitigation Site**	Date: **July 20, 2005**
Applicant / Owner: **MDT**	County: **Meagher**
Investigator: **PBSJ - Traxler**	State: **Montana**

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

VEGETATION (USFWS Region 9: Northwest)

Dominant Species	Stratum	Indicator	Dominant Species	Stratum	Indicator
1. *Typha latifolia*	Herb	OBL	11.		
2. *Scirpus acutus*	Herb	OBL	12.		
3. *Carex nebrascensis*	Herb	OBL	13.		
4. *Mentha arvensis*	Herb	FAC	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-): **4 / 4 = 100%**			FAC Neutral: **3 / 3 = 100%**		
Remarks: **Plot is adjacent to SF Smith River channel**					

HYDROLOGY

No Recorded Data (Describe in Remarks): **N/A** Stream, Lake, or Tide Gauge **N/A** Aerial Photographs **N/A** Other **No** No Recorded Data	Wetland Hydrology Indicators Primary Indicators: **NO** Inundated **YES** Saturated in Upper 12 Inches **NO** Water Marks **YES** Drift Lines **YES** Sediment Deposits **YES** Drainage Patterns in Wetland
Field Observations: Depth of Surface Water **N/A** ____ (in.) Depth to Free Water in Pit **= 5** (in.) Depth to Saturated Soil **= 0** (in.)	Secondary Indicators (2 or more required): **NO** Oxidized Root Channels in Upper 12 inches **NO** Water-Stained Leaves **NO** Local Soil Survey Data **YES** FAC-Neutral Test **NO** Other (Explain in Remarks)
Remarks:	

SOILS

Map Unit Name (Series and Phase): **Fluvaquentic Haploquolls**
Map Symbol: **501B** Drainage Class: _____ 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.
18	A/B	10 YR 2/1	10 YR 5/6 /	Few Faint	Clay Loam
		/ 	/ /	N/A N/A	
		/ 	/ /	N/A N/A	
		/ 	/ /	N/A N/A	
		/ 	/ /	N/A N/A	

Hydric Soil Indicators:

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

Remarks:

WETLAND DETERMINATION

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

Remarks:

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

1. Project Name: S. F. Smith River Wetland Mitigation **2. Project #:** B43054.00.0216 **Control #:** _____

3. Evaluation Date: 7/20/2005 **4. Evaluator(s):** PBS&J/Traxler **5. Wetland / Site #(s):** _____

6. Wetland Location(s) i. T: 7 N **R:** 7 E **S:** 15 **T:** __ N **R:** __ E **S:** _____

ii. Approx. Stationing / Mileposts: _____

iii. Watershed: 7 - Missouri / Sun / Smith **GPS Reference No. (if applies):** _____

Other Location Information: _____

7. A. Evaluating Agency MDT

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

B. Purpose of Evaluation:
- ☐ Wetlands potentially affected by MDT project
- ☐ Mitigation wetlands; pre-construction
- ☒ Mitigation wetlands; post-construction
- ☐ Other

9. Assessment Area (total acres): 10+ (visually estimated)
_____ (measured, e.g. GPS)

Comments: _____

10. CLASSIFICATION OF WETLAND AND AQUATIC HABITATS IN AA

HGM CLASS [1]	SYSTEM [2]	SUBSYSTEM [2]	CLASS [2]	WATER REGIME [2]	MODIFIER [2]	% OF AA
Riverine	Riverine	None	Aquatic Bed	Permanently Flooded	---	20
Riverine	Palustrine	---	Emergent Wetland	Semipermanently Flooded	---	60
---	---	---	---	---	---	
---	---	---	---	---	---	

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

Comments: _____

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

12. GENERAL CONDITION OF AA

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

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

Comments: (types of disturbance, intensity, season, etc.) grazing, highway

ii. Prominent weedy, alien, & introduced species: _____

iii. Briefly describe AA and surrounding land use / habitat: AA includes reactivated channel of S. F. Smith River and adjacent wetland and upland habitat.

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

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

Comments: _____

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

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

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

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

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

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

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

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

Primary or Critical habitat **(list species)**	☐ D	☐ S	_____
Secondary habitat **(list species)**	☐ D	☐ S	_____
Incidental habitat **(list species)**	☐ D	☒ S	_____
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)	☐ **High**								☒ **Moderate**								☐ **Low**			
Class Cover Distribution (all vegetated classes)	☐ **Even**				☐ **Uneven**				☐ **Even**				☒ **Uneven**				☐ **Even**			
Duration of Surface Water in ≥ 10% of AA	**P/P**	**S/I**	**T/E**	**A**	**P/P**	**S/I**	**T/E**	**A**	**P/P**	**S/I**	**T/E**	**A**	**P/P**	**S/I**	**T/E**	**A**	**P/P**	**S/I**	**T/E**	**A**
Low disturbance at AA (see 12)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Moderate disturbance at AA (see 12)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
High disturbance at AA (see 12)	--	--	--	--	--	--	--	--	--	--	--	--	M	--	--	--	--	--	--	--

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

Evidence of Wildlife Use from 14C(i)	**Wildlife Habitat Features Rating** from 14C(ii)			
	☐ **Exceptional**	☐ **High**	☒ **Moderate**	☐ **Low**
Substantial	--	--	--	--
Moderate	--	--	.5 (M)	--
Low	--	--	--	--

Comments: waterfowl, amphibians, small mammals and big game.

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

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

iii. Rating: Use the conclusions from 14D(i) and 14D(ii) above and the matrix below to 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)			
	☐ **Exceptional**	☐ **High**	☐ **Moderate**	☒ **Low**
Native game fish	--	--	--	--
Introduced game fish	--	--	--	.4 (M)
Non-game fish	--	--	--	--
No fish	--	--	--	--

Comments: Brook Trout

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

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

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

Comments: _____

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.			
% cover of wetland vegetation in AA	☐ **≥ 70%**		☐ **< 70%**		☒ **≥ 70%**		☐ **< 70%**	
Evidence of flooding or ponding in AA	☐ **Yes**	☐ **No**	☐ **Yes**	☐ **No**	☒ **Yes**	☐ **No**	☐ **Yes**	☐ **No**
AA contains **no or restricted outlet**	--	--	--	--	--	--	--	--
AA contains **unrestricted outlet**	--	--	--	--	.4 (M)	--	--	--

Comments: highway, livestock.

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**		
	☒**Permanent / Perennial**	☐**Seasonal / Intermittent**	☐**Temporary / Ephemeral**
≥ 65 %	--	--	--
35-64 %	.7 (M)	--	--
< 35 %	--	--	--

Comments: No shrub communities due to grazing, moderate trampling in some areas.

14I. PRODUCTION EXPORT / FOOD CHAIN SUPPORT

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

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

Comments: _____

14J. GROUNDWATER DISCHARGE / RECHARGE (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.**		
Estimated Relative Abundance from 11	☐rare	☐common	☐abundant	☐rare	☐common	☐abundant	☐rare	☒common	☐abundant
Low disturbance at AA (12i)	--	--	--	--	--	--	--	--	--
Moderate disturbance at AA (12i)	--	--	--	--	--	--	--	--	--
High disturbance at AA (12i)	--	--	--	--	--	--	--	.2L	--

Comments: _____

14L. RECREATION / EDUCATION POTENTIAL

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

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

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

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

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

Ownership	**Disturbance at AA from 12(i)**		
	☐ Low	☐ Moderate	☒ High
Public ownership	--	--	--
Private ownership	--	--	.1(L)

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	low	0.30	1	
B. MT Natural Heritage Program Species Habitat	low	0.10	1	
C. General Wildlife Habitat	moderate	0.50	1	
D. General Fish/Aquatic Habitat	moderate	0.40	1	
E. Flood Attenuation	moderate	0.40	1	
F. Short and Long Term Surface Water Storage	high	1.00	1	
G. Sediment/Nutrient/Toxicant Removal	moderate	0.40	1	
H. Sediment/Shoreline Stabilization	moderate	0.70	1	
I. Production Export/Food Chain Support	high	0.90	1	
J. Groundwater Discharge/Recharge	high	1.00	1	
K. Uniqueness	low	0.20	1	
L. Recreation/Education Potential	low	0.10	1	
	Total:	**6.00**	**12.00**	_____
		Percent of Total Possible Points:	**50%** (Actual / Possible) x 100 [rd to nearest whole #]	

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

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

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

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

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

☐ **I** ☐ **II** ☒ **III** ☐ **IV**

Appendix C

REPRESENTATIVE PHOTOGRAPHS
2005 AERIAL PHOTOGRAPH

MDT Wetland Mitigation Monitoring
South Fork Smith River
Ringling, Montana

Photo Point 1: 180 degrees South
Looking downstream from inlet culvert under highway.

Photo Point 2: 110 degrees East
Typical channel profile with cattle path along top of bank.

Photo Point 2: 10 degrees North

Photo Point 3: 100 degrees East

Photo Point 3: 280 degrees West
Lone mature willow along channel.

Photo Point 4: 340 degrees NW
Shallow/widened channel with standing water

2005 SF Smith River Photographs - Sheet 1

Photo Point 4: 200 degrees SW
Heavily grazed/hummocky historic meander.

Photo Point 5: 80 degrees East
Narrow, deeper, more natural channel with some gravel

Photo Point 5: 215 degrees SW

Photo Point 6: 170 degrees South
Dry backwater area

Photo Point 6: 90 degrees East
Stream channel parallel to highway at west end of analysis area.

Photo Point 6: 15 degrees North
Culvert under highway where creek leaves the analysis area.

2005 SF Smith River Photographs - Sheet 2

	
Vegetation Transect: Start	Vegetation Transect: End
	
Streambank with bank pin. Bank is well vegetated and experiencing no erosion or migration.	Streambank with bank pin. Cattle trail remains, but bank is mostly stable and not migrating.

2005 SF Smith River Photographs - Sheet 3

South Fork Smith River 2005 Aerial Photograph

Appendix D

BIRD SURVEY PROTOCOL
GPS PROTOCOL

MDT Wetland Mitigation Monitoring
South Fork Smith River
Ringling, 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

MACROINVERTEBRATE SAMPLING PROTOCOL AND DATA

MDT Wetland Mitigation Monitoring
South Fork Smith River
Ringling, Montana

AQUATIC INVERTEBRATE SAMPLING PROTOCOL

Equipment List

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

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

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

Site Selection

Select the sampling site with these considerations in mind:

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

Sampling

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

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

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

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

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

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

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

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

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

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

Photograph the sampled site.

Sample Handling/Shipping

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

MDT Mitigated Wetland Monitoring Project

Aquatic Invertebrate Monitoring
Summary 2001 - 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^{th} percentile (for those metrics that decrease in value in response to stress) or below the 25^{th} 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^{th} percentile for decreasing scores (or above the 25^{th} 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. 1	Musgrave – Rest. 1	Musgrave – Rest. 1
Musgrave – Rest. 2	Musgrave – Rest. 2	Musgrave – Rest. 2	Musgrave – Rest. 2	Musgrave – Rest. 2
Musgrave – Enh. 1	Musgrave – Enh. 1	Musgrave – Enh. 1	Musgrave – Enh. 1	Musgrave – Enh. 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, %Orthocladiinae of Chironomidae, %Crustacea + %Mollusca, and %Amphipoda) measure the relative contributions of certain taxonomic groups that may have significant responses to habitat and/or water quality impacts. For example, amphipods have been demonstrated to increase in abundance in alkaline conditions. Short-lived, relatively mobile taxa such as chironomids dominate ephemeral environments; many are hemoglobin-bearers capable of tolerating de-oxygenated conditions.

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

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

Metric scoring criteria were re-examined each year as new data was added. For 2005, all 151 records were utilized. Ranges of individual metrics, as well as median metric values remained remarkably consistent over all 5 years of analysis. Since metric value distributions changed insignificantly with the addition of the 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.

Metric	Metric calculation	Expected response to degradation or impairment
Total taxa	Count of unique taxa identified to lowest recommended taxonomic level	Decrease
POET	Count of unique Plecoptera, Trichoptera, Ephemeroptera, and Odonata taxa identified to lowest recommended taxonomic level	Decrease
Chironomidae taxa	Count of unique midge taxa identified to lowest recommended taxonomic level	Decrease
Crustacea taxa + Mollusca taxa	Count of unique Crustacea taxa and Mollusca taxa identified to lowest recommended taxonomic level	Decrease
% Chironomidae	Percent abundance of midges in the subsample	Increase
Orthocladiinae/Chironomidae	Number of individual midges in the sub-family Orthocladiinae / total number of midges in the subsample.	Decrease
%Amphipoda	Percent abundance of amphipods in the subsample	Increase
%Crustacea + %Mollusca	Percent abundance of crustaceans in the subsample plus percent abundance of molluscs in the subsample	Increase
HBI	Relative abundance of each taxon multiplied 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%
Orthocladiinae/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
Orthocladiinae/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
Total score	**38**	**32**	**28**	**34**	**48**	**44**	**26**	**30**
Percent of maximum score	**0.633333**	**0.533333**	**0.466667**	**0.566667**	**0.8**	**0.733333**	**0.433333**	**0.5**
Impairment classification	**sub-optimal**	**poor**	**poor**	**sub-optimal**	**optimal**	**optimal**	**poor**	**poor**

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

	RIDGEWAY	MUSGRAVE REST. 1	MUSGRAVE REST. 2	MUSGRAVE ENH. 1	HOSKINS LANDING	PETERSON RANCH 1	PETERSON RANCH 2	PETERSON RANCH 4	PETERSON RANCH 5
Total taxa	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%
Orthocladiinae/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%
Total taxa	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
Orthocladiinae/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
Total score	**38**	**42**	**34**	**42**	**50**	**54**	**34**	**48**	**44**
Percent of maximum score	**0.633333**	**0.7**	**0.566667**	**0.7**	**0.833333**	**0.9**	**0.566667**	**0.8**	**0.733333**
Impairment classification	**sub-optimal**	**optimal**	**sub-optimal**	**optimal**	**optimal**	**optimal**	**sub-optimal**	**optimal**	**optimal**

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%
Orthocladiinae/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
Orthocladiinae/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
Total score	**40**	**38**	**36**	**48**	**42**	**48**	**40**	**26**	**38**
Percent of maximum score	**0.666667**	**0.633333**	**0.6**	**0.8**	**0.7**	**0.8**	**0.666667**	**0.433333**	**0.633333**
Impairment classification	**sub-optimal**	**sub-optimal**	**sub-optimal**	**optimal**	**optimal**	**optimal**	**sub-optimal**	**poor**	**sub-optimal**

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

	NOREM	ROCK CREEK RANCH	WAGNER MARSH
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%
Orthocladiinae/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
Orthocladiinae/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
Total score	**24**	**40**	**38**
Percent of maximum score	**0.4**	**0.666667**	**0.633333**
Impairment classification	**poor**	**sub-optimal**	**sub-optimal**

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.: MDT05LW001

RAI No.: MDT05LW001 **Sta. Name:** SOUTH FORK SMITH RIVER
Client ID:
Date Coll.: 7/20/2005 **No. Jars:** 1 **STORET ID:**

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Non-Insect							
Cladocera	10	8.33%	Yes	Unknown		8	CF
Ostracoda	12	10.00%	Yes	Unknown		8	CG
Naididae							
Naididae	2	1.67%	Yes	Unknown		8	CG
Physidae							
Physidae	6	5.00%	Yes	Unknown		8	SC
Planorbidae							
Gyraulus sp.	12	10.00%	Yes	Unknown		8	SC
Talitridae							
Hyalella sp.	35	29.17%	Yes	Unknown		8	CG
Odonata							
Coenagrionidae							
Coenagrionidae	1	0.83%	Yes	Larva	Early Instar	7	PR
Libellulidae							
Leucorrhinia sp.	2	1.67%	Yes	Larva		9	PR
Ephemeroptera							
Baetidae							
Baetidae	2	1.67%	No	Larva	Early Instar	4	CG
Callibaetis sp.	9	7.50%	Yes	Larva		9	CG
Heteroptera							
Corixidae							
Sigara sp.	1	0.83%	Yes	Adult		5	PH
Coleoptera							
Hydrophilidae							
Hydrophilidae	1	0.83%	Yes	Larva	Larva	5	PR
Diptera							
Ceratopogonidae							
Ceratopogonidae	1	0.83%	Yes	Pupa	Pupa	6	PR
Chironomidae							
Chironomidae							
Corynoneura sp.	3	2.50%	Yes	Larva		7	CG
Cricotopus (Isocladius) sp.	2	1.67%	Yes	Larva		7	SH
Paramerina sp.	1	0.83%	Yes	Larva		6	PR
Paratanytarsus sp.	13	10.83%	Yes	Larva		6	CG
Pentaneura sp.	5	4.17%	Yes	Larva		6	PR
Pseudochironomus sp.	2	1.67%	Yes	Larva		5	CG
Sample Count	**120**						

Metrics Report

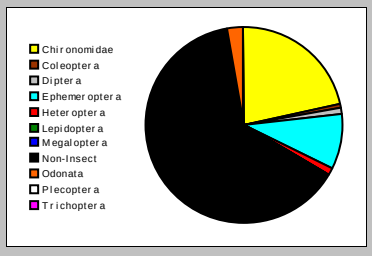
Project ID: MDT05LW
RAI No.: MDT05LW001
Sta. Name: SOUTH FORK SMITH RIVER
Client ID:
STORET ID
Coll. Date: 7/20/2005

Abundance Measures

Sample Count:	120	
Sample Abundance:	7,200.00	1.67% of sample used
Total Abundance:	9,684.00	
Coll. Procedure:		
Sample Notes:		

Taxonomic Composition

Category	R	A	PRA
Non-Insect	6	77	64.17%
Odonata	2	3	2.50%
Ephemeroptera	1	11	9.17%
Plecoptera			
Heteroptera	1	1	0.83%
Megaloptera			
Trichoptera			
Lepidoptera			
Coleoptera	1	1	0.83%
Diptera	1	1	0.83%
Chironomidae	6	26	21.67%

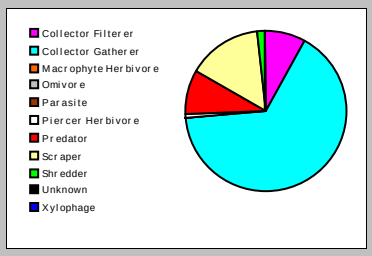


Dominant Taxa

Category	A	PRA
Hyalella	35	29.17%
Paratanytarsus	13	10.83%
Ostracoda	12	10.00%
Gyraulus	12	10.00%
Cladocera	10	8.33%
Callibaetis	9	7.50%
Physidae	6	5.00%
Pentaneura	5	4.17%
Corynoneura	3	2.50%
Pseudochironomus	2	1.67%
Naididae	2	1.67%
Leucorrhinia	2	1.67%
Cricotopus (Isocladius)	2	1.67%
Baetidae	2	1.67%
Ceratopogonidae	1	0.83%

Functional Composition

Category	R	A	PRA
Predator	6	11	9.17%
Parasite			
Collector Gatherer	7	78	65.00%
Collector Filterer	1	10	8.33%
Macrophyte Herbivore			
Piercer Herbivore	1	1	0.83%
Xylophage			
Scraper	2	18	15.00%
Shredder	1	2	1.67%
Omivore			
Unknown			



Metric Values and Scores

Metric	Value	BIBI	MTP	MTV	MTM
Composition					
Taxa Richness	18	1	2		0
Non-Insect Percent	64.17%				
E Richness	1	1		0	
P Richness	0	1		0	
T Richness	0	1		0	
EPT Richness	1		0		0
EPT Percent	9.17%		0		0
Oligochaeta+Hirudinea Percent	1.67%				
Baetidae/Ephemeroptera	1.000				
Hydropsychidae/Trichoptera	0.000				
Dominance					
Dominant Taxon Percent	29.17%		3		2
Dominant Taxa (2) Percent	40.00%				
Dominant Taxa (3) Percent	50.00%	3			
Dominant Taxa (10) Percent	89.17%				
Diversity					
Shannon H (loge)	2.331				
Shannon H (log2)	3.363		3		
Margalef D	3.563				
Simpson D	0.133				
Evenness	0.082				
Function					
Predator Richness	6		3		
Predator Percent	9.17%	1			
Filterer Richness	1				
Filterer Percent	8.33%			2	
Collector Percent	73.33%		2		1
Scraper+Shredder Percent	16.67%		2		0
Scraper/Filterer	1.800				
Scraper/Scraper+Filterer	0.643				
Habit					
Burrower Richness	1				
Burrower Percent	1.67%				
Swimmer Richness	2				
Swimmer Percent	8.33%				
Clinger Richness	1	1			
Clinger Percent	1.67%				
Characteristics					
Cold Stenotherm Richness	0				
Cold Stenotherm Percent	0.00%				
Hemoglobin Bearer Richness	3				
Hemoglobin Bearer Percent	12.50%				
Air Breather Richness	1				
Air Breather Percent	0.83%				
Voltinism					
Univoltine Richness	8				
Semivoltine Richness	1	1			
Multivoltine Percent	49.17%		2		
Tolerance					
Sediment Tolerant Richness	1				
Sediment Tolerant Percent	10.00%				
Sediment Sensitive Richness	0				
Sediment Sensitive Percent	0.00%				
Metals Tolerance Index	2.769				
Pollution Sensitive Richness	0	1		0	
Pollution Tolerant Percent	23.33%	3		1	
Hilsenhoff Biotic Index	7.542		0		0
Intolerant Percent	0.00%				
Supertolerant Percent	73.33%				
CTQa	102.000				

Bioassessment Indices

BioIndex	Description	Score	Pct	Rating
BIBI	B-IBI (Karr et al.)	14	28.00%	
MTP	Montana DEQ Plains (Bukantis 1998)	17	56.67%	Slight
MTV	Montana Revised Valleys/Foothills (Bollman 1998)	3	16.67%	Severe
MTM	Montana DEQ Mountains (Bukantis 1998)	3	14.29%	Severe