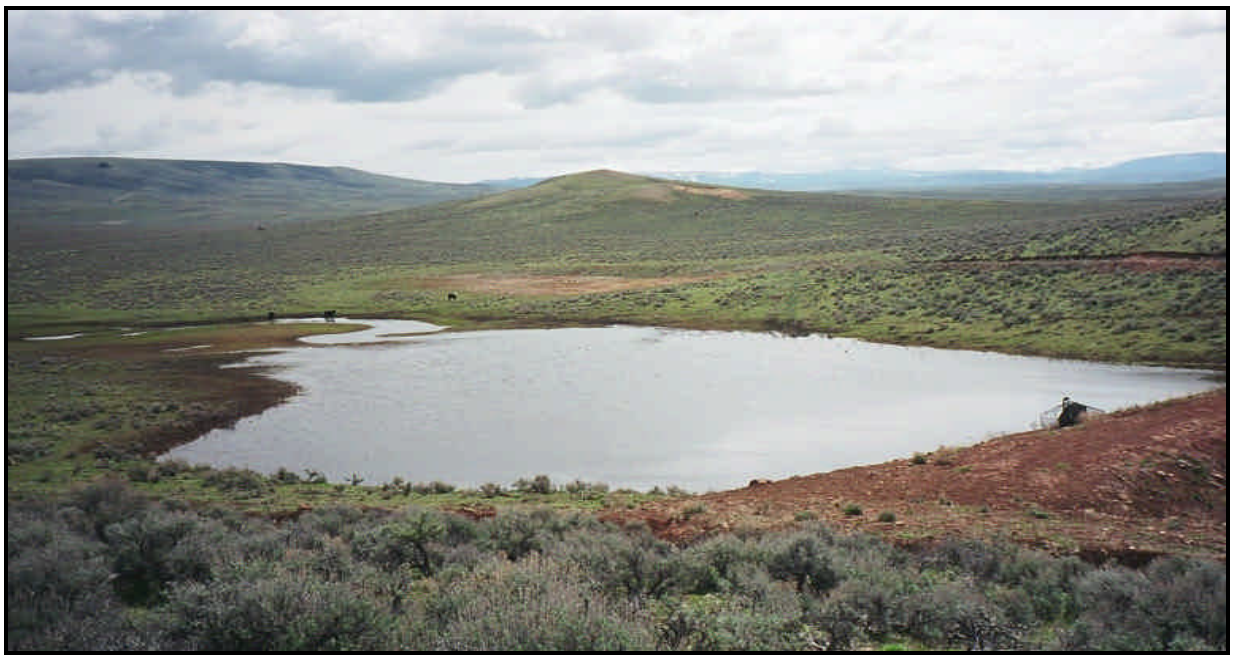
MONTANA DEPARTMENT OF TRANSPORTATION WETLAND MITIGATION MONITORING REPORT: YEAR 2003

Ringling - Galt
Ringling, Montana



Prepared for:
MONTANA DEPARTMENT OF TRANSPORTATION
2701 Prospect Avenue
Helena, MT 59620-1001

Prepared by:
LAND & WATER CONSULTING, INC.
P.O. Box 8254
Missoula, MT 59807

March 2004

Project No: 130091.015

MONTANA DEPARTMENT OF TRANSPORTATION

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LAND & WATER

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1.0 INTRODUCTION

The Ringling/Galt wetland mitigation project was constructed in 2000 to provide partial mitigation for projected wetland impacts resulting from MT Dept. of Transportation's (MDT) Ringling – North highway reconstruction project. Constructed in Watershed #7 (Missouri-Sun-Smith) and the MDT Butte District, the 20-acre mitigation site is located approximately 7 miles north of Ringling in Meagher County **(Figure 1)**. The site occurs on private land (Galt Ranch) located northeast of US Hwy 89, in the Agate Creek drainage.

Design features included minor excavation and placement of a dike across Agate Creek to retain surface water drainage. A primary water control structure was built near the north end of the dike, with an emergency spillway constructed around the north end of the dike. Wetland hydrology is to be primarily provided by surface water from Agate Creek, and supplemented by precipitation. Following construction, the dike and other disturbed areas were seeded with a graminoid seed mix.

No wetland habitat occurred at the site prior to project implementation (Urban pers. comm.). Target wetland communities to be produced at the site included open water/aquatic bed and shallow marsh/wet meadow. Target wetland functions to be provided at the site included habitat diversity, flood control & storage, general wildlife habitat, sediment filtration, and nutrient cycling.

MDT has conducted no formal monitoring; however, MDT personnel have visited the site intermittently. Photographs taken during these visits have not been incorporated into a report format, but are available in the MDT project files. To date, and potentially due to extreme drought conditions, the site has not yet retained enough surface water for a sufficient length of time to begin the establishment of wetland communities. The site was formally monitored in 2001 and 2003, but was not monitored in 2002 due to extreme drought conditions and lack of surface water. This site is presently being monitored twice per year to document wetland and other biological attributes.

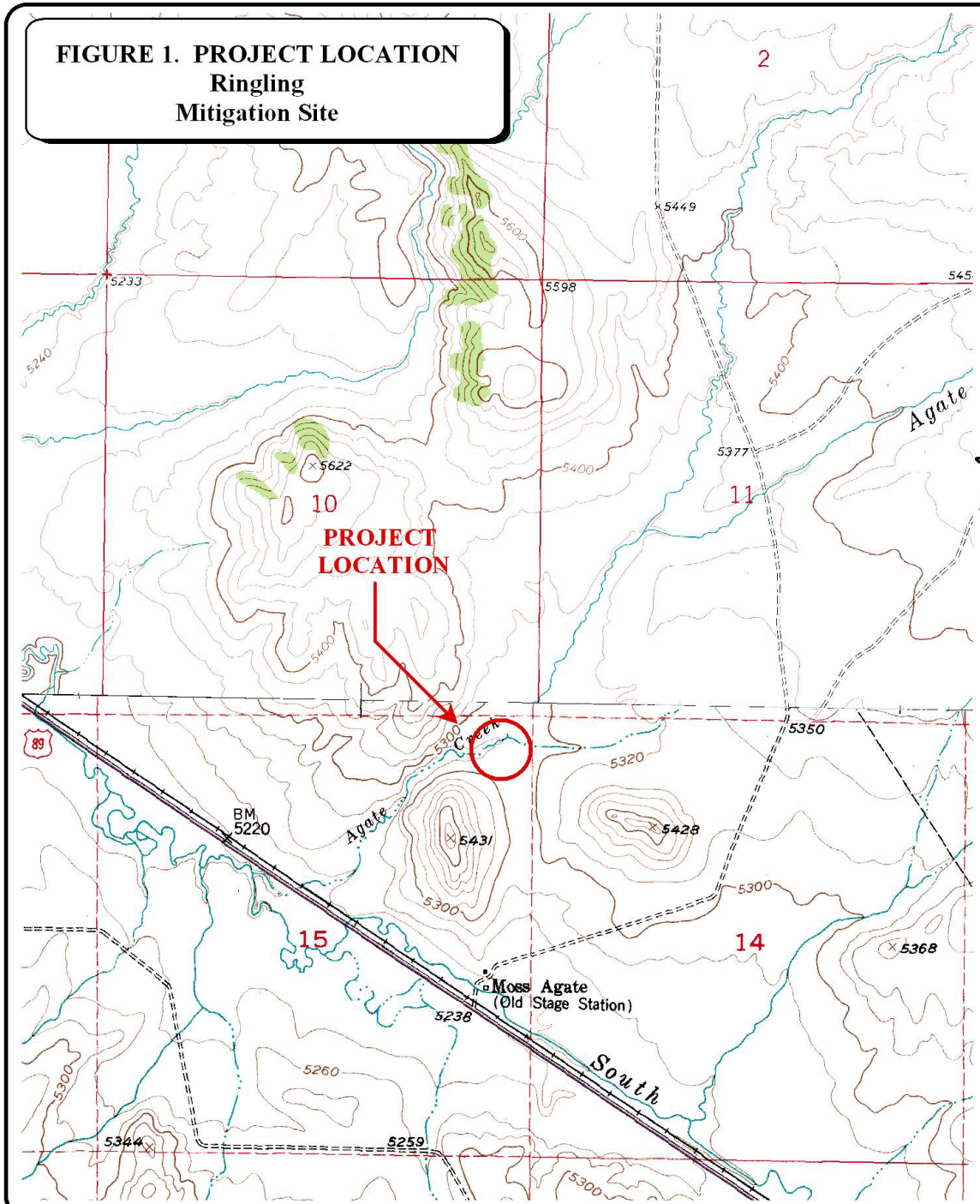
In May 2000, the U.S. Army Corps of Engineers (COE) determined that this site could not be used as permanent mitigation for the Ringling – North project due to the lack of a perpetual conservation easement (COE 2000). Monitoring of the site will proceed, to document the establishment of wetland habitat to be used as mitigation should the landowner agree to a perpetual conservation easement in the future. The monitoring area is illustrated in **Figure 2** (**Appendix A**).

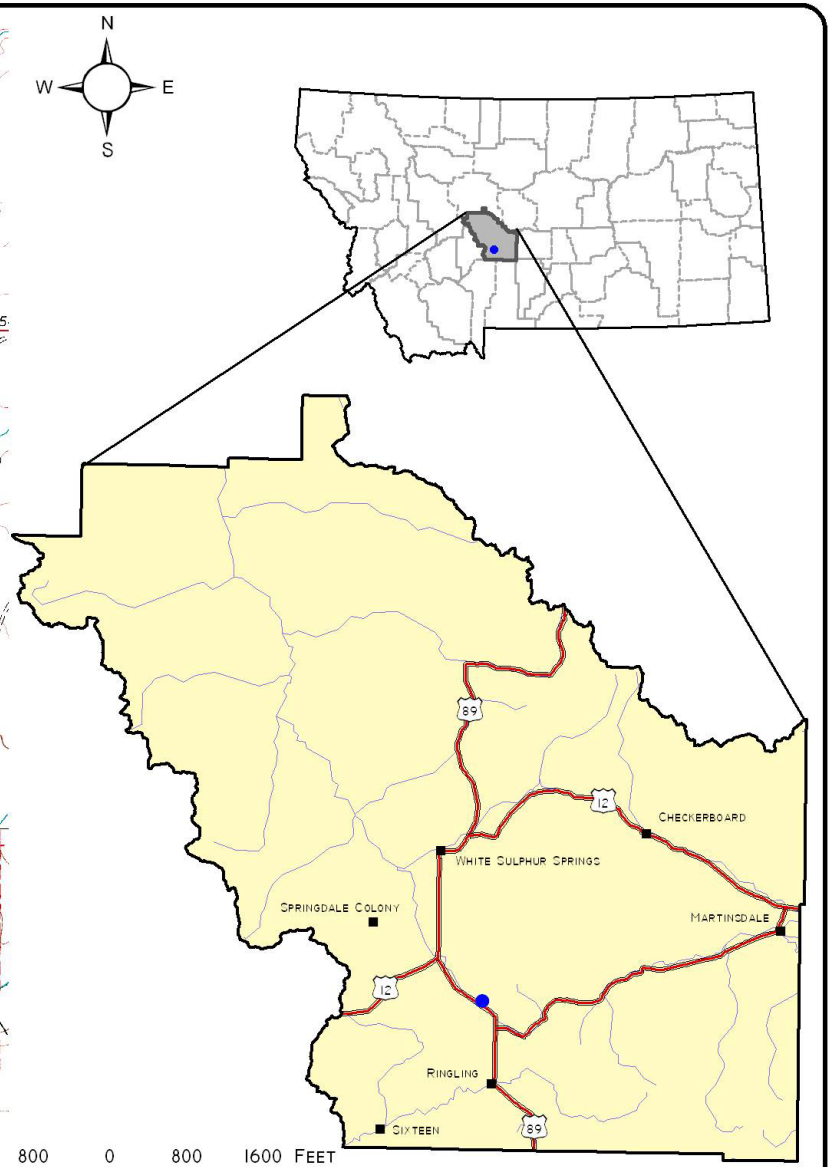
2.0 METHODS

2.1 Monitoring Dates and Activities

The site was visited on May 22 and August 7, 2003. All information contained on the Wetland Mitigation Site Monitoring Form (**Appendix B**) was collected during these two site visits. Activities and information conducted/collected included: vegetation community mapping; vegetation transect; soils data; hydrology data; bird and general wildlife use; photograph points;

FIGURE 1. PROJECT LOCATION
Ringling
Mitigation Site





PROJECT #: 130091.015
DATE: MAY 2001
LOCATION:
PROJECT MANAGER: B. DUTTON
DRAWN BY: B. NOECKER

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and (non-engineering) examination of the dike structure. As no wetland habitat has yet established within the monitoring area, a wetland delineation was not performed. Consequently, a wetland functional assessment was not performed. Enough water was retained at the site in 2003 to allow for a macro-invertebrate sample to be taken for the first time since monitoring began in 2001.

2.2 Hydrology

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

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 were delineated on an aerial photograph during the mid-season visit. Standardized community mapping was not employed as many of these systems are geared towards climax vegetation. Estimated percent cover of the dominant species in each community type was recorded on the site monitoring form (**Appendix B**).

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

No woody species were planted at the site. Consequently, no monitoring relative to the survival of such species was conducted.

2.4 Soils

Soils were evaluated during the mid-season visit 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

Wetland delineation was conducted during the mid-season visit according the 1987 COE Wetland Delineation Manual. The monitoring area was investigated for the presence of wetland hydrology, hydrophytic vegetation and hydric soils. The indicator status of vegetation was derived from the National List of Plant Species that Occur in Wetlands: Northwest Region 9 (Reed 1988). The information was recorded on a COE Routine Wetland Delineation Data Form (**Appendix B**).

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 visits. 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 visits. No formal census plots, spot mapping, point counts, or strip transects were conducted. Bird observations were recorded incidental to other monitoring activity 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

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

2.9 Functional Assessment

A functional assessment, using the 1999 MDT Montana Wetland Assessment Method, was proposed for this site prior to monitoring. Upon conducting the mid-season field survey, it was determined that no wetland habitat had yet established within the monitoring area, and therefore a functional assessment was deemed unnecessary for the 2003 monitoring season.

2.10 Photographs

Photographs were taken in 2003 showing the current land use surrounding the site, the upland buffer, the monitored area, and the vegetation transect. Four photograph points were established and recorded with a resource grade GPS unit in 2001. The approximate locations of these photo points are shown on **Figure 2** (**Appendix A**). All photographs were taken using a 50 mm lens. A description and compass direction for each photograph was recorded on the wetland monitoring form.

2.11 GPS Data

During the 2001 monitoring season, survey points were collected with a resource grade GPS unit at the vegetation transect beginning and ending locations, and at all photograph locations. No new GPS data were collected during the 2003 monitoring year.

2.12 Maintenance Needs

The dike near the north end of the site was examined during the 2003 site visit for obvious signs of breaching, damage, or other problems. This did not constitute an engineering-level structural inspection, but rather a cursory examination. Current or future potential problems were documented.

3.0 RESULTS

3.1 Hydrology

During the May site visit, standing water was documented on the site for the first time since monitoring began in 2001. The dashed line on **Figure 3** in **Appendix A** shows the extent of inundation during the May visit and the solid line represents the small area upstream of the dike that was still wet in August.

Agate Creek is an ephemeral tributary of the South Fork of the Smith River and is dammed by the dike constructed for this project. No other dike structures are known in this drainage upstream of the project area. Agate Creek has a defined low water channel, and narrow floodplain, indicating that during most years, water drains through the project area during spring runoff. However, the absence of wetland vegetation within the drainage prior to dike construction indicates that the length of inundation is insufficient to support wetland vegetation.

Drought conditions are likely responsible for the overall lack of water being retained behind the dike. According to the Western Regional Climate Center, White Sulphur Springs yearly precipitation totals for 2001 (9.62 inches), 2002 (10.9 inches), and 2003 (10.22) were 76, 86, and 81 percent, respectively, of the total annual mean precipitation (12.63 inches) in this area.

Surface water retention in 2003 was encouraging, as it is the first time water has been documented on the site. Continued inundation in 2004 and beyond could result in the establishment of wetland habitat where none has yet developed.

3.2 Vegetation

Vegetation species identified on the site are presented in **Table 1** and on the attached data form. The entire site was comprised of upland vegetation including 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 *(Iris missouriensis)* and hound's tongue *(Cynoglossum officinale)*.

Table 1: ***2001 - 2003 Ringling/Galt Mitigation Site Vegetation Species List***

Species[1]	Region 9 (Northwest) Wetland Indicator
Achillea millefolium	FACU
Agropyron smithii	--
Agropyron spicatum	FACU
Artemisia tridentate	--
Bouteloua gracilis	--
Cirsium arvense	FAC-
Cynoglossum officinale	--
Glycyrrhiza lepidota	FAC+
Hordeum jubatum	FAC-
Iris missouriensis	FACW+
Juncus balticus	**FACW+**
Lupinus sp.	FACU
Solidago canadensis	FACU
Stipa comata	--
Taraxacum officinale	FACU

[1]**Bolded** species indicate those documented within the analysis area for the first time in 2003.

Vegetation transect results are detailed in the attached data form in **Appendix B,** and are summarized in the transect map below.. Sagebrush communities dominate the landscape with the exception of a narrow band along the Agate Creek channel, where sagebrush does not persist. The area is actively grazed by cattle and receives substantial use by ground squirrels, elk and mule deer, thus possibly having an effect on species composition.

Vegetation Transect Map

2001	**Transect Start**	***Type 3 - Upland (100')***	***Type 1 - Upland (100')***	***Type 2 - Upland (180')***	***Type 1 (60')***	Type 3 *Upland (180')*	**Total: 620'**	**Transect End**
2003	**Transect Start**	***Type 3 - Upland (100')***	***Type 1 - Upland (100')***	***Type 2 - Upland (180')***	***Type 1 (60')***	Type 3 *Upland (180')*	**Total: 620'**	**Transect End**

3.3 Soils

According to the draft Meagher County soil survey (NRCS 2001), soils at the site are comprised of Martinsdale-Meagher cobbly loams. These are moderately well drained to well drained soils that range from loams to clays. This soil type is mapped along the Agate Creek drainage and is not listed as a hydric soil despite having hydric components.

Soils examined adjacent to Agate Creek 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". Soils were dry, with no inundation or other hydric indicators in the first 18 inches.

3.4 Wetland Delineation

Prior to project implementation, MDT did not document any wetland habitat in the analysis area. Despite the fact that water was retained on-site in 2003, the site has not had sufficient hydrology to begin wetland development and thus no wetlands were delineated within the monitoring area. Continued inundation in 2004 and beyond may result in wetland establishment behind the dike and will be documented during future monitoring.

3.5 Wildlife

Wildlife species, or evidence of wildlife, observed on the site during 2003 monitoring effort are listed in **Table 2**. 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. Several waterfowl species were documented at the site during the spring visit, as the site was providing pair bonding and mating habitat for various waterfowl. No reptiles or amphibians were observed.

Table 2: ***Fish and Wildlife Species Observed at the Ringling – Galt Mitigation Site 2001 - 2003***

FISH, AMPHIBIANS, REPTILES None
BIRDS **American Kestrel (*Falco sparverius*)** **American Wigeon (*Anas americana*)** **Common Goldeneye (*Bucephala clangula*)** Common Raven (*Corvus corax)* **Green-winged Teal (*Anas crecca*)** **Killdeer (*Charadrius vociferous*)** **Mallard (*Anas platyrhynchos*)** Mourning Dove (*Zenaida macroura*) **Northern Pintail (*Anas acuta*)** **Northern Shoveler (*Anas clypeata*)** **Redhead (*Aythya americana*)** Red-tailed Hawk (*Buteo jamaicensis)* Western Meadowlark (*Sturnella neglecta*) **Wilson's Phalarope (*Phalaropus tricolor*)**
MAMMALS **Mule Deer (*Odocoileus hemionus*) (scat only)** **Elk (*Cervus elaphus*) (scat only)** **Richardson's Ground Squirrel (*Spermophilus richardsonii*)**
Bolded species were documented during the 2003 monitoring. All other species have been documented during one or more of the previous monitoring seasons.

3.6 Macroinvertebrates

Macroinvertebrate sampling was conducted at the small remnant open water area within the channel next to the dike (see **Figure 2**). Macroinvertebrate sampling results are provided in **Appendix E** and were summarized by Rhithron Associates in the italicized sections below (Bollman 2003).

Low taxa richness at this site suggested limited habitats. Hypoxic substrates are indicated by the large number of the hemoglobin-bearing midge Chironomus sp. Nutrient enrichment and elevated water temperatures could explain these findings. A high biotic index value supports this hypothesis. Metric scores suggest that biotic condition at this site was poor.

3.7 Functional Assessment

As no wetland habitat occurs within the monitoring area, a functional assessment form was not completed for this site.

3.8 Photographs

Representative photos taken from photo-points and transect ends are provided in **Appendix C**. A 2003 aerial photograph is also provided in **Appendix C**.

3.9 Maintenance Needs/Recommendations

The dike, water control structure, and emergency spillway were generally in good condition during the mid-season visit. Cattle are using the standpipe near the top of the dike as a scratching post; however, it does not appear as though the pipe has sustained any damage from such use. Ground squirrels are burrowing into the lower part of the dike, especially in the vicinity of the inlet pipe. Disturbance of the dike by ground squirrels could leave the dike vulnerable to erosion during a heavy stormwater or runoff event.

In general, it appears that the water available to the site is insufficient during some years to support the proposed wetland creation. This is likely due to persistent drought conditions in the area. However, according to NRCS personnel familiar with the drainage (Brooker pers. comm.), Agate Creek flows enough water during years of normal or above normal precipitation, to flood the basin behind the dike. Monitoring of the site will continue to document any changes that may occur as a result of increased water delivery to the site through runoff and precipitation.

At this time, no corrective actions are recommended, as lack of wetland development to date has apparently resulted from sub-normal precipitation and runoff.

3.10 Current Credit Summary

As previously stated, in May 2000, the COE determined that this site could not be used as permanent mitigation for the Ringling – North project due to the lack of a perpetual conservation easement. No specific performance criteria were required to be met at this site in order to document its success. To date, the site has yet to create any wetland habitat and therefore no credit, COE approved or otherwise, for wetland creation can be attributed to this project.

4.0 REFERENCES

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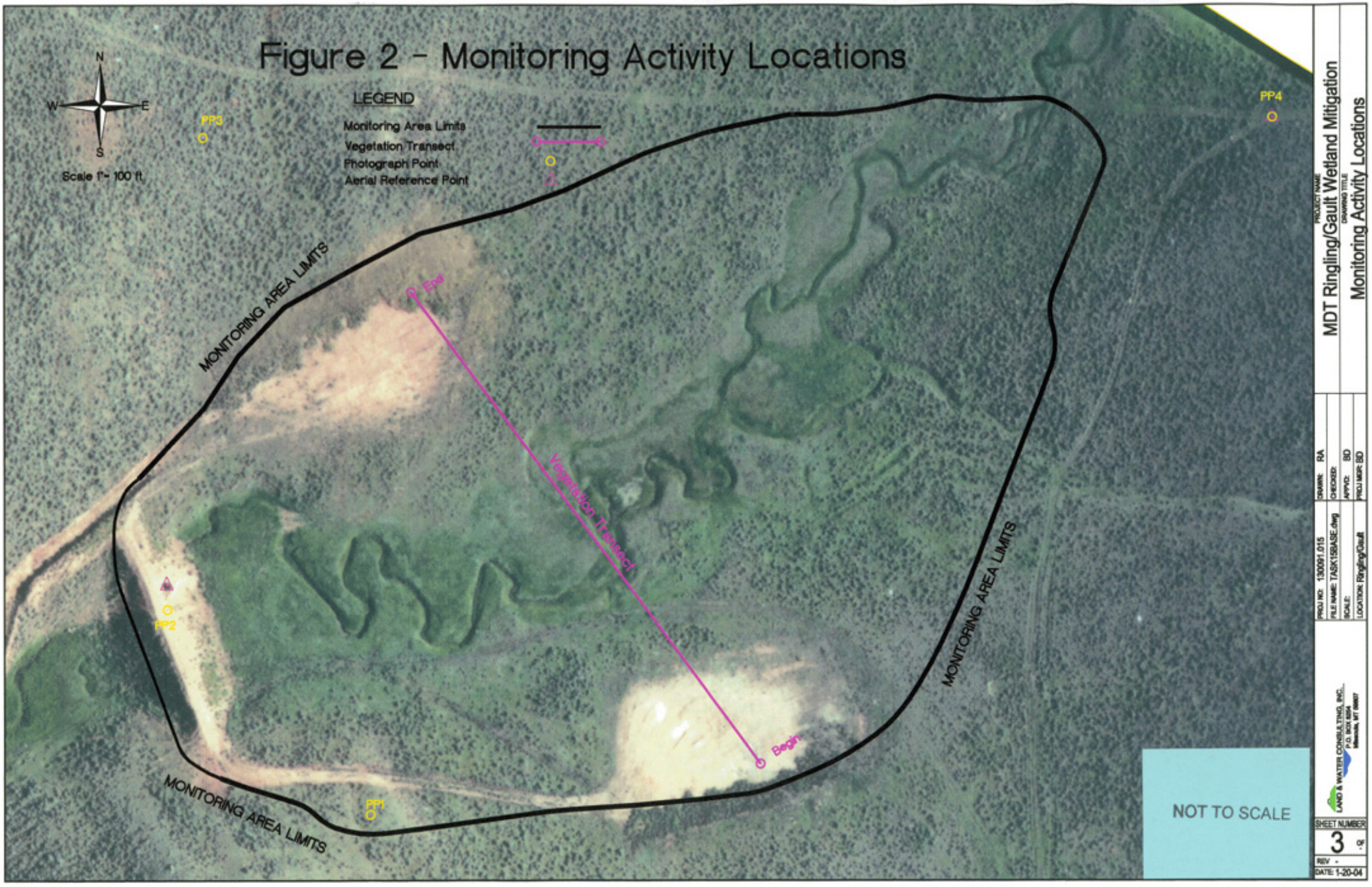
Appendix A

FIGURES 2 & 3

MDT Wetland Mitigation Monitoring
Ringling/Galt
Ringling, Montana

LAND & WATER

Figure 2 - Monitoring Activity Locations



PROJECT NAME
MDT Ringling/Gault Wetland Mitigation
DRAWING TITLE
Monitoring Activity Locations

PROJ NO: 130091.015
FILE NAME: TASK1SBASE.dwg
SCALE:
LOCATION: Ringling/Gault

DRAWN: RA
CHECKED:
APPVD: BD
PROJ MGR: BD

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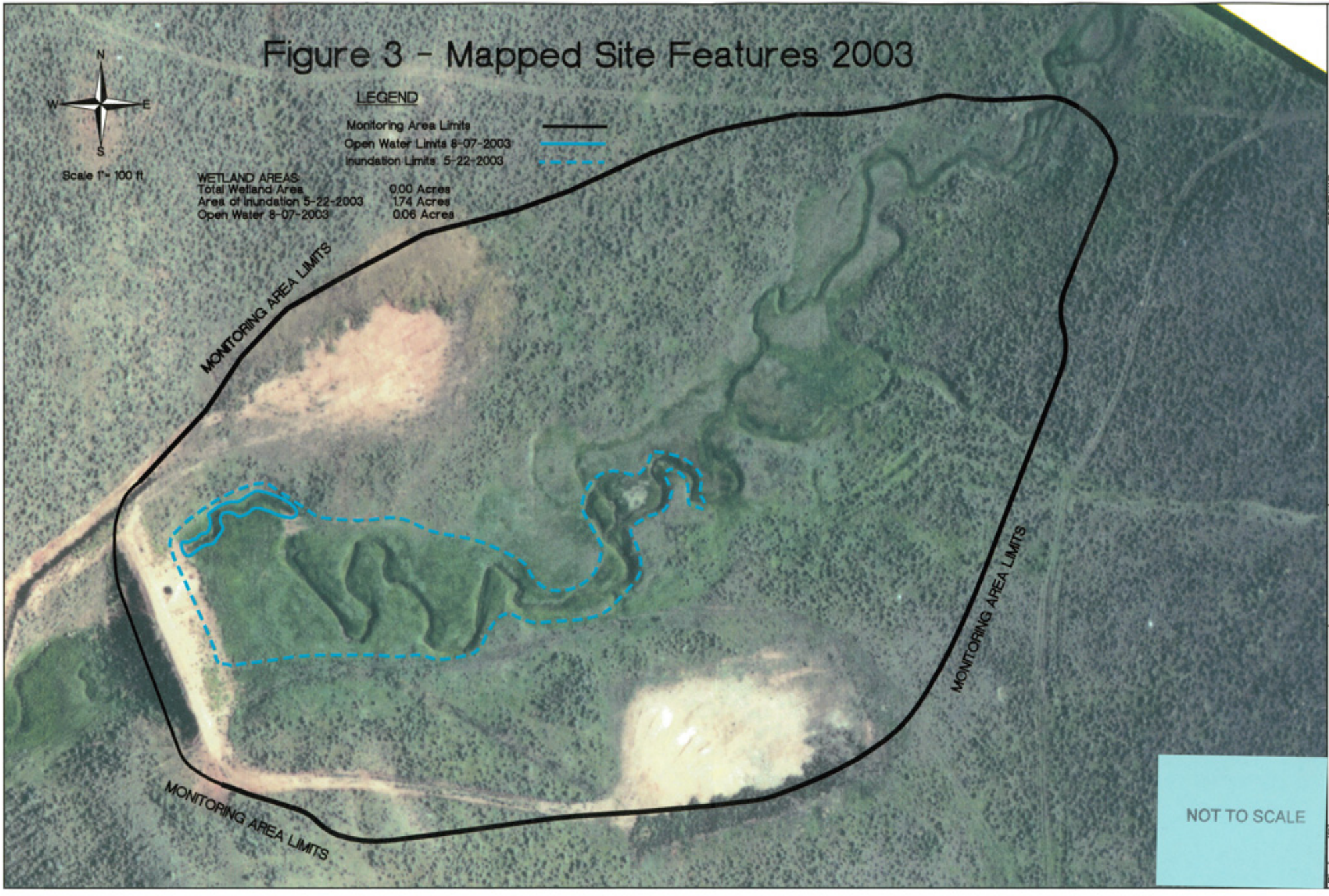
P.O. BOX 8254
Missoula, MT 59807

SHEET NUMBER
3
REV -
DATE: 1-20-04

Figure 3 - Mapped Site Features 2003



PROJECT NAME: MDT Ringling/Gault Wetland Mitigation

DRAWING TITLE: Mapped Site Features 2003

PROJ NO: 130091.015 | DRAWN: RA
FILE NAME: TASK15BASE.dwg | CHECKED:
SCALE: 1"=100ft | APPVD: BD
LOCATION: Ringling/Gault | PROJ MGR: BD

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P.O. BOX 8254
Missoula, MT 59807

SHEET NUMBER: 3

REV: -

DATE: 1-30-04

Appendix B

COMPLETED 2003 WETLAND MITIGATION SITE MONITORING FORM
COMPLETED 2003 BIRD SURVEY FORMS
COMPLETED 2003 WETLAND DELINEATION FORMS

MDT Wetland Mitigation Monitoring
Ringling/Galt
Ringling, Montana

LAND & WATER

LWC / MDT WETLAND MITIGATION SITE MONITORING FORM

Project Name: **Ringling - Galt** Project Number: **130091.015** Assessment Date: **8/7/03**
Location: **7 miles N of Ringling** MDT District: **Butte** Milepost: _____
Legal description: T**7N** R**7E** Section **15** Time of Day: **1000-1300**
Weather Conditions: **Partly cloudy approx. 80 degrees** Person(s) conducting the assessment: **Traxler**
Initial Evaluation Date: **5 / 29 / 01** Visit #: **2** Monitoring Year: **2003 (year 3)**
Size of evaluation area: **10+ acres** Land use surrounding wetland: **Agriculture, grazing,**

HYDROLOGY

Surface Water Source: **Agate Creek**
Inundation**:** Present **X** Absent____ Average depths: **0.5 ft** Range of depths: **0 - 2** ft
Assessment area under inundation: **<5%**
Depth at emergent vegetation-open water boundary: **NA – no emergent vegetation**
If assessment area is not inundated are the soils saturated w/in 12" of surface**:** Yes___No
Other evidence of hydrology on site (drift lines, erosion, stained vegetation etc.):

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: Site had standing water during both the spring and mid-season visits for the first time since project completion.

VEGETATION COMMUNITIES

Community No.: **_1_** Community Title (main species): **ARTTRI_- Upland_____**

Dominant Species	% Cover	Dominant Species	% Cover
ARTTRI	21-50		
AGRSPI	21-50		
AGRSMI	21-50		
Lupinus	11-20		

COMMENTS/PROBLEMS:

Community No.: **__2_** Community Title (main species): **_IRI MIS / HOR JUB - Upland_____**

Dominant Species	% Cover	Dominant Species	% Cover
IRI MIS	21-50		
ACHMIL	21-50		
HOR JUB	21-50		
STICOM	21-50		

COMMENTS/PROBLEMS: Occurs along drainage bottom

Community No.: **_3__** Community Title (main species): **_CYNOFF_____**

Dominant Species	% Cover	Dominant Species	% Cover
CYNOFF	11-20		
SOLCAN	11-20		

COMMENTS/PROBLEMS: Disturbed area where dike material was obtained. Area is less than 50% vegetated.

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	1,2		
Agropyron smithii	1		
Agropyron spicatum	1		
Artemisia tridentata	1		
Bouteloua gracilis	1		
Cirsium arvense	2,3		
Cynoglossum officinale	3		
Glycyrrhiza lepidota	2,3		
Hordeum jubatum	2		
Iris missouriensis	2		
Juncus balticus	2		
Lupinus sp.	1,2,3		
Stipa comata	1,2		
Taraxacum officinale	2		

COMMENTS/PROBLEMS: Bolded Species are new in 2003 .

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	0	yes	yes		
Antelope	3				
Elk	0	yes	yes		
Badger	0			yes	
Richardson's ground squirrel	>50	yes		yes	

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
____ 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 2003 monitoring.

WETLAND DELINEATION

(Attach Corps of Engineers delineation forms)

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

COMMENTS/PROBLEMS: _See attached completed delineation forms. No wetland habitat on-site.

FUNCTIONAL ASSESSMENT

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

COMMENTS/PROBLEMS: __NA_____

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 _**X**__ NO___
If yes, are the structures working properly and in good working order? YES _**X**__ NO___
If no, describe the problems below.

COMMENTS/PROBLEMS: .

MDT WETLAND MONITORING – VEGETATION TRANSECT

Site: Ringling - Galt Date: 8/7/03 Examiner: MT Transect # 1

Approx. transect length: 620 feet Compass Direction from Start (Upland): _____

Vegetation type A:	Type 3 - CYNOFF	
Length of transect in this type:	100	feet
Species:		Cover:
SOLCAN		2
GLYLEP		2
CYNOFF		2
	Total Vegetative Cover:	50%

Vegetation type B:	Type 1 - ARTTRI	
Length of transect in this type:	100	feet
Species:		Cover:
ARTTRI		3
AGRSPI		4
AGRSMI		4
Lupinus sp.		3
	Total Vegetative Cover:	90%

Vegetation type C:	Type 2 – HORJUB/IRIMIS	
Length of transect in this type:	180	feet
Species:		Cover:
HORJUB		2
IRIMIS		3
ACHMIL		3
JUNBAL		3
	Total Vegetative Cover:	90%

Vegetation type D:	Type 1 - ARTTRI	
Length of transect in this type:	60	feet
Species:		Cover:
ARTTRI		3
AGRSPI		4
AGRSMI		4
Lupinus sp.		3
	Total Vegetative Cover:	90%

MDT WETLAND MONITORING – VEGETATION TRANSECT

Site: Ringling - Galt Date: 8/7/03 Examiner: MT Transect # 1

Approx. transect length: 620 feet Compass Direction from Start (Upland):

Vegetation type E:	Type 3 - CYNOFF
Length of transect in this type:	65 feet
Species:	Cover:
SOLCAN	2
GLYLEP	2
CYNOFF	2
Total Vegetative Cover:	40

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:	

LAND & WATER

MDT WETLAND MONITORING – VEGETATION TRANSECT (back of form)

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

Indicator Class:
+ = Obligate
- = Facultative/Wet
0 = Facultative

Source:
P = Planted
V = Volunteer

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

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

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

Notes:

Bolded species are new additions in 2003. Changes in species cover percentages are indicated by *italics*, with the 2001 percentages included in parentheses

3/01

LAND & WATER

BIRD SURVEY – FIELD DATA SHEET

Page **_1__** of **__1_**
Date: 5/22/03
Survey Time: 1100

SITE: Ringling/Galt

Bird Species	#	Behavior	Habitat	Bird Species	#	Behavior	Habitat
American Wigeon	6	F,L,BD	OW,MA				
Common Goldeneye	2	L	OW				
Common Mallard	6	L,F	OW,MA				
Green-winged Teal	4	F,L	OW,MA				
Killdeer	7	F	MA				
Northern Pintail	6	F,L	OW,MA				
Northern Shoveler	4	F,L	OW,MA				
Redhead	2	F,L	OW,MA				
Wilson's Phalarope	2	F	MA				

Notes: Conditions: Partly Cloudy & Windy, approximately 60 degrees
Site had water for 1st time – approximately 2 acres flooded.
Heavy cattle grazing
No water flowing into or out of site
Wildlife observations: 1 coyote, lots of groundsquirrels, 3 antelope, elk scat.
Photos taken of site.

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

BIRD SURVEY – FIELD DATA SHEET

Page **1** of **1**
Date: 8/7/03
Survey Time: 1200

SITE: S. F. Smith

Bird Species	#	Behavior	Habitat	Bird Species	#	Behavior	Habitat
American Kestrel	1	FO					
Killdeer	2	F	MA				

Notes:

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

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

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

Project/Site: Ringling/Galt Wetland Mitigation Site	**Project No:** Task 015	**Date:** 7-Aug-2003
Applicant/Owner: Montana Department of Transportation		**County:** Meagher
Investigators: Traxler		**State:** Montana
		Plot ID: 1

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

VEGETATION (USFWS Region No. 9)

Dominant Plant Species(Latin/Common)	Stratum	Indicator	Plant Species(Latin/Common)	Stratum	Indicator
Agropyron spicatum	Herb	FACU-	*Glycyrrhiza lepidota*	Herb	FAC+
Wheatgrass,Blue-Bunch			Licorice,American		
Agropyron smithii	Herb	FACU	*Iris missouriensis*	Herb	FACW+
Wheatgrass,Western			Iris,Rocky Mountain		
Achillea millefolium	Herb	FACU			
Yarrow,Common					

Percent of Dominant Species that are OBL, FACW or FAC: (excluding FAC-) 2/5 = 40.00%

FAC Neutral: 1/4 = 25.00%
Numeric Index: 17/5 = 3.40

Remarks:
Plot is in upland veg. community near the Agate Creek drainage bottom.

HYDROLOGY

NO Recorded Data(Describe in Remarks):
- N/A Stream, Lake or Tide Gauge
- N/A Aerial Photographs
- N/A Other

YES No Recorded Data

Field Observations

Depth of Surface Water:	N/A *(in.)*
Depth to Free Water in Pit:	> 18 *(in.)*
Depth to Saturated Soil:	> 18 *(in.)*

Wetland Hydrology Indicators

Primary Indicators
- NO Inundated
- NO Saturated in Upper 12 Inches
- YES Water Marks
- NO Drift Lines
- NO Sediment Deposits
- NO Drainage Patterns in Wetlands

Secondary Indicators
- NO Oxidized Root Channels in Upper 12 Inches
- NO Water-Stained Leaves
- NO Local Soil Survey Data
- NO FAC-Neutral Test
- NO Other(Explain in Remarks)

Remarks:
Faint water line on dike. Soil is very dry and not saturated within 18 inches of surface.

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

Project/Site: Ringling/Galt Wetland Mitigation Site	**Project No:** Task 015	**Date:** 7-Aug-2003
Applicant/Owner: Montana Department of Transportation		**County:** Meagher
Investigators: Traxler		**State:** Montana
		Plot ID: 1

SOILS

Map Unit Name (Series and Phase): Martinsdale-Meagher cobbly loams
Map Symbol: 554B **Drainage Class:**
Mapped Hydric Inclusion? no
Taxonomy (Subgroup):
Field Observations Confirm Mapped Type? (Yes) No

Profile Description

Depth (Inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle Abundance/Contrast		Texture, Concretions, Structure, etc
18		N/A	N/A	N/A	N/A	Loam

Hydric Soil Indicators:

- NO Histosol
- NO Histic Epipedon
- NO Sulfidic Odor
- NO Aquic Moisture Regime
- NO Reducing Conditions
- NO 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 (No)	Is the Sampling Point within the Wetland? Yes (No)
Wetland Hydrology Present?	Yes (No)	
Hydric Soils Present?	Yes (No)	

Remarks:
Sampling point is not within a wetland. No wetlnd habitat within the analysis area.

LAND & WATER

Appendix C

REPRESENTATIVE PHOTOGRAPHS
2003 AERIAL PHOTOGRAPH

MDT Wetland Mitigation Monitoring
Ringling/Galt
Ringling, Montana

LAND & WATER

Photo taken on May 22, 2003. First photo documentation of ponded water on-site.

Photo Point 3, 180 degrees S. Photo taken on May 22, 2003. First photo documentation of ponded water on-site.

Photo Point 3, 180 degrees S. Photo taken on 8/7/03.

Photo Point 1, 0 degrees N. Photo date 8/7/03.

Vegetation Transect Start, 330 degrees NW. Photo date 8/7/03.

Vegetation Transect End, 150 degrees SE. Photo date 8/7/03.

LAND & WATER


GPS ER GPS ER DAS1160 P=-2.5 R=5.4 Y=0.
0030
7-28-03 Galt/Ringling
1:6000 Horizons, Inc.
Wetland

Appendix D

BIRD SURVEY PROTOCOL
GPS PROTOCOL

MDT Wetland Mitigation Monitoring
Ringling/Galt
Ringling, Montana

LAND & WATER

BIRD SURVEY PROTOCOL

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

Species Use within the Mitigation Wetland: Survey Method

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

Sites that can be circumambulated or walked throughout.

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

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

Sites that cannot be circumambulated.

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

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

Species Use within the Mitigation Wetland: Data Recording

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

1. Bird Species List

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

2. Bird Density

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

3. Bird Behavior

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

4. Bird Species Habitat Use

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

GPS Mapping and Aerial Photo Referencing Procedure

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

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

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

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

Appendix E

MACROINVERTEBRATE SAMPLING PROTOCOL AND DATA

MDT Wetland Mitigation Monitoring
Ringling/Galt
Ringling, Montana

LAND & WATER

AQUATIC INVERTEBRATE SAMPLING PROTOCOL

Equipment List

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

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

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

Site Selection

Select the sampling site with these considerations in mind:

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

Sampling

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

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

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

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

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

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

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

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

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

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

Photograph the sampled site.

Sample Handling/Shipping

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

MDT WETLAND MITIGATION MONITORING PROJECT
Aquatic Invertebrate Monitoring
Summary 2001, 2002, 2003

METHODS

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

The method employed to assess these wetlands is based on constructing an index using a battery of 12 bioassessment metrics or attributes (**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 and distributions, ranges, and quartiles for each metric were examined. All sites were used except Camp Creek, which was sampled in 2002 and 2003. The fauna at that site was different from that of the other sites, and suggested montane stream conditions rather than wetland conditions. The Camp Creek site was assessed using the tested metric battery developed for montane streams of Western Montana (Bollman 1998). For the wetlands, "optimal" scores were generally those that fell above the 75th percentile (for those metrics that decrease in value in response to stress) or below the 25th percentile (for metrics that respond to stress by an increase in value) of all scores. Additional scoring ranges were established by bisecting the range below the 75th percentile for decreasing scores (or above the 25th percentile for increasing scores) into "sub-optimal" and "poor" assessment categories. A score of 5, 3, or 1 was assigned to optimal, sub-optimal, and poor metric performance, respectively. In this way, metric values were translated into normalized metric scores, and scores for all metrics were summed to produce a total bioassessment score. Total bioassessment scores were classified according to a similar process, using the ranges and distributions of total scores for all sites studied.

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

Sample Processing

Aquatic invertebrate samples were collected at mitigation wetland sites in the summer months of 2001, 2002, and 2003 by personnel of Wetlands West, Inc. and/or Land & Water Consulting, Inc. Sampling procedures utilized were based on the protocols developed by the Montana Department of Environmental Quality (MDEQ).

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 200 organisms, when possible, from each sample. In some cases, the entire sample contained fewer than 200 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 MDEQ Standard Operating Procedures for Sampling and Sample Analysis (Bukantis 1998). Ten percent of samples were re-identified by a second taxonomist

for quality assurance purposes. The identified samples have been archived at Rhithron's laboratory. Taxonomic data and organism counts were entered into an Excel 2000 spreadsheet, and metrics were calculated and scored using spreadsheet formulae.

Bioassessment Metrics

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

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

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

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

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

RESULTS

In 2001, 29 sites were sampled statewide. Nineteen of these sites were revisited in 2002, and 13 new sites were sampled. In 2003, 17 sites that had been visited in both 2001 and 2002 were re-sampled, and 11 sites sampled for the first time in 2001 were re-visited. In addition, 2 new sites were sampled. Thus, the 2003 database contains records for 90 sampling events at 44 unique sites. **Table 2** summarizes sites and sampling dates.

Metric scoring criteria were re-developed each year as new data was added. For 2003, 88 records were utilized. Because of the addition of data, scoring criteria changed for several metrics in 2003; thus, biotic condition classifications assigned in 2002 for some sites also changed. However, ranges of individual metrics, as well as median metric values remained remarkably consistent in each of the three years.

Table 1. Aquatic invertebrate metrics employed in the MTDT mitigation wetland monitoring study, 2001- 2003.

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

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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.

Table 2. Sampled MDT Mitigation Sites by Year

2001	2002	2003
Beaverhead 1	Beaverhead 1	Beaverhead 1
Beaverhead 2	Beaverhead 2	
Beaverhead 3	Beaverhead 3	
Beaverhead 4	Beaverhead 4	Beaverhead 4
Beaverhead 5	Beaverhead 5	Beaverhead 5
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 – Flashlight	Fourchette – Flashlight	Fourchette – Flashlight
Fourchette – Penguin	Fourchette – Penguin	Fourchette – Penguin
Fourchette – Albatross	Fourchette – Albatross	Fourchette – Albatross
Big Spring	Big Spring	Big Spring
Vince Ames		
Ryegate		
Lavinia		
Stillwater	Stillwater	Stillwater
Roundup	Roundup	Roundup
Wigeon	Wigeon	Wigeon
Ridgeway	Ridgeway	Ridgeway
Musgrave – Rest. 1	Musgrave – Rest. 1	Musgrave – Rest. 1
Musgrave – Rest. 2	Musgrave – Rest. 2	Musgrave – Rest. 2
Musgrave – Enh. 1	Musgrave – Enh. 1	Musgrave – Enh. 1
Musgrave – Enh. 2		
	Hoskins Landing	Hoskins Landing
	Peterson - 1	Peterson – 1
	Peterson – 2	
	Peterson – 4	Peterson – 4
	Peterson – 5	Peterson – 5
	Jack Johnson - main	Jack Johnson - main
	Jack Johnson - SW	Jack Johnson - SW
	Creston	Creston
	Lawrence Park	
	Perry Ranch	
	SF Smith River	SF Smith River
	Camp Creek	Camp Creek
	Kleinschmidt	Kleinschmidt – pond
		Kleinschmidt – stream
		Ringling - Galt

Aquatic Invertebrate Taxonomic Data

Site Name RINGLING-GALT **Date Collected** 8/ 7/2003

Order	Family	Taxon	Count	Percent	Unique	BI	FFG
Coleoptera							
	Dytiscidae						
		Hygrotus	1	0.79%	Yes	5	PR
	Haliplidae						
		Haliplus	3	2.36%	Yes	5	PH
	Hydrophilidae						
		Helophorus	3	2.36%	Yes	11	SH
		Tropisternus	9	7.09%	Yes	5	PR
Diptera							
	Chironomidae						
		Chironomus	63	49.61%	Yes	10	CG
		Procladius	6	4.72%	Yes	9	PR
Heteroptera							
	Corixidae						
		Hesperocorixa	16	12.60%	Yes	10	PH
	Notonectidae						
		Notonecta	26	20.47%	Yes	5	PR
Grand Total			**127**				

Aquatic Invertebrate Data Summary

Project ID: MDT03LW
STORET Station ID:
Station Name: RINGLING-GALT

Activity ID:

Sample Date: 8/7/2003

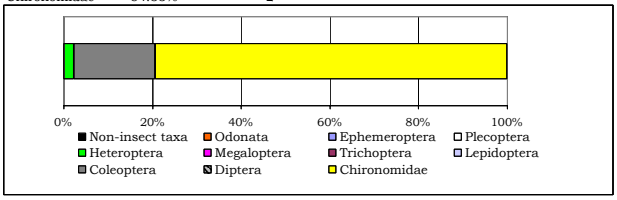
Sample type	
SUBSAMPLE TOTAL ORGANISMS	127
Portion of sample used	80.00%
Estimated number in total sample	159
Sampling effort	
Time	
Distance	
Jabs	
Habitat type	
EPT abundance	0
Taxa richness	8
Number EPT taxa	0
Percent EPT	0.00%

DOMINANCE

TAXON	ABUNDANCE	PERCENT
Chironomus	63	49.61%
Notonecta	26	20.47%
Hesperocorixa	16	12.60%
Tropisternus	9	7.09%
Procladius	6	4.72%
SUBTOTAL 5 DOMINANTS	120	94.49%
Haliplus	3	2.36%
Helophorus	3	2.36%
Hygrotus	1	0.79%
TOTAL DOMINANTS	127	100.00%

TAXONOMIC COMPOSITION

GROUP	PERCENT	#TAXA
Non-insect taxa	0.00%	0
Odonata	0.00%	0
Ephemeroptera	0.00%	0
Plecoptera	0.00%	0
Heteroptera	1.57%	2
Megaloptera	0.00%	0
Trichoptera	0.00%	0
Lepidoptera	0.00%	0
Coleoptera	12.60%	4
Diptera	0.00%	0
Chironomidae	54.33%	2



SAPROBITY

Hilsenhoff Biotic Index	8.65

DIVERSITY

Shannon H (loge)	1.75
Shannon H (log2)	1.21
Margalef D	1.44
Simpson D	0.31
Evenness	0.15

VOLTINISM

TYPE	# TAXA	PERCENT
Multivoltine	2	54.33%
Univoltine	2	33.07%
Semivoltine	4	12.60%

TAXA CHARACTERS

	#TAXA	PERCENT
Tolerant	3	56.69%
Intolerant	0	0.00%
Clinger	0	0.00%

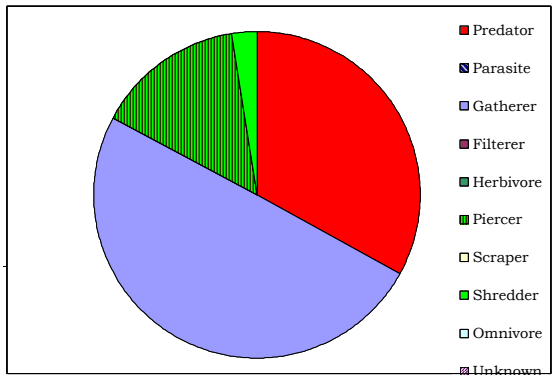
FUNCTIONAL COMPOSITION

GROUP	PERCENT	#TAXA
Predator	33.07%	4
Parasite	0.00%	0
Gatherer	49.61%	1
Filterer	0.00%	0
Herbivore	0.00%	0
Piercer	14.96%	2
Scraper	0.00%	0
Shredder	2.36%	1
Omnivore	0.00%	0
Unknown	0.00%	0

BIOASSESSMENT INDICES

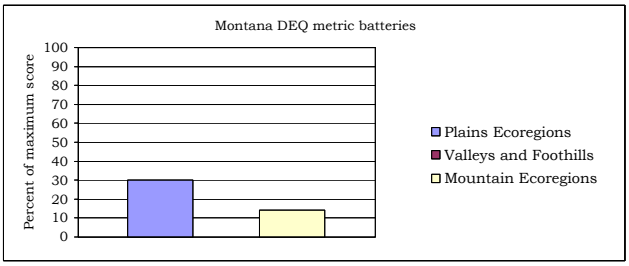
B-IBI (Karr et al.)

METRIC	VALUE	SCORE	
Taxa richness	8	1	
E richness	0	1	
P richness	0	1	
T richness	0	1	
Long-lived	4	3	
Sensitive richness	0	1	
%tolerant	56.69%	1	
%predators	33.07%	3	
Clinger richness	0	1	
%dominance (3)	82.68%	1	
	TOTAL SCORE	14	28%



MONTANA DEQ METRICS (Bukantis 1998)

METRIC	VALUE	Plains Ecoregions	Valleys and Foothills	Mountain Ecoregions
Taxa richness	8	0	0	0
EPT richness	0	0	0	0
Biotic Index	7.00	1	0	0
%Dominant taxon	49.61%	1	1	0
%Collectors	49.61%	3	3	3
%EPT	0.00%	0	0	0
Shannon Diversity	1.21	0		
%Scrapers +Shredders	2.36%	0	0	0
Predator taxa	4	2		
%Multivoltine	54.33%	2		
%H of T	#DIV/0!		#DIV/0!	
TOTAL SCORES		9	#DIV/0!	3
PERCENT OF MAXIMUM		30.00	#DIV/0!	14.29
IMPAIRMENT CLASS		MODERATE	#DIV/0!	SEVERE



COMMUNITY TOLERANCES

Sediment tolerant taxa	0
Percent sediment tolerant	0.00%
Sediment sensitive taxa	0
Metals tolerance index (McGuire)	5.61
Cold stenotherm taxa	0
Percent cold stenotherms	0.00%

HABITUS MEASURES

Hemoglobin bearer richness	2
Percent hemoglobin bearers	70.08%
Air-breather richness	2
Percent air-breathers	7.87%
Burrower richness	1
Percent burrowers	49.61%
Swimmer richness	4
Percent swimmers	12.60%

Montana Plains ecoregions metrics (Bramblett and Johnson)

Riffle		*Pool*	
EPT richness	0	E richness	0
Percent EPT	0.00%	T richness	0
Percent Oligochaetes and Leeches	0.00%	Percent EPT	0.00%
Percent 2 dominants	70.08%	Percent non-insect	0.00%
Filterer richness	0	Filterer richness	0
Percent intolerant	0.00%	Univoltine richness	2
Univoltine richness	2	Percent supertolerant	69.29%
Percent clingers	0.00%		
Swimmer richness	4		