MONTANA DEPARTMENT OF TRANSPORTATION
WETLAND MITIGATION MONITORING REPORT: YEAR 2005

Roundup Wetland
Roundup, Montana

Prepared for:

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

Prepared by:

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

December 2005

Project No: B43054.00 - 0510

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Cover Photo: *A new community of* Scirpus pungens *in northeast area of the north lagoon.*

1.0 INTRODUCTION

This annual report summarizes methods and results of the fifth year of monitoring at the Montana Department of Transportation's (MDT) Roundup mitigation site. The Roundup wetland site was created to provide wetland mitigation credits for MDT's reconstruction of U.S. Highway 12 in Watershed #10 located in District 5, Billings District. The site is located in Musselshell County, Montana, Section 18, Township 8 North, Range 26 East, immediately south of U.S. Highway 12 and approximately one mile east of the town of Roundup **(Figure 1)**. Elevations range from approximately 3,169 to 3,175 feet above sea level.

The mitigation site is located at the site of the former wastewater lagoons for the city of Roundup **(Figure 2, Appendix A)**. This former two-celled treatment facility, covering approximately 26 acres, contained sludge of varying depths with concentrations of nitrates, and possibly heavy metals of which portions were capped during construction modification. The organic sludge was left in the west end of the southern end of the wetland bed and capped with one foot of soil to prevent potential biohazards risks. Five monitoring wells were installed around the lagoon to monitor any possible groundwater contamination from the sludge. The dike between cells was breached as shown in **Figures 2 and 3 (Appendix A)** to allow water to access both cells.

Construction was completed on this site in April of 2000 with a goal of creating at least 24 acres of wetlands with a diverse vegetative community. The site was designed to develop a hemi-marsh emergent wetland system with standing water depths no greater than three feet. Water depths vary within the wetland due to the natural topography behind the dike. Water was designed to enter the wetland mitigation system through two methods and locations **(MDT Monitoring Plan and Detail: Final Plan, Appendix D)**.

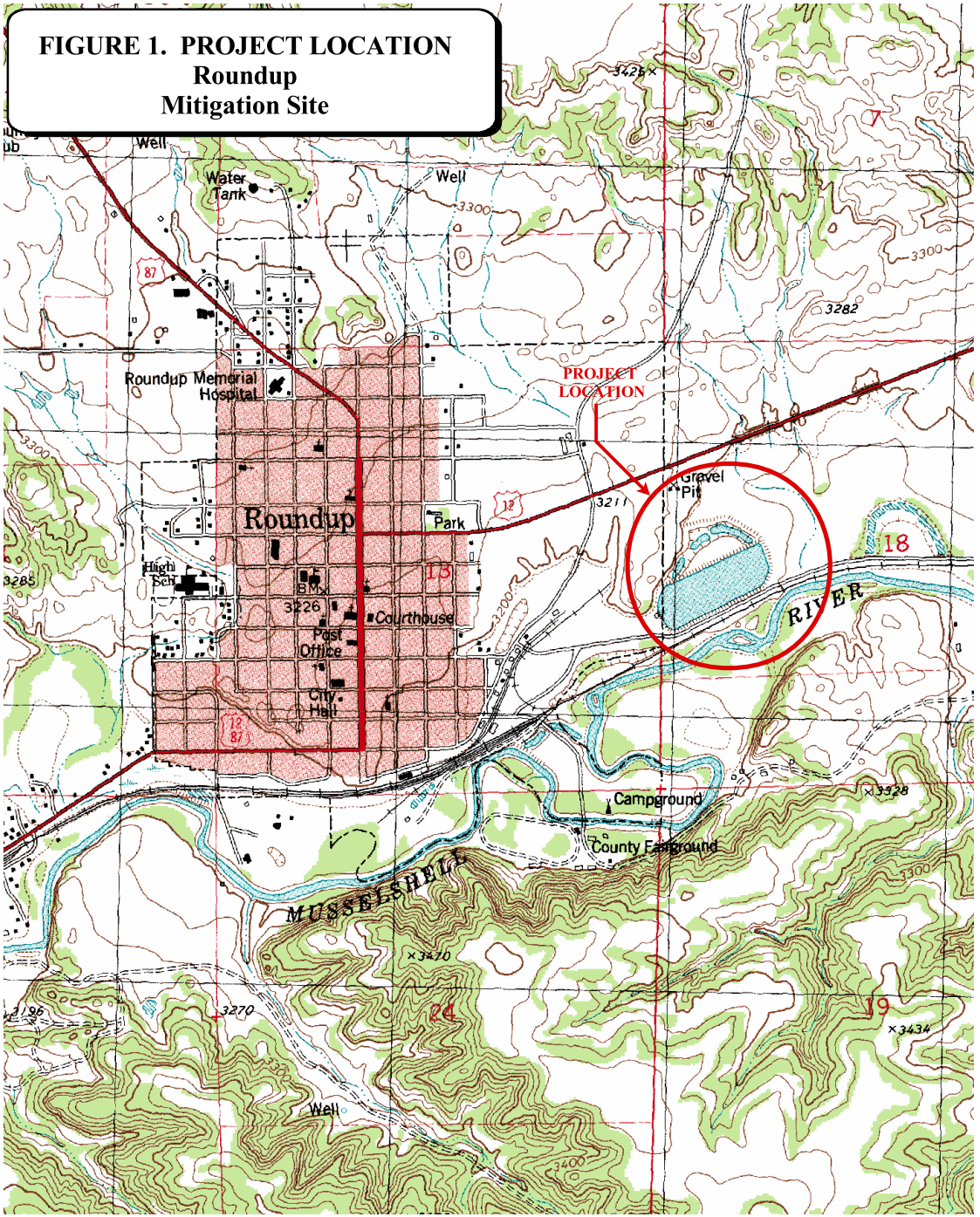
One source of hydrology is through a channel, which funnels storm water runoff from the northeastern section of the city of Roundup and U.S. Highway 12 into the southwestern end of the wetland. The estimated runoff volume for this system is 12,700 m^3, and 17,825 m^3 of water for the 5-and 25-year event, respectively (MDT 2000). A second source of hydrology is treated wastewater from the new Roundup sewage treatment facility which is discharged into the wetland to maintain the design water level elevation. There is no physical "outlet" designed for the system; water leaves only through evaporation and evapotranspiration. The site has only been filling with the wastewater and stormwater since July of 2001. The Roundup lagoons are visited three times during the year: a spring and fall bird survey and during mid-summer to collect the monitoring data.

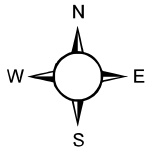
2.0 METHODS

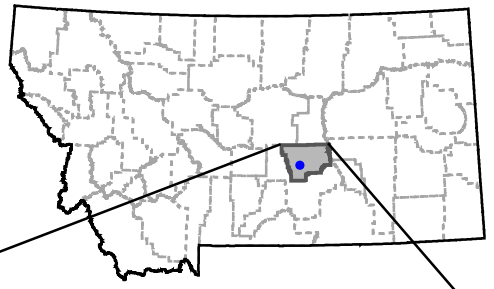
2.1 Monitoring Dates and Activities

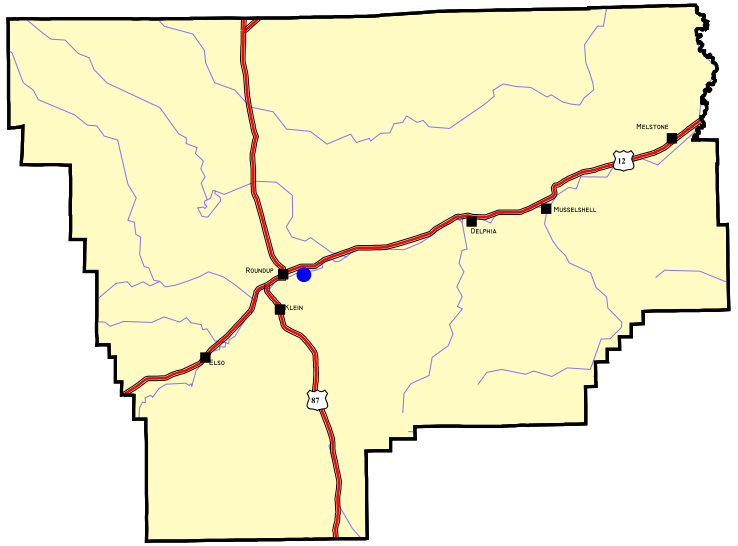
The Roundup wetland mitigation site was monitored on three dates in 2005: May 10 (bird observation), July 19 and 20 (monitoring event), and October 11 (bird observation). All information contained within the Wetland Mitigation Site Monitoring Form **(Appendix B)** was

FIGURE 1. PROJECT LOCATION
Roundup
Mitigation Site









800 0 800 1600 FEET

1: 24,000

PROJECT #: 130091.031
DATE: APRIL 2001
LOCATION:
PROJECT MANAGER: B. DUTTON
DRAWN BY: B. NOECKER

LAND & WATER CONSULTING, INC.

1120 CEDAR PO BOX 8254 MISSOULA, MT 59807

collected during the monitoring event. Activities and information conducted/collected included: wetland delineation; wetland/open water boundary mapping; vegetation community mapping; vegetation transects; soils data; hydrology data; bird and general wildlife use; photograph points; functional assessment; and maintenance need assessment at bird nesting structures and inflow and outflow structures.

2.2 Hydrology

Wetland hydrology indicators were recorded using procedures outlined in the U.S. Army Corps of Engineers (COE) 1987 Wetland Delineation Manual (Environmental Laboratory 1987). Hydrology data were recorded on the Routine Wetland Delineation Data Form **(Appendix B)** at each wetland determination point.

All additional hydrologic data were recorded on the mitigation site monitoring form **(Appendix B)**. The boundary between emergent vegetation and open water was mapped on the aerial photograph **(Figure 3, Appendix A)**. Groundwater is monitored at one well that is located inside of the monitoring limits **(Detail: Final Plan, Appendix D)**. Precipitation data for 2005 were compared to the 1914- March 2005 average (WRCC 2005).

2.3 Vegetation

General vegetation types were delineated on an aerial photograph during the site visit (**Figure 3, Appendix A)**. Coverage of the dominant species in each community type is listed on the monitoring form **(Appendix B)**. A comprehensive plant species list for the entire site was compiled and will be updated as new species are encountered. Observations from past years will be compared with new data to document vegetation changes over time. Minimal woody vegetation was planted at this site by the Conservation District. Willow sprigs were planted during the early spring of 2004 by MDT.

The transect was relocated during the 2002 visit within the center of the constructed wetland. The location of this transect is shown on **Figure 2, Appendix A**. Percent cover for each species was recorded on the vegetation transect form **(Appendix B)**. The transect will be used to evaluate changes over time, especially the establishment and increase of hydrophytic vegetation. Transect ends were marked with metal fence posts and their locations hand-drawn on the vegetation map. Photos of the transect were taken from both ends during the site visit.

2.4 Soils

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

2.5 Wetland Delineation

A wetland delineation was conducted within the assessment area according to the 1987 COE Wetland Delineation Manual. Wetland and upland areas within the monitoring area were investigated for the presence of wetland hydrology, hydrophytic vegetation and hydric soils. The 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 the Routine Wetland Delineation Forms **(Appendix B)**. The wetland/upland and open water boundaries were used to calculate the wetland area.

2.6 Mammals, Reptiles, and Amphibians

Mammal, reptile, and amphibian species observations were recorded on the wetland monitoring form during the site visit **(Appendix B)**. Indirect use indicators were also recorded including tracks, scat and burrows. A comprehensive wildlife species list for the entire site was compiled and will be updated as new species are encountered. Observations from past years will be compared with new data to determine if wildlife use is changing over time.

2.7 Birds

Bird observations were recorded during the site visit according to the established bird survey protocol **(Appendix E)**. Four (4) wood duck boxes have been installed on site. A general, qualitative bird list has been compiled using these observations. Observations will be compared between years in future studies.

2.8 Macroinvertebrates

One macroinvertebrate sample was collected during the site visit following the 2001 protocol **(Appendix F)**. Samples were preserved as outlined in the sampling procedure and sent to Rhithron Associates for analysis. The approximate sampling location is indicated on **Figure 2, Appendix A**. Results are included in **Appendix F**.

2.9 Functional Assessment

A functional assessment form was completed for the Roundup wetland mitigation site using the 1999 MDT Montana Wetland Assessment Method. Field data necessary for this assessment were collected on a condensed data sheet. The remainder of the assessment was completed in the office.

2.10 Photographs

Photographs were taken showing the current land use surrounding the site, the wetland buffer, the monitored area, and the vegetation transect. A description and compass direction for each photograph were recorded on the wetland monitoring form.

During the 2001 monitoring season, each photograph point was marked on the ground with a wooden stake and the location recorded with a resource grade GPS **(Appendix E).** Photographs are retaken at the same locations each year. The approximate locations are shown on **Figure 2, Appendix A**.

2.11 GPS Data

During the 2001 monitoring season survey points were collected using a resource grade Trimble Geoexplorer III hand-held GPS unit **(Appendix E)**. Points collected included: photograph locations; bird box locations, and the jurisdictional wetland boundary. In addition, during the August 2001 monitoring season survey points were collected at four (4) landmarks recognizable on the air photo for purposes of line fitting to the topography. GPS points were not collected during the 2005 season; wetland boundaries and community types were mapped on an aerial photograph.

2.12 Maintenance Needs

The condition of inflow and outflow structures, and nesting structures or other mitigation related structures were evaluated. This examination did not entail an engineering-level analysis.

3.0 RESULTS

3.1 Hydrology

During the July 2005 monitoring event, depth to groundwater within well number #3 was 7.50 feet, approximately 1 foot higher than the yearly average (8.76 feet). The approximate location of well #3 is shown on **Figure 2, Appendix B.**

As mentioned previously, water was designed to enter the system through two methods and locations. One method of water entry is through a drainage channel which funnels storm water and roadway runoff from the northeastern section of the city of Roundup and U.S. Highway 12 into the southwestern end of the wetland **(Detail: Site Plan, Appendix D)**. Drought has decreased the amount of water that enters the wetland through the stormwater system. The other source of hydrology is the treated wastewater discharge from the new Roundup sewage treatment facility.

The wetland was originally designed with a flow-through system; treated water would have flowed into the wetland system and then into the Musselshell River. This design feature was eliminated by the Montana Department of Environmental Quality (MTDEQ) and the Environmental Protection Agency (EPA) primarily due to potential issues with heavy metals/contaminants in the remaining sewage system sludge. The COE would not allow the site to be used for mitigation if it was part of the treatment system. Water levels in the wetland decrease through evaporation and evapotranspiration during the growing season.

During the July 20, 2004 visit, approximately 67% (14.74 acres) of the assessment area was inundated with less than 4 feet of standing water. More than 65% of the open water was located in the south lagoon where it was likely less than 6" deep and intermittent in nature. In 2004 the gross wetland area was comprised of 2.51 acres of exposed soil. As a result of the higher precipitation in 2005, this intermittently exposed substrate was inundated. The shallow water in the south lagoon is utilized by the highest numbers of foraging shorebirds and waterfowl within the Roundup wetland.

According to the Western Regional Climate Center (WRCC), the Roundup station's annual mean (1914 – March 2005) precipitation was 12.29 inches; the average precipitation through the month of July for that period was 8.4 inches. For the year 2005, precipitation through July was 12.5 inches or 149% of the mean (WRCC 2005). The high precipitation for the first half of 2005 resulted in the high well reading and the large area of inundation as late as mid-July.

3.2 Vegetation

Vegetation species identified on the site are presented in **Table 1** and in the monitoring form **(Appendix B)**. Five vegetation communities were mapped on the mitigation area map **(Figure 3, Appendix A)**. The communities include: Type 1, *Kochia scoparia*; Type 2, *Chenopodium species;* Type 3, *Alopecurus arundinaceus;* Type 4, *Kochia scoparia / Alopecurus arundinaceus* (dominant species in this type have changed since 2002)*;* Type 5, *Agropyron cristatum/Kochia scoparia,* and Type 6, *Scirpus* spp. Dominant species within each community are listed on the monitoring form **(Appendix B)**.

Preferred wetland vegetation species such as *Scirpus, Puccinella, and Eleocharis* are beginning to form colonies in exposed substrate areas that are saturated year round. The edge of the lagoons are colonized with *Chenopodium* which out-competes the preferred hydrophytic species.

Vegetation species along the transect have not changed; the wetland area continues to be dominated by kochia, a FAC species (**Charts 1** and **2**). The presumed higher level of saturation in the area of the transect in 2005 had decreased the amount and vitality of kochia (at the time of the investigation the soils were not saturated). With low precipitation in 2001-2004, the kochia along the transect had by 2004 exceeded 5 feet in height. In 2005, with increased precipitation / saturation, it was less than 4 feet tall and in a state of increasing decadence. The vegetation transect results are detailed in the monitoring form **(Appendix B), Table 2,** and **Charts 1** and **2.** No other hydrophytic species have ever been observed along the transect since its installation in 2002.

3.2.1 Weed management

The MDT is in the process of developing a weed management plan comprised of several methods of control. Weedy species along the edge of the open water that cannot be burned will require an aquatic labeled chemical. Burning areas that tend to be dry by late summer but prior to seed maturation is an alternative for the area south of the north lagoon; spraying with an aquatic label after burning is recommended in early fall. Repeating these procedures for 4 to 5 years in mid to late summer will ensure that the seed bank is being eradicated. Flooding from

the higher 2005 precipitation has begun to decrease kochia in the south lagoon and within the transect area. As the drought subsides, more water may be available to effectively drown some of the unwanted weedy vegetation. Herbicide methods are included in **Appendix G**.

Table 1: ***2001-2005 Roundup Wetland vegetation species list.***

Scientific Name	Region 9 (Northwest) Wetland Indicator Status
Agropyron cristatum	-(UPL)
Alopecurus arundinaceus	- (FACW)
Chenopodium leptophyllum	FACU
Chenopodium hybridum	-(FAC)
Cirsium arvense	FACU+
Eleocharis palustris	OBL
Elymus cinereus	(UPL)
Grindelia squarrosa	FACU
Hordeum jubatum	FAC+
Kochia scoparia	FAC
Lemna minor	OBL
Melilotus officinalis	FACU
Phalaris arundinacea	FACW
Polygonum spp.	(probably FACW-OBL)
Puccinellia nuttalliana	OBL
Rhus trilobata	-(FAC)
Ribes aureum	FAC+
Rumex crispus	FACW
Rumex maritimus	FACW+
Scirpus acutus [2]	OBL
Scirpus maritimus	**OBL**
Scirpus pungens	OBL
Tamarix ramosissima	**FACW**

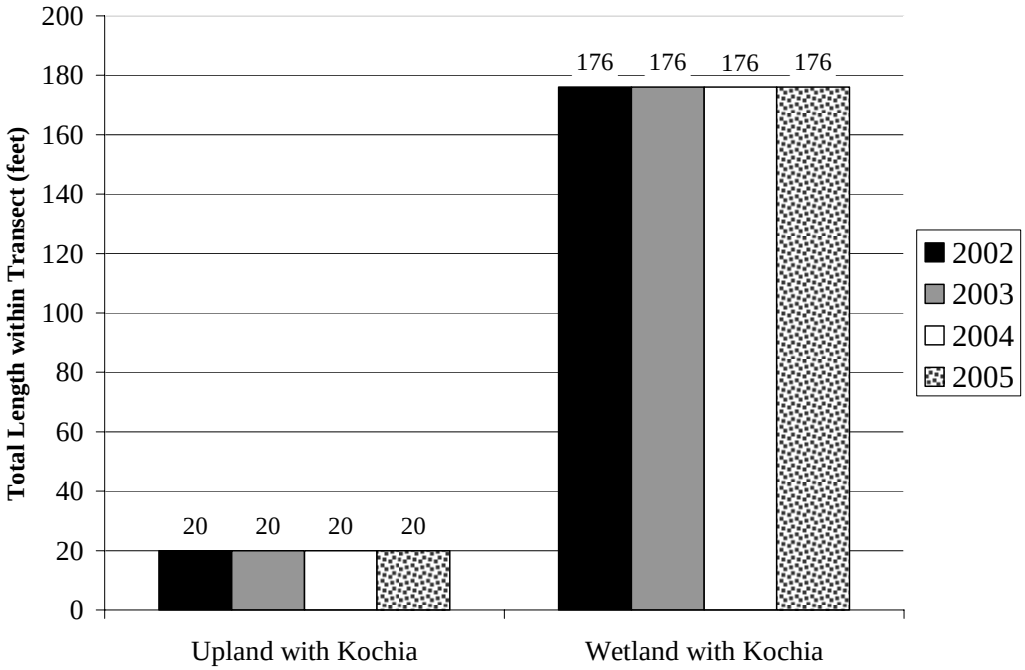
[1] **Bolded** species indicate those documented within the analysis area for the first time in 2005.
"-" = Species either not included or classified as "non-indicator" in the *National List of Plant Species that Occur in Wetlands: Northwest (Region 9)* (Reed 1988); status in parentheses are probable and based on the biologist's experience.
[2] *Scirpus acutus* identification is not positive; growing in inundated area.

Table 2: ***2001-2005 transect data summary.***

Monitoring Year	2001[1]	2002	2003	2004	2005
Transect Length (feet)	100	196	196	196	196
# Vegetation Community Transitions along Transect	1	2	2	2	2
# Vegetation Communities along Transect	2	2	2	2	2
# Hydrophytic Vegetation Communities along Transect	1	1	1	1	1
Total Vegetative Species	4	2	2	2	2
Total Hydrophytic Species	2	2	2	2	2
Total Upland Species	2	0	0	0	0
Estimated % Total Vegetative Cover	100	100[2]	100[2]	100[2]	100[2]
% Transect Length Comprised of Hydrophytic Vegetation Communities	60	90[2]	90[2]	90[2]	90[2]
% Transect Length Comprised of Upland Vegetation Communities	40	10[2]	10[2]	10[2]	10[2]
% Transect Length Comprised of Unvegetated Open Water	0	0	0	0	0
% Transect Length Comprised of Bare Substrate	0	0	0	0	0

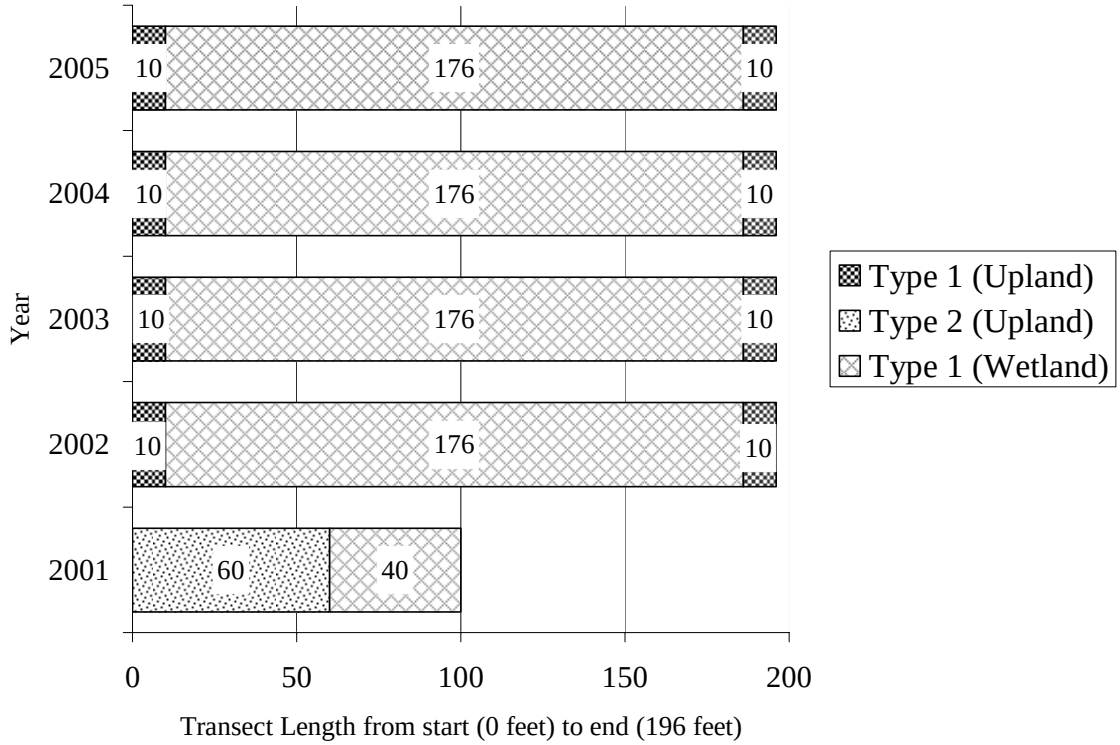
[1]Transect moved in 2002.
[2]Vegetation 100% comprised of *Kochia scoparia*, a FAC species in "Upland" and "Wetland" communities.

Chart 1: ***Length of vegetation communities along Transect 1 from 2002 to 2005.***[1]



[1] The 2001 transect is not shown for comparison as it was moved to its present position in 2002.

Chart 2: ***Transect maps showing vegetation types from start of transect (0 feet) to the end of transect (100 feet in 2001; 196 feet in 2002-2005).***



3.3 Soils

The site was mapped as part of the Musselshell County Soil Survey. The Havre-Glendive Complex (11A) is the dominant mapped soil at the site. The soil series is well drained and typical of floodplains, alluvial fans and stream terraces; it is classified as an Aridic Ustifluvent. The old lagoons were constructed entirely within this complex. The Havre component is a loamy texture and the Glendive component tends to be a fine, sandy loam. Construction of the lagoons has probably changed the accuracy of this soil mapping.

Soils were sampled at one wetland site (SP-1) and one upland site (SP-2); SP-1 is located between the old dike that historically separated the north and south lagoons and SP-2 is on the constructed island adjacent to the northern lagoon pond. At SP-1 (wetland) soils were a dark gray (5Y 4/2) sandy loam at a depth of 10 inches. Soils were not saturated at the time of the investigation, however the kochia within the transect is dying as a result of a presumed level of soil saturation. At SP-2 (upland) on the island, the soil was a dark gray (5Y 4/2) silt loam at a depth of 10 inches. No moisture was noted in the pit.

3.4 Wetland Delineation

The 2005 delineation resulted in a total of 22.07 acres of developing aquatic habitats. The wetland boundary excludes the historic dike and the constructed islands **(Figure 3, Appendix A)**. Of the 22.07 gross wetland acreage, 14.74 acres were shallow, open water; no exposed soil was observed during the field visit as a result of the high precipitation levels from March through July. The kochia within the area of the transect has begun to die off because of the presumed higher saturation level. The net wetland area decreased from 9.52 acres in 2004 to 7.33 acres in 2005 because of the kochia die-off in the south lagoon as a result of inundation. Areas of preferred hydrophytic vegetation are beginning to develop where *Chenopodium* and kochia are absent, however these areas have not yet increased the net wetland acreage. Preferred wetland species are likely to increase as inundation continues at design levels. The COE data forms are included in **Appendix B**

3.5 Wildlife

Wildlife species are listed in **Table 3.** Activities and densities associated with these observations are included on the monitoring form in **Appendix B**. Several mule deer, 2 red fox (hunting foraging waterfowl) and a very large (>3 ft long) bull snake were observed during the 2005 site visits.

Four wood duck boxes are located with the site as shown on **Figure 2, Appendix B**. No signs of habitation were observed in July, however 3 adult females and 13 young were observed foraging in the north lagoon during the July site visit, indicating the boxes are likely used for nesting.

Table 3. *2001-2005* w*ildlife species observed on the Roundup Wetland Mitigation Site*[1].

AMPHIBIANS AND REPTILES	
Bull snake (*Pituophis catenifer*) unidentified frogs (*Rana* spp. 2002)	
BIRDS	
American Avocet (*Recurvirostra americana*)	**Mallard (*Anas platyrhynchos*)**
American Coot (*Fulica americana*)	**Marsh Wren (*Cistohorus palustris*)**
American Kestrel (Falco sparverius)	Mourning Dove (Zenaida macroura)
American Robin (*Turdus migratorius*)	Northern Harrier (*Circus cyaneus*)
American Wigeon (*Anas americana*)	**Northern Shoveler (*Anas clypeata)***
Bank Swallow (*Riparia riparia*)	**Pied-billed Grebe (*Podilymbus podiceps*)**
Black-necked Stilt (*Himantopus mexicanus*)	Redhead (*Aythya Americana*)
Blue-winged Teal (*Anas discors*)	**Red-wing Blackbird (*Agelaius phoeniceus*)**
Brewer's Blackbird (*Euphagus cyanocephalus*)	Ring-necked Duck (*Aythya collaris*)
Canada Goose (*Branta canadensis*)	Ring-necked Pheasant (*Phasianus colchicus*)
Canvasback (*Aythya valisineria*)	Rock Dove (*Columba livia*)
Cinnamon Teal (*Anas cyanoptera*)	Ross Goose (*Chen rossii*)
Cliff Swallow (*Hirundo pyrrhonota*)	Ruddy Duck (*Oxyura dominica*)
Common Merganser (*Megus merganser*)	Sandhill Crane (*Grus canadensis*)
Common Snipe (*Gallinago gallinago*)	Sandpiper (species unidentified)
Double-crested Cormorant (*Phalacrocorax auritus*)	Solitary Sandpiper (*Tringa solitaria*)
Eared Grebe (*Podiceps nigricollis*)	**Song Sparrow (*Melospiza melodia*)**
Eastern Kingbird (*Tyrannus tyrannus*)	**Spotted Sandpiper (*Actitis macularia*)**
European Starling (*Sturnus vulgaris*)	**Tree swallow (*Tachycineta bicolor*)**
Franklin's Gull (*Larus pipixcan*)	Violet Green Swallow (*Tachycineta thalassina*)
Gadwall (*Anas strepera*)	**Western Meadowlark (*Sturnella neglecta*)**
Great Blue Heron (*Ardea herodias*)	Whimbrel (*Numenius phaeopus*)
Greater Yellow legs (*Tringa melanoleuca*)	White-crowned Sparrow (Zonotrichia atricapilla)
Green-winged Teal (*Anas crecca*)	**Willet (*Catoptrophorus semipalmatus*)**
House Sparrow (*Passer domesticus*)	**Wilson's Phalarope (*Phalaropus tricolor*)**
Killdeer (*Charadrius vociferus*)	**Wood Duck (*Aix sponsa*)**
Least Sandpiper (*Calidris minitilla*)	Yellow-headed Blackbird (*Xanthocephalus xanthocephalus*)
Lesser Scaup (*Aythya affinis*)	Yellow-rumped Warbler (*Dendroica coronata*)
Lesser Yellow Legs (*Tringa flavipes*)	
Long-billed Dowitcher (*Limnodromus scolopaceus*)	
MAMMALS	
Mule Deer (*Odocoileus hemionus)*	
Red Fox (*Vulpes vulpes*)	
Domestic cat (MDT sighting)	
Muskrat (*Ondatra zibethica*) (MDT sighting)	

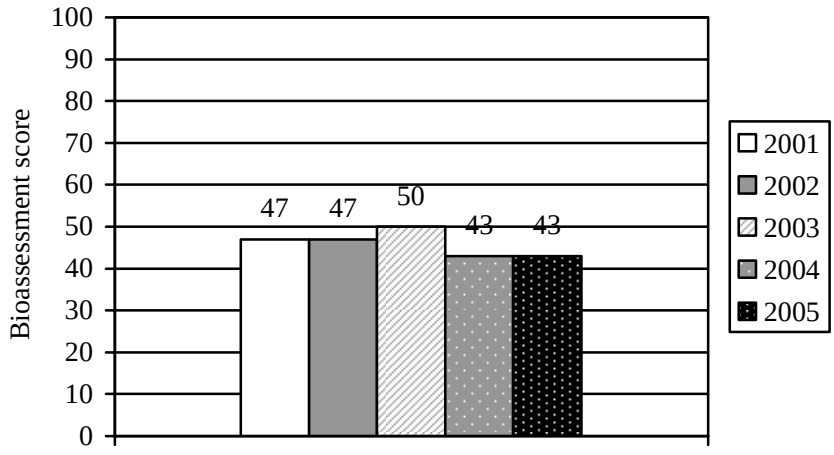
[1]**Bolded** species indicate those documented within the analysis area in 2005.

3.6 Macroinvertebrates

Macroinvertebrate sampling results are provided in **Appendix F** and **Chart 3** and were summarized by Rhithron Associates in the italicized section below (Bollman 2005).

Scores indicated poor biotic conditions at the Roundup site for all 5 studied years. Taxa richness continued to decline; only 7 taxa were collected in 2005. Benthic surfaces appeared to dominate potential habitats for invertebrates. The biotic index value remained high, suggesting warm water temperatures and/or nutrient enrichment. All 3 midge taxa present in the sample were hemoglobin-bearers.

Chart 3: ***Bioassessment scores from 2001 to 2005.***



3.7 Functional Assessment

Completed functional assessment forms are included in **Appendix B** and summarized below in **Table 4**. The site rated as an overall Category II wetland and scores 158.9 Functional Units. This represents an increase of approximately 220% since 2001, but only a 6% increase since 2002 and almost no change in functional units since 2004. The functional units will continue to remain the same unless the wetland starts to develop a more preferred wetland vegetation community and includes more structural diversity. The list of avian species has increased since monitoring began and has consequently increased the General Wildlife Habitat rating to high (0.9) which qualifies the wetland as a Category II wetland. Wildlife use, particularly migratory songbirds, would further increase with the survival and proliferation of a willow shrub community.

3.8 Photographs

Representative photos taken from photo points and transect ends are included in **Appendix C.**

3.9 Maintenance Needs/Recommendations

All dikes and inlet structures were functioning satisfactorily. All located bird boxes are in good condition. Other than treatment for weedy species (as described above), no other maintenance needs were apparent at the site.

Table 4: ***Summary of 2001-2005 wetland function/value ratings and functional points at the Roundup Wetland Mitigation Project.***

Function and Value Parameters from the 1999 MDT Montana Wetland Assessment Method	2001 Roundup Wetland	2002 Roundup Wetland	2003 Roundup Wetland	2004 Roundup Wetland	2005 Roundup Wetland
Listed/Proposed T&E Species Habitat	Low (0)	Low (0)	Low (0)	Low (0)	Low (0)
MNHP Species Habitat	Low (0)	High (.8)	High (.8)	High (.8)	High (.8)
General Wildlife Habitat	Low (.3)	Mod. (.7)	High (.9)	High (.9)	High (.9)
General Fish/Aquatic Habitat	NA	NA	NA	NA	NA
Flood Attenuation	High (1)	Mod. (.6)	Mod. (.6)	Mod. (.6)	Mod. (.6)
Short and Long Term Surface Water Storage	High (.8)	High (1)	High (1)	High (1)	High (1)
Sediment, Nutrient, Toxicant Removal	Mod. (.7)	Mod. (.7)	Mod. (.7)	Mod. (.7)	Mod. (.7)
Sediment/Shoreline Stabilization	NA	High (1)	High (1)	High (1)	High (1)
Production Export/Food Chain Support	Mod. (.6)	Mod. (.6)	Mod. (.6)	High (.8)	High (.8)
Groundwater Discharge/Recharge	Low (.1)	Low (.1)	Low (.1)	Low (.1)	Low (.1)
Uniqueness	Low (.2)	Low (.3)	Low (.3)	Low (.3)	Low (.3)
Recreation/Education Potential	Low (.2)	High (1)	High (1)	High (1)	High (1)
Actual Points/ Possible Points	3.9/10	6.8/11	7/11	7.2/11	7.2/11
% of Possible Score Achieved	39%	61%	64%	65%	65%
Overall Category	III	III	II	II	II
Total Acreage of Assessed Wetlands / Open Water within Easement	**18.51**	**22.00**	**22.00**	**22.0**	**22.07**
Functional Units (acreage x actual points)	**72.21**	**149.60**	**154.00**	**158.40**	**158.90**
Net Acreage Gain	**18.51**	**22.00**	**22.00**	**22.0**	**22.07**
Net Functional Unit Gain	**72.21**	**149.60**	**154.00**	**158.40**	**158.90**
Total Functional Unit "Gain"	**72.21**	**149.60**	**154.00**	**158.40**	**158.90**

3.10 Current Credit Summary

The 2005 delineation showed a total of 22.07 acres of developing aquatic habitats. Of that, 14.74 acres (67%) are shallow, open water; exposed soils during 2004 were flooded during the 2005 visit as a result of the high spring and early summer rainfall. In 2005, the net wetland area was 7.33 acres; 0.6 acre (0.3% of gross wetland area) was represented by non-weedy hydrophytic species. As water levels increase, and/or the weeds are treated and removed, the preferred wetland species will increase. The Roundup wetland continues to rate as a Category II wetland with little change in overall area since 2002.

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Appendix A

FIGURES 2 & 3

MDT Wetland Mitigation Monitoring
Roundup Wetland
Roundup, Montana

Figure 2 Monitoring Activity Locations 2005

PROJECT NAME
MDT Roundup Lagoon Wetland Mitigation
DRAWING TITLE
Monitoring Activity Locations 2005

PROJ NO: B43054.0510	DRAWN: SH		
LOCATION: Roundup, MT	PROJ MGR: JB		
SCALE: 1"=150'	CHECKED: LB	APPVD:	JB
FILE NAME:BASE2005.dwg			

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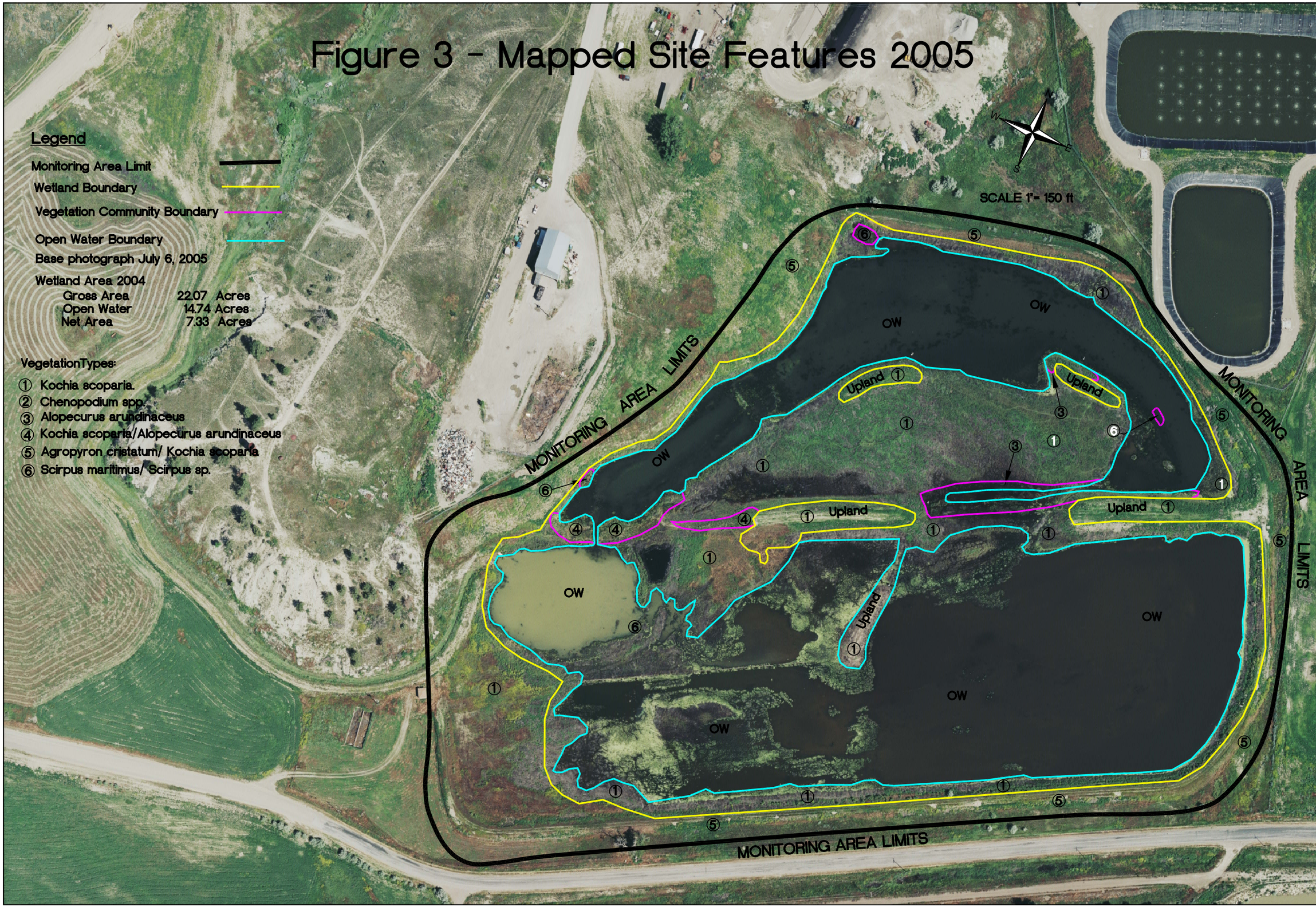
Figure 3 - Mapped Site Features 2005



PROJECT NAME
MDT Roundup Lagoon Wetland Mitigation
DRAWING TITLE
Mapped Site Features 2005

PROJ NO: B43054.0510	DRAWN: SH		
LOCATION: Roundup, MT	PROJ MGR: JB		
SCALE: 1"=150'	CHECKED: LB	APP'VD:	JB
FILE NAME:BASE2005.dwg			

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Appendix B

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

MDT Wetland Mitigation Monitoring
Roundup Wetland
Roundup, Montana

LWC / MDT WETLAND MITIGATION SITE MONITORING FORM

Project Name:__Roundup____ Project Number:___B43054.510_ Assessment Date:_7/20/05_ __
Location Roundup, MT_ MDT District:_____5____ Milepost:____49_____
Legal description: T_8N___ R_26E___ Section_18___ Time of Day:__4:30 PM & 7 AM_
Weather Conditions:__clear_____ Person(s) conducting the assessment:
_____LB/LWC_____
Initial Evaluation Date:__8/14/01__ Visit #:_____5____ Monitoring Year:_2005_____
Size of evaluation area:__22__acres Land use surrounding wetland: sewer treatment plant; waste recovery site; hayfields_

HYDROLOGY

Surface Water Source:___stormwater and treated water from_treatment plant_____
Inundation**:** Present_X___ Absent____ Average depths:_4___ft Range of depths:_0__-_6___ft
Assessment area under inundation:_67%
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.):
Area partially inundated, saturated, evidence of inundation, and marginally saturated/moist soils in Kochia area.

Groundwater
Monitoring wells: Present___X____Absent_____
Record depth of water below ground surface

Well #	Depth	Well #	Depth	Well #	Depth
3	7.5 feet				

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

COMMENTS/PROBLEMS: _Well water level higher than in past years; lagoons also flooded beyond levels observed in past years. Kochia is drowning out in south lagoon. _____

VEGETATION COMMUNITIES

Community No.:__1__ Community Title (main species):__ *Kochia scoparia* ___

Dominant Species	% Cover	Dominant Species	% Cover
Kochia scoparia	99		
Chenopodium leptophyllum	<1		
Chenopodium hybridium	<1		
Elymus cinereus	<1		

COMMENTS/PROBLEMS: ___This CT occurs in upland and wetland areas, identified by "UPL:CT-1" and "Wetland: CT-1" on map. _____
_____

Community No.:__2__ Community Title (main species): ___*Chenopodium spp.*_____

Dominant Species	% Cover	Dominant Species	% Cover
Chenopodium leptophyllum	<5	*Alopecurus arundinacea*	<1
Chenopodium hybridium	90	*Hordeum jubatum*	<1
Kochia scoparia	5	*Scirpus maritimus*	<1
Rumex maritimus	<1		
Rumex Crispus	<1		

COMMENTS/PROBLEMS: _____
_____
_____
_____

Community No.:__3__ Community Title (main species):_____ *Alopecurus arundinaceus* _____

Dominant Species	% Cover	Dominant Species	% Cover
Alopecurus arundinacea	85		
willow sprigs	<1		
Rumex crispus	<5		
Scirpus pungens	<5		
Phalarus arundinacea	<5		
Hordeum jubatum	<5		

COMMENTS/PROBLEMS: _____
_____
_____
_____

Additional Activities Checklist:
__X__Record and map vegetative communities on air photo

VEGETATION COMMUNITIES (continued)

Community No.:__4__ Community Title (main species):_____ *Kochia scoparia / Alopecurus arundinaceus* _____

Dominant Species	% Cover	Dominant Species	% Cover
Alopecurus arundinacea	80	*Eleocharis palustris*	<5
Lemna minor.	<1	*Scirpus acutus*	<1
Polygonum spp.	<1	*Kochia scoparia*	<5
Puccinellia nuttalliana	<5	*Chenopodium leptophyllum*	<5
Rumex crispus	<1	*Rumex maritimus*	<1
Scirpus pungens	<1	*Scirpus maritimus*	<1

COMMENTS/PROBLEMS: _____This community is diversifying. _____
_____
_____
_____

Community No.:__5__ Community Title (main species):__ *Agropyron cristatum/ Kochia scoparia* ___

Dominant Species	% Cover	Dominant Species	% Cover
Agropyron cristatum	40	*Rhus trilobata*	<1
Chenopodium leptophyllum	10	*Ribes aureum*	<1
Cirsium arvense	<5		
Grindelia spp.	<5		
Kochia scoparia	40		
Melilotus officinalis	<5		

COMMENTS/PROBLEMS: _____
_____
_____
_____

Community No.:_6__ Community Title (main species):_*Scirpus* spp._____

Dominant Species	% Cover	Dominant Species	% Cover
Scirpus maritimus	(100)		
Scirpus acutus	(100)		

COMMENTS/PROBLEMS: Unable to collect; inundated areas. _____
_____

COMPREHENSIVE VEGETATION LIST

Species	Vegetation Community Number(s)	Species	Vegetation Community Number(s)
Agropyron cristatum	1		
Alopecurus arundinacea	2, 3, 4		
Chenopodium leptophyllum	1, 2, 4, 5		
Chenopodium hybridum	1, 2		
Cirsium arvense	1, 5		
Eleocharis palustris	4		
Elymus cinereus	1		
Grindelia squarrosa	1, 5		
Hordeum jubatum	2, 3		
Kochia scoparia	1, 2, 4, 5		
Lemna minor	4		
Melilotus officinalis	1, 5		
Phalarus arundinacea	3, 4		
Polygonum spp.	4		
Puccinellia nuttalliana	4		
Rhus trilobata	1, 5		
Ribes aureum	1, 5		
Rumex crispus	2, 3, 4		
Rumex maritimus	2, 4		
Scirpus acutus	4		
Scirpus maritimus	**2, 4, 6**		
Scirpus pungens	3, 4, 6		
Salix sprigs	3		
Tamarix ramosissima	**2**	**(Should be cut/destroyed; one plant only.)**	
Bold denotes observed in 2005 for the first time			

COMMENTS/PROBLEMS: Tamarisk located on east side of south lagoon.

PLANTED WOODY VEGETATION SURVIVAL

Species	Number Originally Planted	Number Observed	Mortality Causes

COMMENTS/PROBLEMS: _____No live willow sprigs observed in 2005.

_____
_____
_____
_____
_____
_____
_____
_____

WILDLIFE

BIRDS

(Attach Bird Survey Field Forms)

Were man made nesting structures installed? Yes__X__ No____Type:_wood duck_ How many?__3____ Are the nesting structures being utilized? Yes_likely, 3 female with 10-15 chicks observed___ 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 (female)	1	X			
muskrat	1				
Bullsnake (3ft long)	1				
Red Fox (October visit, hunting foraging waterfowl)	2				
Mule Deer (October visit)	10				

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		wetland view	N
B		upland use	S
C		wetland view	E
D		wetland view	W
E		wetland view	S
F		wetland view	E
G		transect end on island	S
H		transect end on old dike	N

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:

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

COMMENTS/PROBLEMS: __*Data hand-drawn during 2005 monitoring event. _____
_____
_____
_____

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
__X*___Survey wetland-upland boundary with a resource grade GPS survey

COMMENTS/PROBLEMS: _*Hand-drawn 2005. _____
_____
_____
_____
_____

FUNCTIONAL ASSESSMENT

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

COMMENTS/PROBLEMS: _____
_____
_____
_____
_____

MAINTENANCE

Were man-made nesting structures installed at this site? YES_X__ NO____
If yes, do they need to be repaired? YES____ NO_X_
If yes, describe problems below and indicate if any actions were taken to remedy the problems.

Were man-made structures build or installed to impound water or control water flow into or out of the wetland? YES____ 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: Roundup Date: 7/19/05 Examiner: LB/LWC Transect # 1

Approx. transect length: 196' Compass Direction from Start (Upland): 14 degrees

Vegetation type A:	CT 1 (UPL soils/hydrol)	
Length of transect in this type:	10'	feet
Species:		Cover:
KOCSCO		100
CHEHYB		<1
Total Vegetative Cover:		100%

Vegetation type B:	CT 1 (WL)	
Length of transect in this type:	176'	feet
Species:		Cover:
KOCSCO (5% is dead)		100
CHEHYB		<1
Total Vegetative Cover:		100%

Vegetation type C:	CT 1 (UPL soils/hydrol)	
Length of transect in this type:	10'	feet
Species:		Cover:
KOCSCO		100
CHEHYB		<1
Total Vegetative Cover:		100%

Vegetation type D:		
Length of transect in this type:		feet
Species:		Cover:
Total Vegetative Cover:		

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 100%* % 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:

* Most of open water edges are vegetated w/ *Chenopodium hybridium* but this species has no indicator status (not in manual). Because this perimeter was saturated it is assumed it is a FAC-OBL spp.

3

BIRD SURVEY – FIELD DATA SHEET

Date: **see below**

SITE: Roundup: 2005 May, July and October Surveys

Bird Species	#	Behavior	Habitat	Bird Species	#	Behavior	Habitat
SPRING: (5/10/05)				**MID-SEASON (7/19-20/05):**			
American Avocet	8	BR/F/FO	OW/MA	American Avocet	11	F	OW/MF
American Wigeon	8	F	OW	Game bird, female	1	flushed	MA
Blue-winged teal	6	F	OW	Gull, unidentified	1	F	OW
Canada Goose	15	BD	OW/UPL	Killdeer	10	BD/F	MA
Canvasback	2	BD	OW	Mallard	23*	F	OW
Cinnamon Teal	4	F	OW	Red-wing Blackbird	30-50	BD	MA
Eared Grebe	3	OW/MA	F	Song Sparrow	3	BD	MA
Gadwall	10	F/L	OW	Spotted Sandpiper	5	F	MA/OW
Green-winged Teal	10	F	OW	Tree Swallow	2	F	OW/MA
Mallard	4	F	OW	Wilson's Phalarope	4	F	OW/MA
Northern Shoveler	20	F	OW	Wood Duck	15*	F	OW
Pied-billed Grebe	1	F	OW				
Red-winged Blackbird	10	BD	MA				
Song Sparrow	2	BD	MA				
Tree swallow	20	F	OW/MA	**FALL (10/11/05):**			
Willet	2	F/BD	OW/MF	American Coot	2	F	OW
Wilson's Phalarope	30	F	OW/MA	Blue-winged Teal	1	F	MA
Wood Duck	2	OW	F	Canada Goose	1	L	OW
				Green-winged Teal	3	F	OW/MA
				Gadwall	3	F	OW
				Mallard	40	F/L	OW
				Marsh Wren	1	F	MA
				Song Sparrow	1	? (singing, not seen)	MA
				Western Meadowlark	1	Flushed	UPL to MA
				Unidentified Shorebird	2 (same sp)	F	MA

Notes:
*Mallard-3 adult 20 young
* Wood Duck-3 adult females, 10-15 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: Roundup	Date: 7/20/05
Applicant/Owner: MDT	County: Musselshell
Investigator: LB/LWC	State: MT
Do Normal Circumstances exist on the site: X Yes ___ No	Community ID: Kochia (btw stake G and H)
Is the site significantly disturbed (Atypical Situation)? X Yes ___ No	Transect ID: 1
Is the area a potential Problem Area?: ___ Yes X No	Plot ID: SP-1
(If needed, explain on reverse.)	

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1	*Kochia scoparia*	H	FAC	9			
2				10			
3				11			
4				12			
5				13			
6				14			
7				15			
8				16			

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

Qualifies as wetland given the FAC inclusion in wetland indicators.

HYDROLOGY

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

___ No Recorded Data Available

Field Observations:

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

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

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

Wetland Hydrology Indicators:

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

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

Remarks:

Area likely wetter (though not detectable today) as indicated by the dying Kochia.

SOILS

Map Unit Name (Series and Phase): Havre-Glendive Complex (11A)

Drainage Class: well

Taxonomy (Subgroup): NA

Field Observations

Confirm Mapped Type? ____ Yes X No

Profile Description:

Depth inches	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
10”	A	5Y4/2	5 Y 4/6	lg., common, distinct	sandy loam

Hydric Soil Indicators:

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

Hydric soil; damp but not saturated.

WETLAND DETERMINATION

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

Remarks:

Kochia dying out, 5% of this area between transect ends is dead and the plant is only2-3 ft high, whereas other years it has been over 5-6 ft high.

Approved by HQUSACE 2/92

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

Project/Site:	Roundup	Date:	7/20/05
Applicant/Owner:	MDT	County:	Musselshell
Investigator:	LB/LWC	State:	MT

Do Normal Circumstances exist on the site:	X	Yes		No	Community ID: Kochia (Stake G on island)
Is the site significantly disturbed (Atypical Situation)?	X	Yes		No	Transect ID: 1
Is the area a potential Problem Area?: (If needed, explain on reverse.)		Yes	X	No	Plot ID: SP-2

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1	*Kochia scoparia*	H	FAC	9			
2				10			
3				11			
4				12			
5				13			
6				14			
7				15			
8				16			

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

Qualifies as wetland given the FAC inclusion in wetland indicators.

HYDROLOGY

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

____ No Recorded Data Available

Field Observations:

Depth of Surface Water: - (in.)

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

Depth to Saturated Soil: - (in.)

Wetland Hydrology Indicators:

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

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

Remarks:

This SP is located on the constructed island and though it has the same spp. profile as SP-1 the island would likely have less hydrology because it is elevated.

SOILS

Map Unit Name (Series and Phase): Havre-Glendive Complex (11A)

Drainage Class: well

Field Observations

Taxonomy (Subgroup): NA

Confirm Mapped Type? _____ Yes _____ No

Profile Description:

Depth inches	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
10	A-B (berm)	5Y 4/2			silt loam

Hydric Soil Indicators:

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

Non-hydric soil.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? X Yes _____ No
Wetland Hydrology Present? _____ Yes X No
Hydric Soils Present? _____ Yes X No

Is this Sampling Point Within a Wetland? _____ Yes X No

Remarks:

Island is not within WL boundary.

Approved by HQUSACE 2/92

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

1. Project Name: Roundup Wetland **2. Project #:** 3054 **Control #:** _____

3. Evaluation Date: 7/20/2005 **4. Evaluator(s):** LB/LWC **5. Wetland / Site #(s):** _____

6. Wetland Location(s) i. T: 8 N **R:** 26 E **S:** 18 **T:** __ N **R:** __ E **S:** _____

ii. Approx. Stationing / Mileposts: _____

iii. Watershed: 10040202 **GPS Reference No. (if applies):** _____

Other Location Information: _____

7. A. Evaluating Agency LWC

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

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
Depression	Palustrine	None	Emergent Wetland	Permanently Flooded	Excavated	30
Depression	Palustrine	None	Unconsolidated Bottom	Temporarily Flooded	Excavated	65
Depression	Palustrine	None	Aquatic Bed	Permanently Flooded	Excavated	5
---	---	---	---	---	---	

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

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.	---	---	moderate disturbance
AA not cultivated, but moderately grazed or hayed or selectively logged or has been subject to relatively minor clearing, or fill placement, or hydrological alteration; contains few roads or buildings.	---	---	---
AA cultivated or heavily grazed or logged; subject to relatively substantial fill placement, grading, clearing, or hydrological alteration; high road or building density.	---	---	---

Comments: (types of disturbance, intensity, season, etc.) roads and dump and sewarge lagoon in adjacent land

ii. Prominent weedy, alien, & introduced species: Chenopodium and Kochia (severe)

iii. Briefly describe AA and surrounding land use / habitat: sewage treatment palnt to east, dump and industry to west.

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: The migratory bird diversity would increase if shrubs were introduced to the edges of the wetland, particularly the north lagoon because of its perennial water presence.

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
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 and Rating	---	---	---	---	---	---	0 (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	Rana sp. observed, may be primary habitat
Secondary habitat **(list species)**	☐ D	☐ S	_____
Incidental habitat **(list species)**	☐ D	☐ S	_____
No usable habitat	☐ D	☐ S	_____

iii. **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 and Rating	---	.8 (H)	---	---	---	---	---

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 appropriate AA attributes 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)	--	--	--	--	--	--	--	--	H	--	--	--	--	--	--	--	--	--	--	--
High disturbance at AA (see #12)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

iii. **Rating** (Using 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	--	.9 (H)	--	--
Moderate	--	--	--	--
Low	--	--	--	--

Comments: The avian diversity is substantial at this site, particularly waterfowl and shorebirds. Red fox, deer, muskrat also observed

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

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

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

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

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

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

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

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

Comments: _____

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

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

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

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

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

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

Applies to wetlands that flood or pond from overbank or in-channel flow, precipitation, upland surface flow, or groundwater flow.
If no wetlands in the AA are subject to flooding or ponding, check NA above.

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

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

Comments: _____

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

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

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

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

Comments: _____

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

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

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

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

Comments: "Wetland" veg. actually Chenopodium (FAC) and Kochia (FAC)

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	--	--	--	.8H	--	--	--	--	--	--	--	--	--	--	--	--	--	--
S/I	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
T/E/A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Comments: Kochia area not counted, too weedy though proliferative.

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

i. ☐ **Discharge Indicators**

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

ii. ☐ **Recharge Indicators**

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

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

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

Comments: likely a seep on north side, area lined otherwise.

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)	--	--	--	--	--	--	--	.3L	--
High disturbance at AA (#12i)	--	--	--	--	--	--	--	--	--

Comments:

14L. RECREATION / EDUCATION POTENTIAL

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

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

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

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

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

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

Comments: excellent bird watching area.

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	L	0.00	1	
B. MT Natural Heritage Program Species Habitat	H	0.80	1	
C. General Wildlife Habitat	H	0.90	1	
D. General Fish/Aquatic Habitat			--	
E. Flood Attenuation	M	0.60	1	
F. Short and Long Term Surface Water Storage	H	1.00	1	
G. Sediment/Nutrient/Toxicant Removal	M	0.70	1	
H. Sediment/Shoreline Stabilization	H	1.00	1	
I. Production Export/Food Chain Support	H	0.80	1	
J. Groundwater Discharge/Recharge	L	0.10	1	
K. Uniqueness	L	0.30	1	
L. Recreation/Education Potential	H	1.00	1	
	Totals:	7.20	11.00	154
	Percent of Total Possible Points:		**65%** (Actual / Possible) x 100 [rd to nearest whole #]	

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

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

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

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

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

☐ **I** ☒ **II** ☐ **III** ☐ **IV**

Appendix C

REPRESENTATIVE PHOTOGRAPHS

MDT Wetland Mitigation Monitoring
Roundup Wetland
Roundup, Montana

ROUNDUP WETLAND MITIGATION SITE 2005

Location: A **Description:** Wetland view
Compass Reading: N

Location: B **Description:** Wetland view
Compass Reading: S

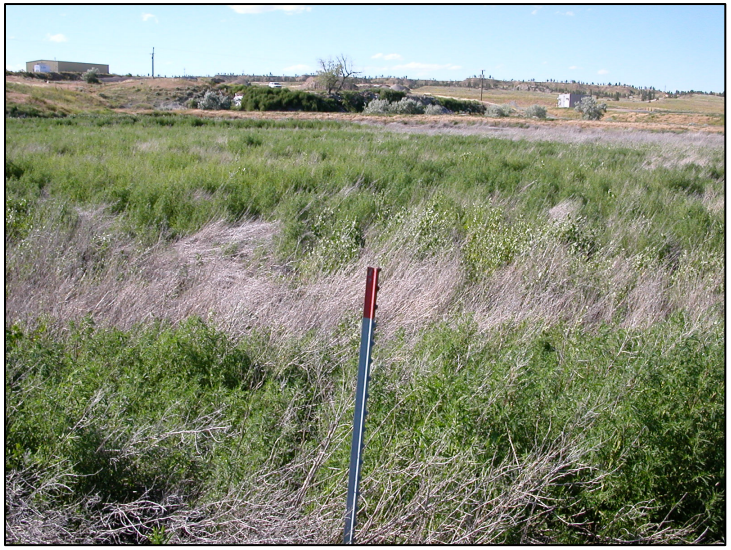
Location: C **Description:** Wetland view
Compass Reading: E

Location: D **Description:** Wetland view
Compass Reading: W

ROUNDUP WETLAND MITIGATION SITE 2005

Location: E **Description:** Wetland view **Compass Reading:** S

Location: F **Description:** Wetland view
Compass Reading: E



Location: G **Description:** Transect end
Compass Reading: S

Location: H **Description:** Transect end on old dike
Compass Reading: N

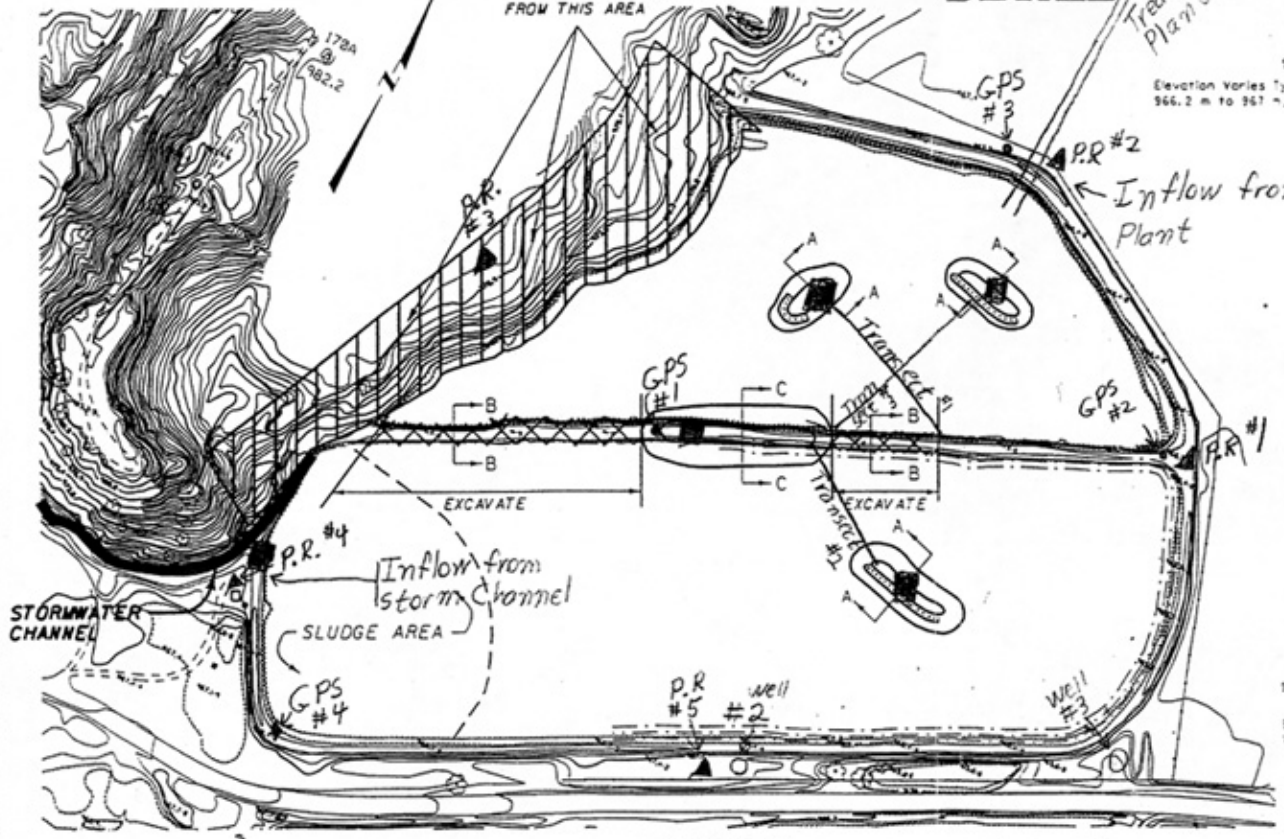
Appendix D

ROUNDUP EAST LAGOON WETLAND FINAL PLAN

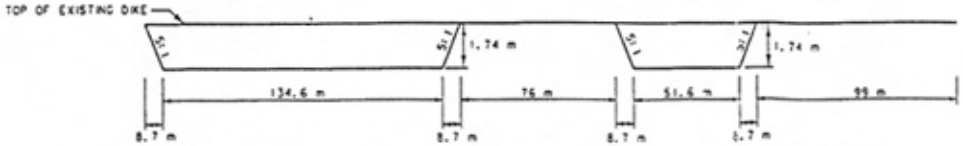
MDT Wetland Mitigation Monitoring
Roundup Wetland
Roundup, Montana

Figure 2

DETAIL

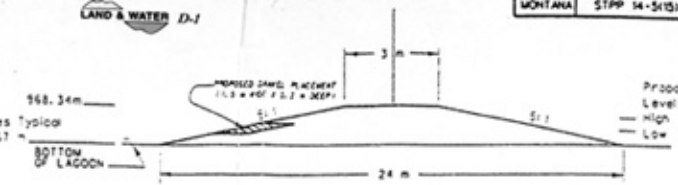


PLAN VIEW — GRAVEL AREAS



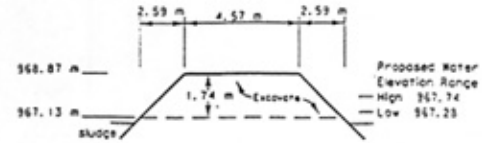
LONGITUDINAL SECTION OF EXISTING DIKE (between north & south lagoon cells)

NOT TO SCALE



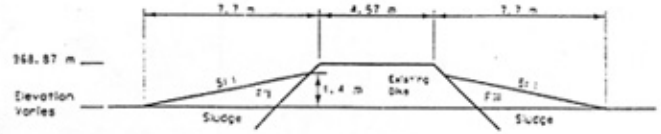
SECTION A-A (Islands)

NOT TO SCALE



SECTION B-B (Existing Dike Excavation)

NOT TO SCALE



SECTION C-C (Remaining Portion of Existing Dike)

NOT TO SCALE

▲ Photo Reference points
○ Well
• G.P.S Point
■ Wood Duck Box

SCALE = 1:1250

ROUNDUP EAST
LAGOON WETLAND

FINAL PLAN

Appendix E

BIRD SURVEY PROTOCOL
GPS PROTOCOL

MDT Wetland Mitigation Monitoring
Roundup Wetland
Roundup, 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 F

2005 MACROINVERTEBRATE SAMPLING PROTOCOL AND DATA

MDT Wetland Mitigation Monitoring
Roundup Wetland
Roundup, 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

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

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McCune, B. and J.B. Grace. 2002. Analysis of Ecological Communities. MjM Software Design, Gleneden Beach, Oregon, USA.

McCune, B. and M.J. Mefford. 2002. PC-ORD. Multivariate Analysis of Ecological Data, Version 4. MjM Software Design, Gleneden Beach, Oregon, USA.

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.: MDT05LW029

RAI No.: MDT05LW029 **Sta. Name:** ROUNDUP
Client ID:
Date Coll.: **No. Jars:** 1 **STORET ID:**

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Non-Insect							
Ostracoda	84	75.00%	Yes	Unknown		8	CG
Physidae							
Physidae	1	0.89%	Yes	Unknown		8	SC
Heteroptera							
Corixidae							
Corisella sp.	3	2.68%	Yes	Adult		11	PR
Coleoptera							
Dytiscidae							
Dytiscidae	3	2.68%	Yes	Larva	Larva	5	PR
Chironomidae							
Chironomidae							
Chironomus sp.	10	8.93%	Yes	Larva		10	CG
Glyptotendipes sp.	10	8.93%	Yes	Larva		10	SH
Tanypus sp.	1	0.89%	Yes	Larva		10	PR
Sample Count	**112**						

Metrics Report

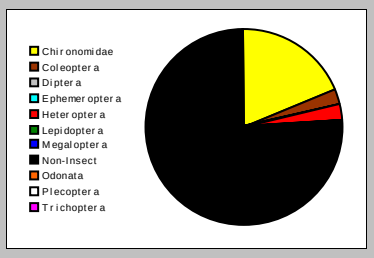
Project ID: MDT05LW
RAI No.: MDT05LW029
Sta. Name: ROUNDUP
Client ID:
STORET ID
Coll. Date:

Abundance Measures

Sample Count:	112	
Sample Abundance:	33,600.00	0.33% of sample used
Total Abundance:	45,192.00	
Coll. Procedure:		
Sample Notes:		

Taxonomic Composition

Category	R	A	PRA
Non-Insect	2	85	75.89%
Odonata			
Ephemeroptera			
Plecoptera			
Heteroptera	1	3	2.68%
Megaloptera			
Trichoptera			
Lepidoptera			
Coleoptera	1	3	2.68%
Diptera			
Chironomidae	3	21	18.75%

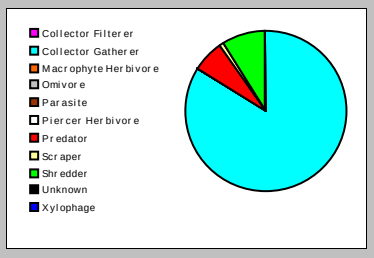


Dominant Taxa

Category	A	PRA
Ostracoda	84	75.00%
Glyptotendipes	10	8.93%
Chironomus	10	8.93%
Dytiscidae	3	2.68%
Corisella	3	2.68%
Tanypus	1	0.89%
Physidae	1	0.89%

Functional Composition

Category	R	A	PRA
Predator	3	7	6.25%
Parasite			
Collector Gatherer	2	94	83.93%
Collector Filterer			
Macrophyte Herbivore			
Piercer Herbivore			
Xylophage			
Scraper	1	1	0.89%
Shredder	1	10	8.93%
Omivore			
Unknown			

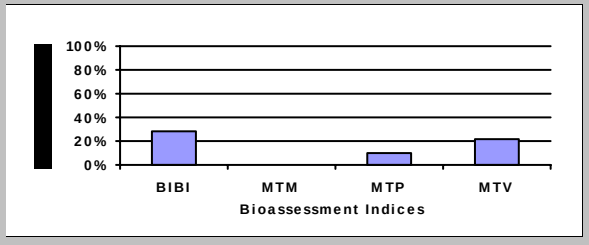


Metric Values and Scores

Metric	Value	BIBI	MTP	MTV	MTM
Composition					
Taxa Richness	7	1	0		0
Non-Insect Percent	75.89%				
E Richness	0	1		0	
P Richness	0	1		0	
T Richness	0	1		0	
EPT Richness	0		0		0
EPT Percent	0.00%		0		0
Oligochaeta+Hirudinea Percent					
Baetidae/Ephemeroptera	0.000				
Hydropsychidae/Trichoptera	0.000				
Dominance					
Dominant Taxon Percent	75.00%		0		0
Dominant Taxa (2) Percent	83.93%				
Dominant Taxa (3) Percent	92.86%	1			
Dominant Taxa (10) Percent	100.00%				
Diversity					
Shannon H (loge)	0.925				
Shannon H (log2)	1.335		0		
Margalef D	1.272				
Simpson D	0.576				
Evenness	0.106				
Function					
Predator Richness	3		1		
Predator Percent	6.25%	1			
Filterer Richness	0				
Filterer Percent	0.00%			3	
Collector Percent	83.93%		1		0
Scraper+Shredder Percent	9.82%		1		0
Scraper/Filterer	0.000				
Scraper/Scraper+Filterer	0.000				
Habit					
Burrower Richness	2				
Burrower Percent	17.86%				
Swimmer Richness	1				
Swimmer Percent	2.68%				
Clinger Richness	0	1			
Clinger Percent	0.00%				
Characteristics					
Cold Stenotherm Richness	0				
Cold Stenotherm Percent	0.00%				
Hemoglobin Bearer Richness	3				
Hemoglobin Bearer Percent	18.75%				
Air Breather Richness	1				
Air Breather Percent	2.68%				
Voltinism					
Univoltine Richness	2				
Semivoltine Richness	1	1			
Multivoltine Percent	93.75%		0		
Tolerance					
Sediment Tolerant Richness	0				
Sediment Tolerant Percent	0.00%				
Sediment Sensitive Richness	0				
Sediment Sensitive Percent	0.00%				
Metals Tolerance Index	4.571				
Pollution Sensitive Richness	0	1		0	
Pollution Tolerant Percent	13.39%	5		1	
Hilsenhoff Biotic Index	8.303		0		0
Intolerant Percent	0.00%				
Supertolerant Percent	94.64%				
CTQa	100.800				

Bioassessment Indices

BioIndex	Description	Score	Pct	Rating
BIBI	B-IBI (Karr et al.)	14	28.00%	
MTP	Montana DEQ Plains (Bukantis 1998)	3	10.00%	Severe
MTV	Montana Revised Valleys/Foothills (Bollman 1998)	4	22.22%	Moderate
MTM	Montana DEQ Mountains (Bukantis 1998)	0	0.00%	Severe



Appendix G

WEED MANAGEMENT

MDT Wetland Mitigation Monitoring
Roundup Wetland
Roundup, Montana

Kochia scoparia Characteristics

Disturbance of the soil and vegetation associated with construction activities, whether on upland reclamation projects or wetland mitigation project sites, typically renders the sites susceptible to weed infestation. Summer-cypress (*Kochia scoparia*), or more commonly referred to as kochia, is an undesirable annual weed that has become a troublesome weed across Montana that colonizes readily on disturbed sites.

Kochia is an early-emerging forb that reproduces exclusively by seed. One plant can produce over 50,000 seeds per year under favorable conditions. Seeds have little or no seedbank viability, they either germinate or decay in 1 year (Booth, 1987). Seeds of kochia have a dormancy period of 2 to 3 months and germinate early in the spring. Kochia has an extensive root system, often penetrating to depths of 6 to 8 feet. Kochia is considered a drought tolerant plant and does not tolerate spring flooding (Boerboom, 1993). This forb is typically found in open unshaded areas on disturbed sites and grows well on a variety of soils types and is often found on saline/alkaline soils.

Herbicide Control

Kochia can be effectively controlled with a variety of herbicides. Grazing and mowing will not control kochia or stop seed production (Anderson, 1994). The effect of fire on kochia is that the plant is often killed, but depending upon the burning season and intensity, seeds still may be viable in the soil for germination.

Herbicides must be used with care in riparian areas in order to protect non-target vegetation and prevent water contamination (**Table 5**). In addition, recent studies have indicated that amphibians are highly susceptible to herbicides. Herbicides that are labeled for riparian areas include 2,4-D, glyphosate (Rodeo label), and triclopyr (Garlon, Redeem). Effective herbicides for the control of kochia on upland areas include Vista (fluroxypry), Curtail (clopyralid) and Redeem (triclopyri and clopyralid). Herbicides such as Rodeo are non-target and kill all vegetation. Herbicides such as Vista, Curtail and Redeem are selective and kill only broadleaf plants.

Kochia is a difficult-to-control weed with an aggressive root system. While the species exhibits varying degrees of tolerance to dicamba (Banvel, Weedmaster), Vista controls even dicamba-resistant/tolerant kochia. Dicamba should not be used in areas adjacent to riparian areas or waterbodies.

Herbicides that readily leach, and herbicides with strict label prohibitions against contamination of water should be used only where there is certainty that they will not drift or enter stormwater runoff into adjacent riparian areas or waterbodies. These herbicides include clopyralid (Stinger, Transline, Curtail), dicamba (Banvel, Weedmaster), metsulfuron (Ally, Escort) and picloram (Tordon).

Management Suggestions

Based on LWC's 2003 monitoring data, kochia dominates this mitigation wetland site. Effective weed control measures for 2004 may include the following:

- Burning off old kochia skeletons to remove the canopy cover in the early spring.
- Spray (using the appropriate herbicide) early in the spring while the kochia plants are actively growing and the kochia seedlings are 3 to 4 inches tall.
- Reseed in the spring with a seed mix formulated with some quick germinating species (e.g. barley, and includes MDT recommended wetland seed mix) to help control the invasion of other annual and undesirable weedy species. A specified amount of time is needed prior to reseeding as not to injure the seed or newly seeded grass and forb species with herbicide soil residual effects. This reseeding time is directly related to the chemical and the amount of herbicide applied.
- Visit the site later in the summer to assess the weed control and seedling efforts, identify locations, if any, of new weed infestation or areas particularly susceptible to new infestations. Spot-spraying may be needed and some areas may need to be reseeded in the fall.

The specific herbicide, application rate, and timing should be approved by the Yellowstone County Weed Supervisor (Scott Bockness), MDT's botanist, MDT's weed control specialist, and the adjacent land owner. It is recommended that herbicides be applied by a licensed applicator.

Table 5: ***Summary of herbicide recommendations for use in the control of*** **Kochia scoparia.**

Herbicide	Active Ingredient	Area of Use	Target Species
Rodeo	2,4-D, glyphosate	riparian[1]	non-target[2]
Garlon	triclopyr	riparian	selective[4]
Redeem	triclopyr	riparian, upland	selective
Vista	fluroxypry	upland	selective
Curtail	clopyralid	upland; avoid[3]	selective
Roundup	glyphomax	avoid	non-target
Stinger	clopyralid	avoid	selective
Transline	clopyralid	avoid	selective
Banvel	dicamba	avoid	selective
Weedmaster	dicamba	avoid	selective
Ally	metsulfuron	avoid	selective
Escort	metsulfuron	avoid	selective
Tordon	picloram	avoid	selective

[1] Safe for use within or adjacent to riparian areas or waterbodies.
[2] Non-target: kills all species.
[3] Not safe adjacent to water bodies or riparian areas.
[4] Kills broadleaf