MONTANA DEPARTMENT OF TRANSPORTATION WETLAND MITIGATION MONITORING REPORT: YEAR 2003

Roundup Wetland
Roundup, Montana

Prepared for:

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

March 2004

Project No: 130091.031

Prepared by:

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

LAND & WATER

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TABLE OF CONTENTS

TABLES

FIGURES

CHARTS

APPENDICES

1.0 INTRODUCTION

This annual report summarizes methods and results of the third 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. Five monitoring wells were installed around the lagoon to monitor any possible groundwater contamination from the sludge. After a review of groundwater quality sampling data, both the DEQ and EPA agreed that there was not a groundwater contamination problem associated with the lagoons (MDT). The organic "sludge" was left in the west end of the southern end of the wetland bed and capped with one foot of soil during construction to prevent potential biohazards risks. 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**).

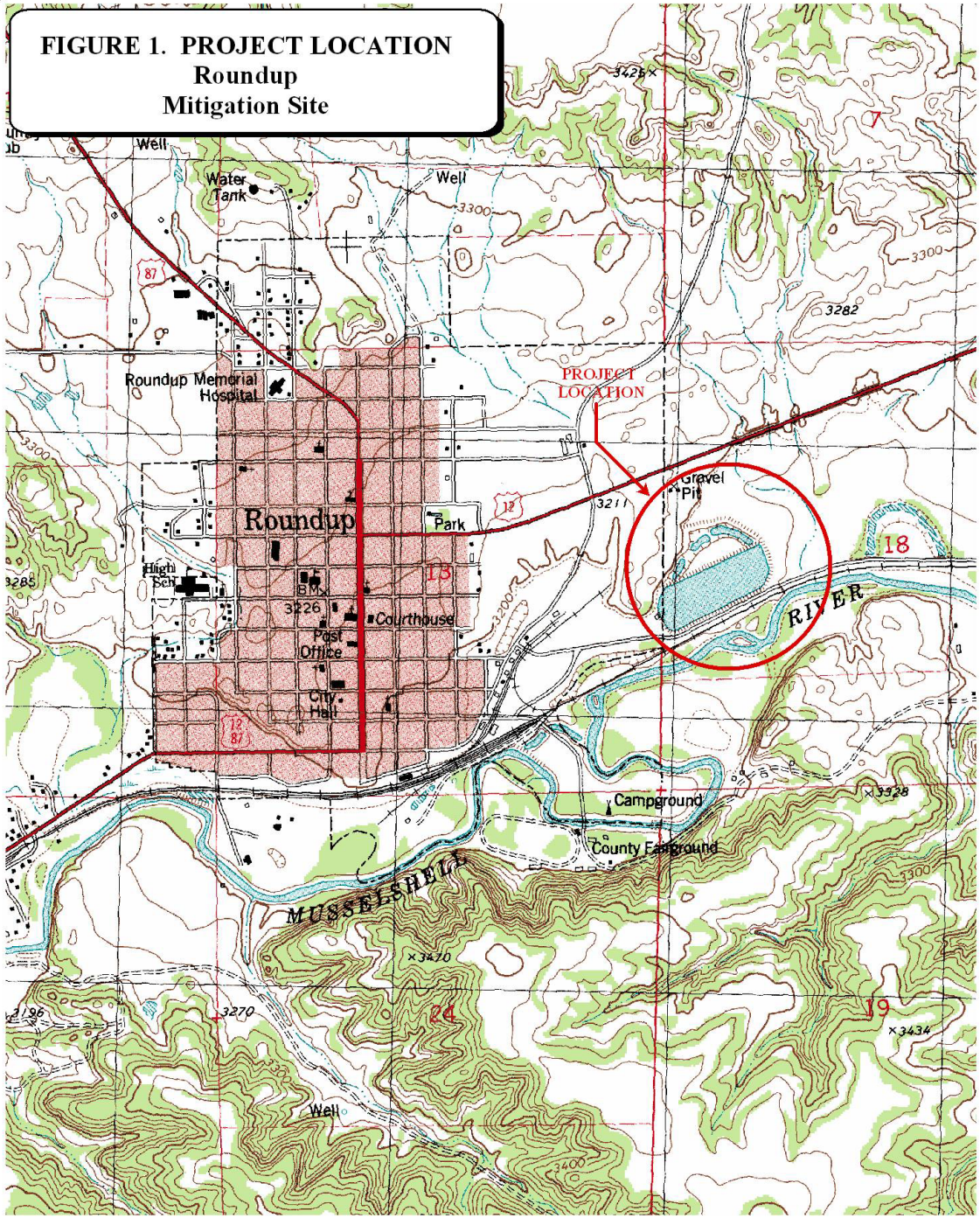
One source of hydrology is through a channel, which funnels storm water runoff from the northeastern section of the city of Roundup and U.S. Highway 12 into the southwestern end of the wetland. The estimated runoff volume for this system is 12,700 m^3, and 17,825 m^3 of water for the 5-and 25-year event, respectively (MDT 2000). Treated wastewater from the new Roundup sewage treatment facility is also 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.

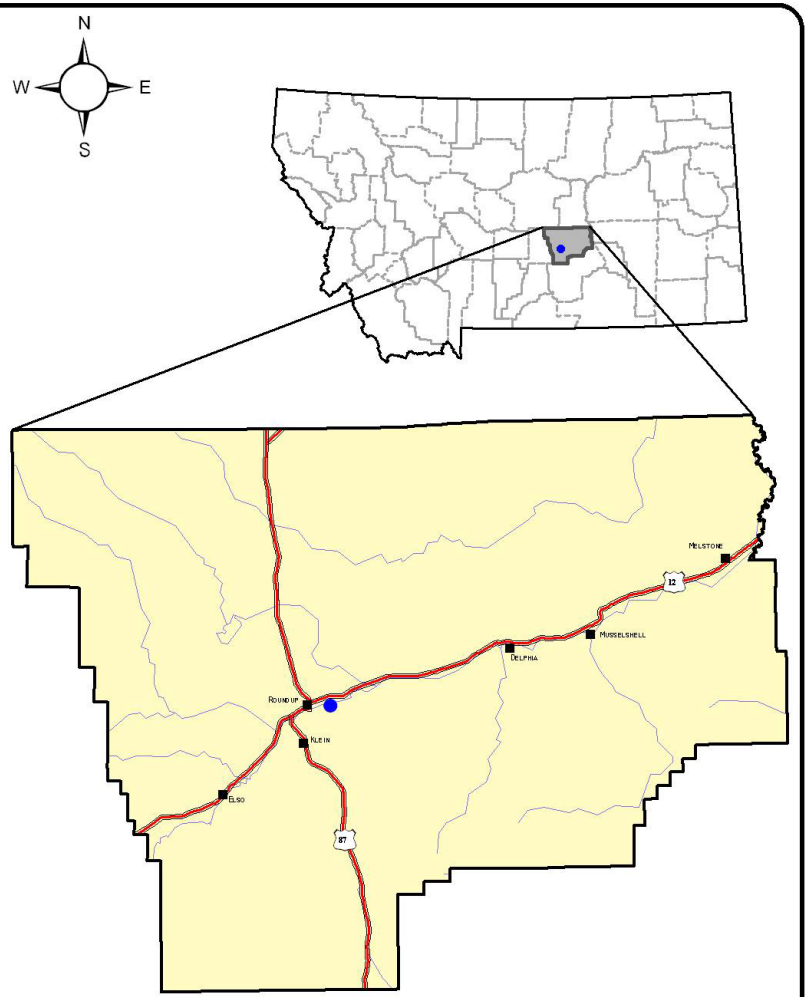
2.0 METHODS

2.1 Monitoring Dates and Activities

The Roundup wetland mitigation site was monitored on three dates in 2003: May 3 (bird observation), August 30 (monitoring event), and October 9 (bird observation). All information contained within the Wetland Mitigation Site Monitoring Form **(Appendix B)** was collected during the monitoring event.

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

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 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 2003 were compared to the 1971-2000 average (WRCC 2003).

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.

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)**. Five 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)** and retaken at the same locations in 2002 and 2003. New photo locations were recorded on the map by hand. 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 2003 season; wetland boundaries and community types were recorded by hand 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 2003 monitoring event, depth to groundwater within well number #3 was 9.1 feet; during 2002 monitoring the level was 9.2 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**). Second, treated wastewater from the new Roundup sewage treatment facility is discharged into the wetland to maintain the designed water level elevation.

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 COE and MTDEQ because the wetland would then be considered part of the treatment facility, which generally are not considered mitigation by the COE, and would have required special discharge permits from both the EPA and DEQ. Water levels in the wetland decrease through evaporation and evapotranspiration during the growing season.

During the August 30, 2003 visit, approximately 25% of the assessment area was inundated with approximately 0.5 to 4 feet of standing water. During August there was a very shallow puddle (estimated <1" deep) in the southeast corner of the AA and a connected open water area in the central southwest area (estimated <6" deep).

According to the Western Regional Climate Center (WRCC 2003), the Roundup station annual mean (1971-2000) precipitation was 13.46 inches; the average precipitation through the month of August (month of June was omitted) for that period was 7.25 inches. For the year 2003,

precipitation through August (June data is missing) was 5.96 inches or 82% of the mean. Statewide, Montana has experienced a 4-year drought, which would have a negative effect on the development of wetland vegetation within this site that is dependent on stormwater discharge.

3.2 Vegetation

Vegetation species identified on the site are presented in **Table 1** and in the monitoring form **(Appendix B)**. Five (5) 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)*;* and, *Type 5, Agropyron cristatum/Kochia scoparia.* Dominant species within each community are listed on the monitoring form **(Appendix B)**.

The Roundup wetland site appears to be developing greater plant species diversity; however, the obligate/facultative wet vegetation species (Community Type 4) occur within very small areas (<10 square feet). These areas appear to have decreased in size since 2002 and the FACW/OBL percent cover also appears to be decreasing and being replaced with *Kochia* and *Alopecurus*. The drought may be causing this decrease in hydrophytic species and subsequent proliferation of weedy species such as *Kochia* and *Chenopodium*. With adequate stormwater events, these weedy species should naturally be extirpated. Planting hydrophytic species in areas that are continuously saturated, such as the central southwest area and the southeast corner, would accelerate hydrophytic vegetation proliferation once the drought ceases.

The wetland boundary includes areas with no vegetation that become open water pools after storm events and/or the release of treated water from the treatment plant. At the time of the monitoring event (August) most of the south lagoon was dry with the exception of three large shallow pools. The vegetated portion of the wetland continues to qualify as a wetland because the dominant vegetation, *Kochia,* is a FAC species. The other dominant plant, *Chenopodium hybridum,* is not included within the indicator status manual. However, *Chenopodium* also continues to colonize the saturated margins of the open water ponds and is thus included within the wetland boundary.

The vegetation transect results are detailed in the monitoring form **(Appendix B),** the transect maps, **Table 2**, and **Chart 1**. Vegetation species along the transect has not changed; the wetland area remains dominated by *Kochia.* No other hydrophytic species were observed in 2002 or 2003 along the transect except for *Kochia* and *Chenopodium*; no upland species were noted as a result of competition.

The transect spans the distance between the old dike separating the south and north lagoons and a constructed island adjacent to one of the northern lagoon ponds. The area between the dike and islands qualified as a wetland with nearly 100% *Kochia* (FAC), very strong hydric soils and evidence of hydrology. The dike and islands were classified as upland, though the dominant species was also *Kochia*, as a result of the absence of hydric soil and evidence of hydrology. This *Kochia scoparia* vegetation type was placed in Community Type 1; however, it is classified as upland or wetland depending on the presence or absence or hydric soils and positive hydrology indicators.

Table 1: ***2001-2003 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 spp. *	**(unknown ID, likely FACW-OBL)**
Grindelia squarrosa	FACU
Kochia scoparia	FAC
Lemna minor	OBL
Melilotus officinalis	FACU
Phalaris arundinacea	FACW
Polygonum spp.	(unknown ID, likely FACW-OBL)
Puccinellia nuttalliana	OBL
Rhus trilobata	-(FAC)
Ribes aureum	FAC+
Rumex crispus	FACW
Rumex maritimus	FACW+
Scirpus acutus *	**OBL**
Scirpus pungens	OBL

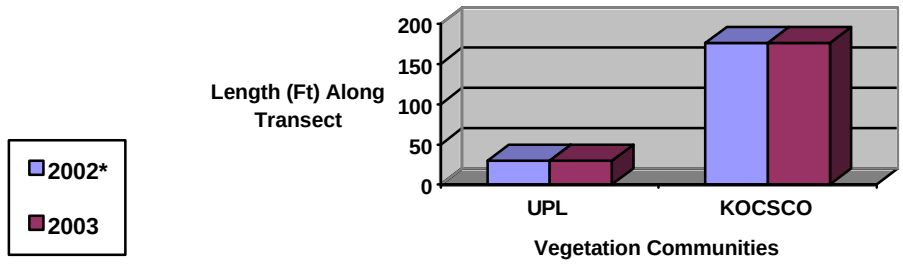
[1]**Bolded** species indicate those documented within the analysis area for the first time.
- : Species not listed in the National List of Plant Species that Occur in Wetlands (Reed 1988); parenthetical status is assumed.
(*Two species, *Eleocharis* and *Scirpus acutus*, could not be positively identified because both were beyond an inundated area.)

Table 2: ***2001-2003 Transect Data Summary***

Monitoring Year	2001[1]	2002	2003
Transect Length	100 feet	196 feet	196 feet
# Vegetation Community Transitions along Transect	1	3	3
# Vegetation Communities along Transect	2	2	2
# Hydrophytic Vegetation Communities along Transect	1	1	1
Total Vegetative Species	4	2	2
Total Hydrophytic Species	2	2	2
Total Upland Species	2	0[2]	0
Estimated % Total Vegetative Cover	100%	100%	100%
% Transect Length Comprised of Hydrophytic Vegetation Communities	60%	90%	90%
% Transect Length Comprised of Upland Vegetation Communities	40%	10%	10%
% Transect Length Comprised of Unvegetated Open Water	0%	0%	0%
% Transect Length Comprised of Bare Substrate	0%	0%	0%

[1] Transect moved in 2002.; [2] Hydrophytic species along transect were *Koch*ia and *Chenopodium; transect included an area of non-hydric soils and a lack of hydrology.*

Chart 1: Length of Vegetation Communities along Transect 1



*** 2001 transect moved; data not included in bar graph.**

2001 Transect Map*

Transect 1 Start	Upland Type 2 (60')	Wetland Type 1 (40')	Total 100'	End Transect 1

* Transect moved in 2002

2002 Transect Map

Transect 1 Start	Upland Type 1 (10')	Wetland Type 1 (176')	Upland Type 1 (10')	Total 196'	End Transect 1

2003 Transect Map

Transect 1 Start	Upland Type 1 (10')	Wetland Type 1 (176')	Upland Type 1 (10')	Total 196'	End Transect 1

3.2.1 Weed Control

A weed management program is recommended to eradicate kochia and goosefoot from the mitigation wetland. The following information is kochia specific because of its prevalence throughout the site, however, kochia and goosefoot are in the same family: Chenopodiaceae. The information is intended to provide guidance in the decision-making process with regard to the planning and implementation of a coordinated kochia control effort.

3.2.1.1 Kochia 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.

3.2.1.2 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 fire effect on kochia is that the plant is most likely 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 3**). 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).

3.2.1.3 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 selection, application rates, and timing should be approved by the Yellowstone County Weed Supervisor (Scott Bockness), MDT's biologist and the adjacent land owner. A use of a licensed herbicide applicator is also recommended.

Table 3. ***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

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.

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 very dark gray (10YR 3/2) sandy loam at a depth of 0-1 inches. From 1-12 inches the soil was a matrix of dark brown and dark yellowish brown (2.5YR 3/3 & 3/4) silty sand; no mottles were evident in the profile. At SP-2 (upland) on the island, the soil was a weak red (2.5YR 4/2) rocky silt loam from 0-8 inches and impenetrable rocky layer at greater than 8 inches.

3.4 Wetland Delineation

The delineated wetland boundary includes the intermittently exposed soil in the southern lagoon, which fills with water after a storm event or treatment plant release. The wetland boundary excludes the historic dike and the constructed islands **(Figure 3, Appendix A)**. The gross "wetland" area is comprised of 22 acres, which includes 5.42 acres of open water and 5.49 acres of intermittently exposed soil; the resulting net wetland area is 11.09 acres. The increase in wetland area from 2002 to 2003 (1.89 acres) is the result of the expansion of Kochia in the south lagoon area. The COE data forms are included in **Appendix B.**

Intermittently exposed soil areas tend not to support weedy species where the line of inundation occurs after storm events. Areas that have very shallow water throughout most of the year (south lagoon) may colonize with hydrophytic vegetation if the area is seeded or plugged with species found on site, including *Scirpus, Eleocharis, and Puccinellia*, and may include species within the broader location.

3.5 Wildlife

Wildlife species are listed in **Table 4.** Activities and densities associated with these observations area included on the monitoring form in **Appendix B**. Deer scat was observed in the wetland area and the active fox den observed in 2002 was uninhabited in 2003.

Four wood duck boxes are located on the site as shown on **Figure 2, Appendix B**. None of the boxes that were checked showed signs of wood duck occupation during any of the monitoring visits. However, starlings appeared to be using two of the boxes for nest sites during the spring visit. Several wood ducks were observed foraging in the north lagoon during the fall visit.

3.6 Macroinvertebrates

Scores indicated poor biotic conditions at the Roundup site for the second year **(Bollman, 2003, Appendix F)**. *Taxa richness remained low, but assemblage sensitivity did increase somewhat since 2002. The composition of the assemblage suggests nutrient enrichment and/or warm water temperatures. The fauna was dominated by ostracods; monotonous substrates and few other habitat options may limit invertebrate diversity here.*

Chart 2: *Bioassessment Results 2001-2003*

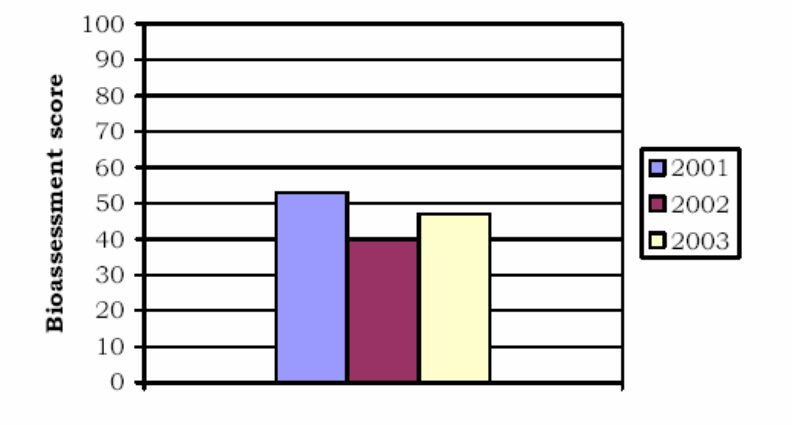


Table 4. ***2001-2003 Wildlife Species Observed on the Roundup Wetland Mitigation Site***[1]

AMPHIBIANS AND REPTILES

unidentified frogs (*Rana sp., 2002)*

BIRDS

American Avocet (*Recurvirostra americana*)
American Coot (*Fulica americana*)
American Kestrel (Falco sparverius)
American Robin (*Turdus migratorius*)
American Wigeon (*Anas americana*)
Bank Swallow (*Riparia riparia*)
Black-necked Stilt (*Himantopus mexicanus*)
Blue-winged Teal (*Anas discors*)
Brewer's Blackbird (*Euphagus cyanocephalus*)
Canada Goose (*Branta canadensis*)
Cinnamon Teal (*Anas cyanoptera*)
Cliff Swallow (*Hirundo pyrrhonota*)
Common Merganser (*Megus merganser*)
Common Snipe (*Gallinago gallinago*)
Double-crested Cormorant (*Phalacrocorax auritus*)
Eared Grebe (*Podiceps nigricollis*)
Eastern Kingbird (*Tyrannus tyrannus*)
European Starling (*Sturnus vulgaris*)
Gadwall (*Anas strepera*)
Great Blue Heron (*Ardea herodias*)
Greater Yellow legs (*Tringa melanoleuca*)
Green-winged Teal (*Anas crecca*)
House Sparrow (*Passer domesticus*)
Killdeer (*Charadrius vociferus*)
Lesser Scaup (*Aythya affinis*)
Lesser Yellow Legs (*Tringa flavipes*)
Long-billed Dowitcher (*Limnodromus scolopaceus*)
Mallard (*Anas platyrhynchos*)
Mourning Dove (Zenaida macroura)
Northern Harrier (*Circus cyaneus*)
Northern Shoveler (*Anas clypeata)*
Redhead (*Aythya Americana*)
Red-wing Blackbird (*Agelaius phoeniceus*)
Ring-necked Duck (*Aythya collaris*)
Ring-necked Pheasant (*Phasianus colchicus*)
Rock Dove (*Columba livia*)
Ross Goose (*Chen rossii*)
Ruddy Duck (*Oxyura dominica*)
Sandhill Crane (*Grus canadensis*)
Sandpiper (species unidentified)
Solitary Sandpiper (*Tringa solitaria*)
Song Sparrow (*Melospiza melodia*)
Spotted Sandpiper (*Actitis macularia*)
Tree swallow (*Tachycineta bicolor*)
Violet Green Swallow (*Tachycineta thalassina*)
Whimbrel (*Numenius phaeopus*)
White-crowned Sparrow (Zonotrichia atricapilla)
Willet (*Catoptrophorus semipalmatus*)
Wilson's Phalarope (*Phalaropus tricolor*)
Wood Duck (*Aix sponsa*)
Yellow-headed Blackbird (*Xanthocephalus xanthocephalus*)
Yellow-rumped Warbler (*Dendroica coronata*)

MAMMALS

Mule Deer (*Odocoileus hemionus)*
Red Fox (*Vulpes vulpes*)

[1]**Bolded species were observed during 2003 monitoring. All other species were observed during one or more of the previous monitoring years, but not during 2003.**

3.7 Functional Assessment

Completed functional assessment forms are included in **Appendix B** and summarized below in **Table 5**. The site rated as an overall Category III wetland and scores 154.0 Functional Units. This represents an increase of approximately 213% since 2001, but only a 3% increase over 2002 functional units. 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 if a willow shrub community were introduced. Wetland shrubs would survive very well within the saturation zone of the north lagoon.

Table 5: ***Summary of 2001, 2002, and 2003 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
Listed/Proposed T&E Species Habitat	Low (0)	Low (0)	Low (0)
MNHP Species Habitat	Low (0)	High (.8)	High (.8)
General Wildlife Habitat	Low (.3)	Moderate (.7)	High (.9)
General Fish/Aquatic Habitat	NA	NA	NA
Flood Attenuation	High (1)	Moderate (.6)	Moderate (.6)
Short and Long Term Surface Water Storage	High (.8)	High (1)	High (1)
Sediment, Nutrient, Toxicant Removal	Moderate (.7)	Moderate (.7)	Moderate (.7)
Sediment/Shoreline Stabilization	NA	High (1)	High (1)
Production Export/Food Chain Support	Moderate (.6)	Moderate (.6)	Moderate (.6)
Groundwater Discharge/Recharge	Low (.1)	Low (.1)	Low (.1)
Uniqueness	Low (.2)	Low (.3)	Low (.3)
Recreation/Education Potential	Low (.2)	High (1)	High (1)
Actual Points/ Possible Points	3.9/10	6.8/11	7/11
% of Possible Score Achieved	39%	61%	63%
Overall Category	III	III	II
Total Acreage of Assessed Wetlands within Easement	18.517 ac	22 ac	22 ac
Functional Units (acreage x actual points)	72.21 fu	149.60 fu	154.0 fu
Net Acreage Gain	18.517 ac	22 ac	22 ac
Net Functional Unit Gain	72.21 fu	149.60 fu	154.0 fu
Total Functional Unit "Gain"	72.21 fu	149.60 fu	154.0 fu

3.8 Photographs

Representative photos taken from photo points and transect ends are included in **Appendix C.** A 2003 aerial photograph is also included in **Appendix C**. Extra photos were taken of the interior of the AA to illustrate the general condition of the wetland. The vegetation diversity did not increase in 2003; likely as a result of the drought conditions.

3.9 Maintenance Needs/Recommendations

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

3.10 Current Credit Summary

The 2003 delineation showed a total of 22 acres of developing aquatic habitats. Of that, 5.42 acres are shallow, open water and 5.49 acres are intermittently exposed soil (mudflat), which total 10.91 acres. The remaining 11.09 acres are comprised primarily of kochia and goosefoot, FAC species, and have positive hydric soil and hydrology indicators; therefore, the remaining acreage qualifies as emergent wetland. The site is three years old and is anticipated to develop more emergent vegetation over time as water levels increase and the effects of drought decrease. Given the shallowness of the open water, special aquatic status of the mud flats, and the developing wetland area (kochia areas) the entire site should be considered creditable for a total of 22 acres.

The Roundup wetland continues to rate as a Category II wetland, an increase from the last two years because of the increasing waterbird diversity. Wildlife use, particularly migratory songbirds, would further increase if a willow shrub community were introduced. Wetland shrubs would survive very well within the saturation zone of the north lagoon.

Based on LWC's 2003 monitoring data, kochia dominates this mitigation wetland site. Effective weed control measure 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 selection, application rates, and timing should be approved by the Musselshell County Weed Supervisor, MDT's Mitigation Specialist and Botanist, the City of Roundup, and the adjacent landowner. A use of a licensed herbicide applicator is also recommended.

4.0 REFERENCES

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Appendix A

FIGURES 2 - 3

MDT Wetland Mitigation Monitoring
Roundup Wetland
Roundup, Montana

LAND & WATER

Figure 2 Monitoring Activity Locations

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

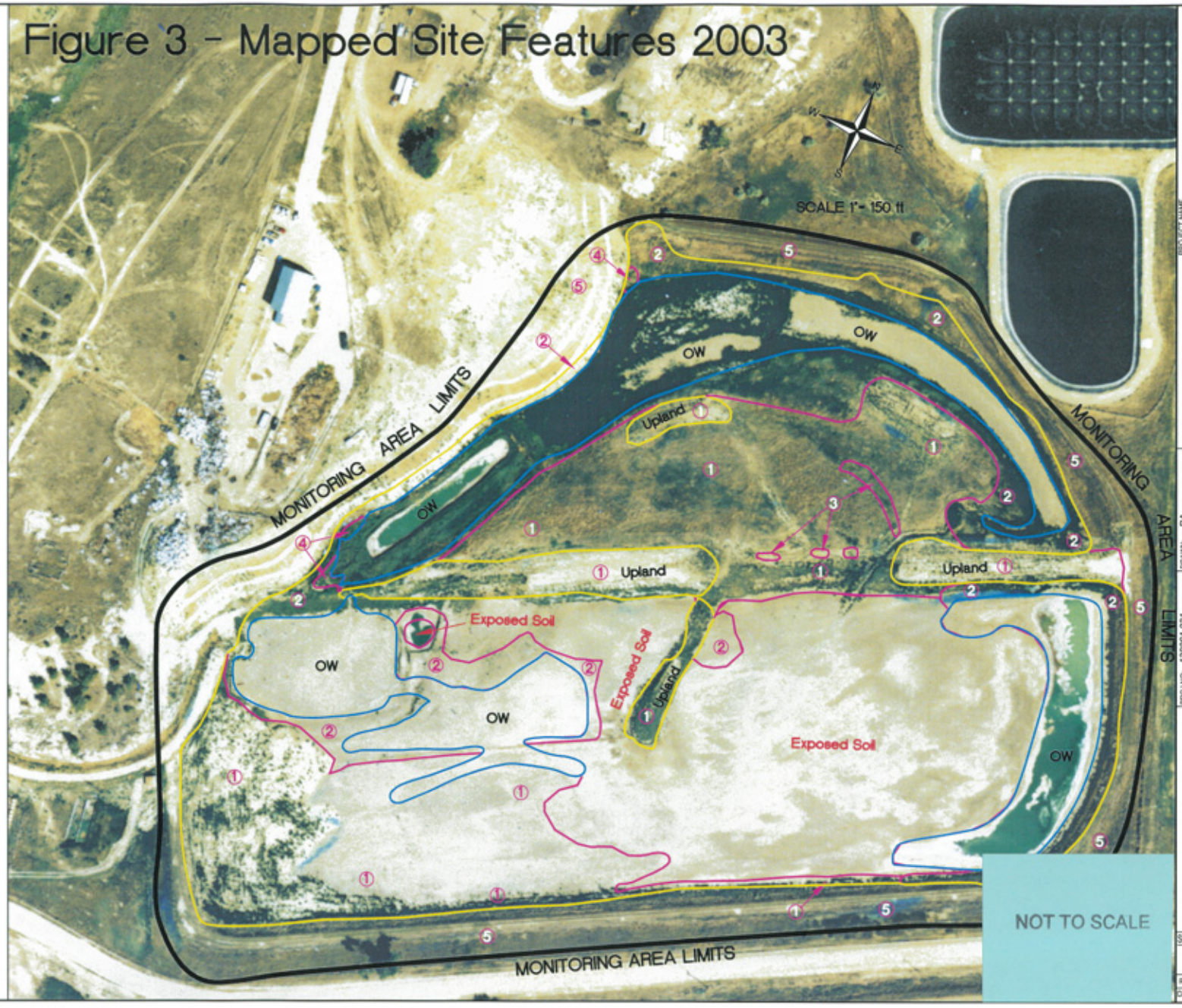
PROJ NO: 130091.031
FILE NAME: TASK3\19BASE.dwg
SCALE: 1"= 150ft
LOCATION: Roundup Lagoon

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

LAND & WATER CONSULTING, INC.
P.O. BOX 1714
Missoula, MT 59807

SHEET NUMBER: 2
REV: -
DATE: 1-15-04

Figure 3 - Mapped Site Features 2003



Legend

Monitoring Area Limit

Wetland Boundary

Vegetation Community Boundary

Open Water Boundary

Wetland Area 2003

Gross Area	22.00 Acres
Open Water	5.42 Acres
Exposed Soil	5.49 Acres
Net Area	11.09 Acres

VegetationTypes:

1. Kochia scoparia.
2. Chenopodium spp.
3. Alopecurus arundinaceus
4. Leochia scoparia/Alopecurus arundinaceus
5. Agropyron cristatum/ Kochia scoparia

PROJECT NAME: MDT Roundup Lagoon Wetland Mitigation

DRAWING TITLE: Mapped Site Features 2003

PROJ NO: 130091.031 | DRAWN: RA

FILE NAME: TASK31BASE.dwg | CHECKED:

SCALE: 1"= 150ft | APPVD: BD

LOCATION: Roundup Lagoon | PROJ MGR: BD

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

SHEET NUMBER: 3

REV: -

DATE: 11-26-03

Appendix B

2003 WETLAND MITIGATION SITE MONITORING FORM
2003 BIRD SURVEY FORMS
2003 WETLAND DELINEATION FORMS
2003 FUNCTIONAL ASSESSMENT FORMS

MDT Wetland Mitigation Monitoring
Roundup Wetland
Roundup, Montana

LAND & WATER

LWC / MDT WETLAND MITIGATION SITE MONITORING FORM

Project Name:__Roundup____ Project Number:___130091-031__ Assessment Date:__8/30/03__
Location Roundup, MT_ MDT District:_____5_____ Milepost:____49_____
Legal description: T_8N___ R_26E___ Section_18___ Time of Day:___7AM___
Weather Conditions:__clear_____ Person(s) conducting the assessment:
_____LB/LWC_____
Initial Evaluation Date:__7/_17_/__01__ Visit #:__3____ Monitoring Year:_2003_____
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:_25_%
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____No X___
Other evidence of hydrology on site (drift lines, erosion, stained vegetation etc.):
Soil moist in assessment area; visit in August and conditions are 5th year of drought.

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

Well #	Depth	Well #	Depth	Well #	Depth
3	9.1 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: _____

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		

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		
Chenopodium hybridium	90		
Kochia scoparia	5		
Rumex maritimus	<1		

COMMENTS/PROBLEMS: _____

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

Dominant Species	% Cover	Dominant Species	% Cover
Alopecurus arundinaceus	100		

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 arundinaceus	40	*Eleocharis spp.*	<5
Lemna minor.	<1	*Scirpus acutus*	<1
Polygonum spp.	<1	*Kochia scoparia*	40
Puccinellia nuttalliana	<1	*Chenopodium leptophyllum*	10
Rumex crispus	<1		
Scirpus pungens	<1		

COMMENTS/PROBLEMS: _____Could not collect some species because of inundation across outlet. This area is being colonized by *Kochia.* _____

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.:____ Community Title (main species):_____

Dominant Species	% Cover	Dominant Species	% Cover

COMMENTS/PROBLEMS: _____

COMPREHENSIVE VEGETATION LIST

Species	Vegetation Community Number(s)	Species	Vegetation Community Number(s)
Agropyron cristatum	1		
Alopecurus arundinaceus	3, 4		
Chenopodium leptophyllum	1, 2		
Chenopodium hybridum	1, 2		
Cirsium arvense	1		
Eleocharis spp. *(confirm 2004)*	4		
Grindelia squarrosa	1		
Kochia scoparia	1, 2, 5		
Lemna minor	4		
Melilotus officinalis	1		
Phalaris arundinacea	2003-unknown		
Polygonum spp.	4		
Puccinellia nuttalliana	4		
Rhus trilobata	1		
Ribes aureum	1		
Rumex crispus	4		
Rumex maritimus	2		
Scirpus acutus *(confirm 2004)*	4		
Scirpus pungens	4		
Bold denotes observed in 2003 for the first time			

COMMENTS/PROBLEMS: ___*Eleocharis* and *Scirpus acutus* were beyond reach because of inundation and therefore could not be positively identified; will attempt to collect in 2004._____

PLANTED WOODY VEGETATION SURVIVAL

Species	Number Originally Planted	Number Observed	Mortality Causes

COMMENTS/PROBLEMS: _____Remains unknown where shrubs were planted, species planted not found (see report). No shrubs found in wetland. _____

WILDLIFE

BIRDS

(Attach Bird Survey Field Forms)

Were man made nesting structures installed? Yes__X__ No____Type:_wood duck_ How many?__4____ Are the nesting structures being utilized? Yes____ No____ X unknown
Do the nesting structures need repairs? Yes____ No_X*___

MAMMALS AND HERPTILES

Species	Number Observed	Indirect indication of use			
		Tracks	Scat	Burrows	Other
Odocoileus spp.			X		

Additional Activities Checklist:
__X___Macroinvertebrate sampling (if required)

COMMENTS/PROBLEMS: ____Knocked on the wood duck boxes that could be reached and the boxes sounded empty, however, several woodies seen in October.__(Hens unlikely to flush from box unless opened.)_____

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
I	**2003 new**	Exposed soil area; south lagoon	E
J	**2003 new**	Old pipeline	W
K	**2003 new**	View over north lagoon from edge area	S
L	**2003 new**	View over Kochia "wetland"	N

COMMENTS/PROBLEMS: __New photos were taken to illustrate the general condition of the AA._____
_____
_____
__

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 2003 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 2003. _____

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__
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: 8/30/03 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
Length of transect in this type:	176’ feet
Species:	Cover:
KOCSCO	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:	

LAND & WATER

MDT WETLAND MONITORING – VEGETATION TRANSECT (back of form)

Cover Estimate

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

Indicator Class:

+ = Obligate
- = Facultative/Wet
0 = Facultative

Source:

P = Planted
V = Volunteer

Percent of perimeter 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: May, July and October Surveys

Bird Species	#	Behavior	Habitat	Bird Species	#	Behavior	Habitat
SPRING: (5/3)				**MID-SEASON (8/30):**			
American Avocet	6	L	OW	Brewers Balckbird	20	F	MA
American Coot	12	F	OW	Common Snipe	1	F	MA
American Wigeon	2	F	OW	Earred Grebe	1	L	OW
Blue-winged teal	7	F	OW	Great Blue Heron	1	F	MA
Canada Goose	12	BD/L	OW	Green-winged Teal	2	F	OW
Double-crested Cormorant	2	L	MA	Killdeer	2	F	MA
European Starling	2	N	MA/OW	Lesser Yellowlegs	2	F	MA/OW
Gadwall	3	F	OW	Mallard	18	F	OW
Great Blue Heron	1	F	MA	Northern Shoveler	1	F	OW
Green-winged Teal	3	BD	OW	Ring-necked Pheasant	16	(Flushed)	MA side of berm
Killdeer	2	BR	MA	Solitary Sandpiper	8	F	MA
Lesser Scaup	6	F	OW	Song Sparrow	4	F	MA
Lesser Yellow Legs	3	F	MA	Spotted Sandpiper	1	F	MA/OW
Mallard	20	F/L/BD	OW	Wilson's Phalarope	12	F	OW
Northern Shoveler	30	F	OW				
Red-wing Blackbird	12	BD	MA				
Ring-necked Duck	1	L	OW				
Ruddy Duck	1 (m)	L	OW	**FALL(10/9):**			
Sandhill Crane	1	N	MA	American Wigeon	6	F	OW
Song Sparrow	3	F/BD	MA	Long-billed Dowitcher	7	F	OW
Spotted Sand Piper	1	FO	OW	Mallard	15	F	OW
Tree swallow	1	F	MA	White-crowned Sparrow	15	F	OW
Willet	5	BD/FO	OW	Wood Duck	10	F	OW
Wood Duck	2 (pr)	F	OW				
Yellow-headed Blackbird	1	F	Dike				

Notes: Starlings nesting in 2 of the Wood Duck boxes

Sandhill Crane nesting in south area (see front picture)

MDT visited the site in June 2003 and observed the following:

"Canada Geese family # 1 10 goslings older birds than family # 2 with 7 goslings. Wood duck 7 young Mallard 8 young almost fledged. Blue-winged teal 7 young Other waterfowl observed on the site include: ruddy duck, gadwall, wigeon, cinnamon teal, double crested cormorant, eared grebe, great blue heron, mallards, ring neck, redhead, and common merganser. Shorebirds observed, include: great blue heron, avocets (nesting), willets, phalarope, killdeer(nesting), black necked stilts (nesting). Both the stilts and avocets took defensive displays and bluff attacks in areas near the islands. Other birds observed, included starlings, robins, tree swallows, barn swallows, bank swallows, violet green swallows, red-winged blackbirds, house sparrows, rock doves, mourning doves, Brewer's blackbirds and a American Kestrel." (Larry Urban, MDT)

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

LAND & WATER

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

Project/Site: Roundup	Date: 8/30/03
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:

Soil moist from recent rains but not saturated at time of investigation (late summer).

SOILS

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

Drainage Class: well

Field Observations

Taxonomy (Subgroup): NA

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.
0-1	A	10YR 3/2			sandy loam
1-12	A	210YR 3/3; 3/4	10YR6/8	fine	silty sand

Hydric Soil Indicators:

____	Histosol	____	Concretions
____	Histic Epipedon	____	High Organic Content in surface Layer in Sandy Soils
____	Sulfidic Odor	____	Organic Streaking in Sandy Soils
X	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:

This SP is located between the old dike and a constructed island. Marginal wetland because of FAC vegetation species which is also an invasive weed though not considered noxious in MT or Musselshell CO.

Approved by HQUSACE 2/92

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

Project/Site:	Roundup			Date:	8/30/03
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?:		Yes	X	No	Plot ID: SP-2
(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
- 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.

LAND & WATER

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.
0-8	B	2.5YR 4/2			rocky silt loam
8+					impenetrable

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

LAND & WATER

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

1. Project Name: Rounup Wetland **2. Project #:** -130091031 **Control #:** _____

3. Evaluation Date: 8/30/2003 **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 (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 (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	50
Depression	Palustrine	None	Unconsolidated Bottom	Temporarily Flooded	Excavated	25
Depression	Palustrine	None	Aquatic Bed	Permanently Flooded	Excavated	25
---	---	---	---	---	---	

[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.	---	---	---
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.	---	---	high disturbance
AA cultivated or heavily grazed or logged; subject to relatively substantial fill placement, grading, clearing, or hydrological alteration; high road or building density.	---	---	---

Comments: (types of disturbance, intensity, season, etc.) 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	---	---	Low

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

LAND & WATER

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 water birds.

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 [3] **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
[3] **65 %**	1 (H)	--	--
35-64 %	--	--	--
< 35 %	--	--	--

Comments: "Wetland veg. actually Chenopodium (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	--	--	--	--	--	--	--	--	--	--	--	.6M	--	--	--	--	--	--
S/I	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
T/E/A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

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

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	M	0.60	1	
J. Groundwater Discharge/Recharge	L	0.10	1	
K. Uniqueness	L	0.30	1	
L. Recreation/Education Potential	H	1.00	1	
	Totals:	7.00	11.00	154
	Percent of Total Possible Points:		**63%** (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
2003 AERIAL PHOTOGRAPH

MDT Wetland Mitigation Monitoring
Roundup Wetland
Roundup, Montana

LAND & WATER

Location: A **Photo Frame:** 017 **Description:** Wetland view (7/17/02) **Compass Reading:** N

Location: B **Photo Frame:** 4A **Description:** Wetland view (10/7/02) **Compass Reading:** S

Location: C **Photo Frame**: 016 **Description:** Wetland view (7/17/02) **Compass Reading:** E

Location: D **Photo Frame**: 5A **Description:** Wetland view (10/17/02) **Compass Reading:** W

Location: E **Photo Frame**: 00A **Description:** Wetland view (10/17/02) **Compass Reading:** S

Location: F **Photo Frame:** 013 **Description:** Wetland view (7/17/02) **Compass Reading:** E

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

Location: H **Photo Frame:** 15 **Description:** Transect end on old dike.(7/17/02) **Compass Reading:** N

Location: I **Description:** Within south area **Compass Reading:** E

Location: J **Description:** On old pipeline **Compass Reading:** W

Location: K **Description:** North lagoon August **Compass Reading:** N

Location: L **Description:** Overview of transect area **Compass Reading:** N


ER GPS ER DAS1160 P=0.1 R=3.9 Y=-0.3
7-28-03 Roundup Lagoon
1:6000 Horizons, Inc.
C13-55
Roundup 2003

Appendix D

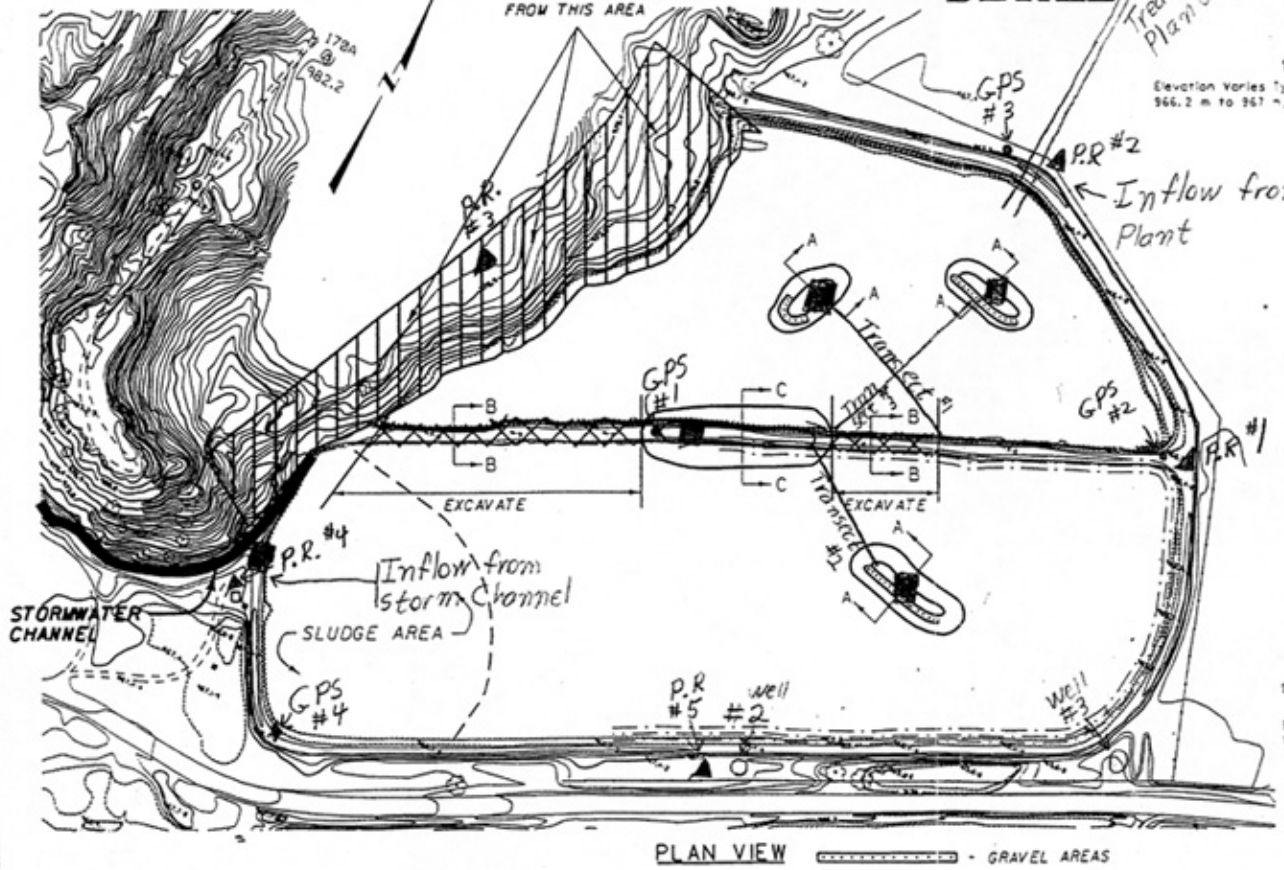
ROUNDUP EAST LAGOON WETLAND FINAL PLAN

MDT Wetland Mitigation Monitoring
Roundup Wetland
Roundup, Montana

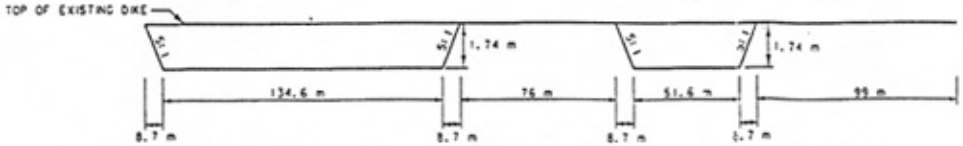
LAND & WATER

Figure 2

DETAIL

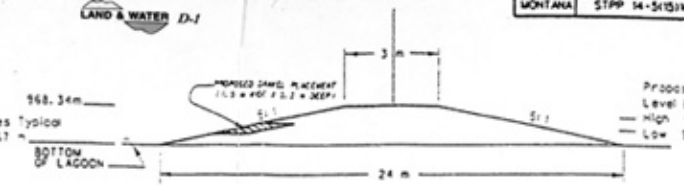


PLAN VIEW — GRAVEL AREAS



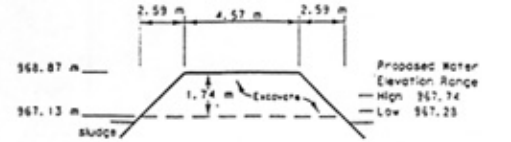
LONGITUDINAL SECTION OF EXISTING DIKE (between north & south lagoon cells)

NOT TO SCALE



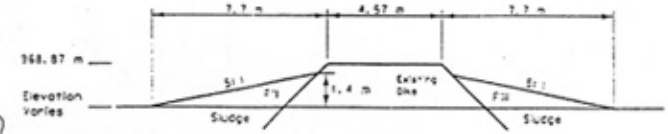
SECTION A-A (Islands)

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

LAND & WATER

BIRD SURVEY PROTOCOL

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

Species Use within the Mitigation Wetland: Survey Method

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

Sites that can be circumambulated or walked throughout.

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

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

Sites that cannot be circumambulated.

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

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

Species Use within the Mitigation Wetland: Data Recording

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

1. Bird Species List

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

2. Bird Density

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

3. Bird Behavior

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

4. Bird Species Habitat Use

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

GPS Mapping and Aerial Photo Referencing Procedure

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

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

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

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

Appendix F

2003 MACROINVERTEBRATE SAMPLING PROTOCOL AND DATA

MDT Wetland Mitigation Monitoring
Roundup Wetland
Roundup, Montana

LAND & WATER

AQUATIC INVERTEBRATE SAMPLING PROTOCOL

Equipment List

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

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

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

Site Selection

Select the sampling site with these considerations in mind:

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

Sampling

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

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

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

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

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

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

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

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

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

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

Photograph the sampled site.

Sample Handling/Shipping

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

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

METHODS

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

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

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

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

Sample Processing

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

Sampling consisted of D-frame net sweeps through emergent vegetation (when present), the water column, over the water surface, and included disturbing and scraping substrates at each sampled sites. Samples were preserved in ethanol at each wetland site and subsequently delivered to Rhithron Associates, Inc. for processing, taxonomic determinations, and data analysis.

At Rhithron's laboratory, Caton subsamplers and stereomicroscopes with 10X magnification were used to randomly select a minimum of 200 organisms, when possible, from each sample. In some cases, the entire sample contained fewer than 200 organisms; in these cases, all organisms from the sample were taken. Taxa were identified in general accordance with the taxonomic resolution standards set out in the MDEQ Standard Operating Procedures for Sampling and Sample Analysis (Bukantis 1998). Ten percent of samples were re-identified by a second taxonomist

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

Bioassessment Metrics

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

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

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

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

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

RESULTS

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

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

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

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

LITERATURE CITED

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

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

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

Table 2. Sampled MDT Mitigation Sites by Year

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

Aquatic Invertebrate Taxonomic Data

Site Name ROUNDUP **Date Collected**

Order	Family	Taxon	Count	Percent	Unique	BI	FFG
		Ostracoda	84	66.14%	Yes	8	CG
		Copepoda	2	1.57%	Yes	8	CG
Amphipoda							
	Talitridae						
		Hyalella	1	0.79%	Yes	8	CG
Coleoptera							
	Haliplidae						
		Haliplus	1	0.79%	Yes	5	PH
Diptera							
	Chironomidae						
		Chironomus	15	11.81%	Yes	10	CG
		Cricotopus (Isocladius)	8	6.30%	Yes	7	SH
		Glyptotendipes	2	1.57%	Yes	10	SH
Ephemeroptera							
	Baetidae						
		Callibaetis	1	0.79%	Yes	9	CG
Heteroptera							
	Corixidae						
		Corisella tarsalis	4	3.15%	Yes	11	PR
		Corixidae	4	3.15%	No	10	PH
		Sigara	1	0.79%	Yes	5	PH
	Notonectidae						
		Notonecta	4	3.15%	Yes	5	PR
Grand Total			**127**				

Aquatic Invertebrate Data Summary

Project ID: MDT03LW
STORET Station ID:
Station Name: ROUNDUP

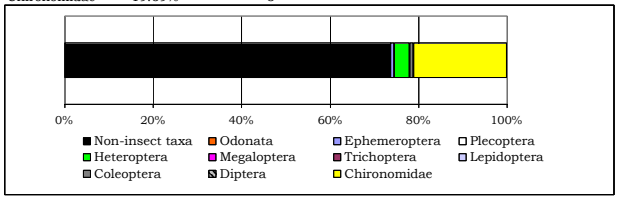
Activity ID:

Sample Date:

Sample type	
SUBSAMPLE TOTAL ORGANISMS	127
Portion of sample used	1.67%
Estimated number in total sample	7620
Sampling effort	
Time	
Distance	
Jabs	
Habitat type	
EPT abundance	1
Taxa richness	11
Number EPT taxa	1
Percent EPT	0.79%

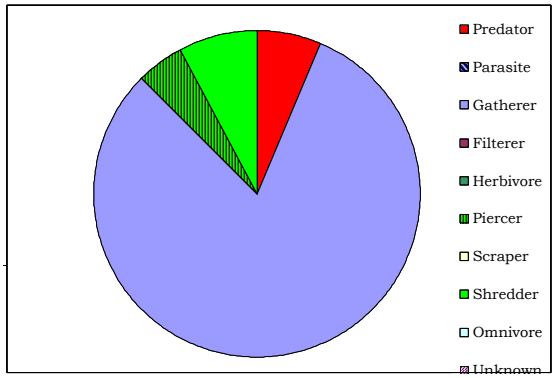
TAXONOMIC COMPOSITION

GROUP	PERCENT	#TAXA
Non-insect taxa	68.50%	3
Odonata	0.00%	0
Ephemeroptera	0.79%	1
Plecoptera	0.00%	0
Heteroptera	3.15%	4
Megaloptera	0.00%	0
Trichoptera	0.00%	0
Lepidoptera	0.00%	0
Coleoptera	0.79%	1
Diptera	0.00%	0
Chironomidae	19.69%	3



FUNCTIONAL COMPOSITION

GROUP	PERCENT	#TAXA
Predator	6.30%	2
Parasite	0.00%	0
Gatherer	81.10%	5
Filterer	0.00%	0
Herbivore	0.00%	0
Piercer	4.72%	3
Scraper	0.00%	0
Shredder	7.87%	2
Omnivore	0.00%	0
Unknown	0.00%	0



COMMUNITY TOLERANCES

Sediment tolerant taxa	0
Percent sediment tolerant	0.00%
Sediment sensitive taxa	0
Metals tolerance index (McGuire)	9.50
Cold stenotherm taxa	0
Percent cold stenotherms	0.00%

HABITUS MEASURES

Hemoglobin bearer richness	3
Percent hemoglobin bearers	16.54%
Air-breather richness	0
Percent air-breathers	0.00%
Burrower richness	2
Percent burrowers	13.39%
Swimmer richness	5
Percent swimmers	43.31%

DOMINANCE

TAXON	ABUNDANCE	PERCENT
Ostracoda	84	66.14%
Chironomus	15	11.81%
Cricotopus (Isocladius)	8	6.30%
Corisella tarsalis	4	3.15%
Corixidae	4	3.15%
SUBTOTAL 5 DOMINANTS	115	90.55%
Notonecta	4	3.15%
Copepoda	2	1.57%
Glyptotendipes	2	1.57%
Hyalella	1	0.79%
Callibaetis	1	0.79%
TOTAL DOMINANTS	125	98.43%

SAPROBITY

Hilsenhoff Biotic Index	7.50

DIVERSITY

Shannon H (loge)	1.61
Shannon H (log2)	1.12
Margalef D	2.27
Simpson D	0.45
Evenness	0.09

VOLTINISM

TYPE	# TAXA	PERCENT
Multivoltine	6	88.19%
Univoltine	4	11.02%
Semivoltine	1	0.79%

TAXA CHARACTERS

	#TAXA	PERCENT
Tolerant	3	13.39%
Intolerant	0	0.00%
Clinger	1	6.30%

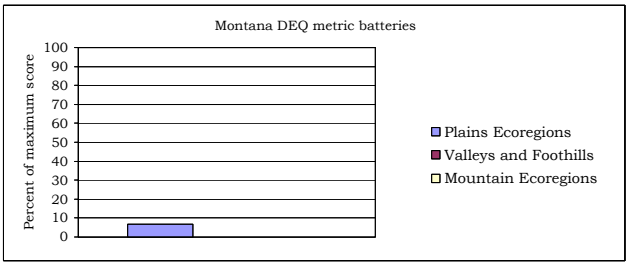
BIOASSESSMENT INDICES

B-IBI (Karr et al.)

METRIC	VALUE	SCORE
Taxa richness	11	1
E richness	1	1
P richness	0	1
T richness	0	1
Long-lived	1	1
Sensitive richness	0	1
%tolerant	13.39%	5
%predators	6.30%	1
Clinger richness	1	1
%dominance (3)	84.25%	1
	TOTAL SCORE	14 28%

MONTANA DEQ METRICS (Bukantis 1998)

METRIC	VALUE	Plains Ecoregions	Valleys and Foothills	Mountain Ecoregions
Taxa richness	11	0	0	0
EPT richness	1	0	0	0
Biotic Index	7.50	0	0	0
%Dominant taxon	66.14%	0	0	0
%Collectors	81.10%	1	1	0
%EPT	0.79%	0	0	0
Shannon Diversity	1.12	0		
%Scrapers +Shredders	7.87%	1	0	0
Predator taxa	2	0		
%Multivoltine	88.19%	0		
%H of T	#DIV/0!		#DIV/0!	
TOTAL SCORES		2	#DIV/0!	0
PERCENT OF MAXIMUM		6.67	#DIV/0!	0.00
IMPAIRMENT CLASS		SEVERE	#DIV/0!	SEVERE



Montana Plains ecoregions metrics (Bramblett and Johnson)

Riffle		*Pool*	
EPT richness	1	E richness	1
Percent EPT	0.79%	T richness	0
Percent Oligochaetes and Leeches	0.00%	Percent EPT	0.79%
Percent 2 dominants	77.95%	Percent non-insect	68.50%
Filterer richness	0	Filterer richness	0
Percent intolerant	0.00%	Univoltine richness	4
Univoltine richness	4	Percent supertolerant	88.98%
Percent clingers	6.30%		
Swimmer richness	5		