
MONTANA DEPARTMENT OF TRANSPORTATION WETLAND MITIGATION MONITORING REPORT: YEAR 2004

Roundup Wetland Roundup, Montana



Prepared for:

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

Prepared by:

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

June 2005

Project No: B43054.00 - 0510

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1.0 INTRODUCTION

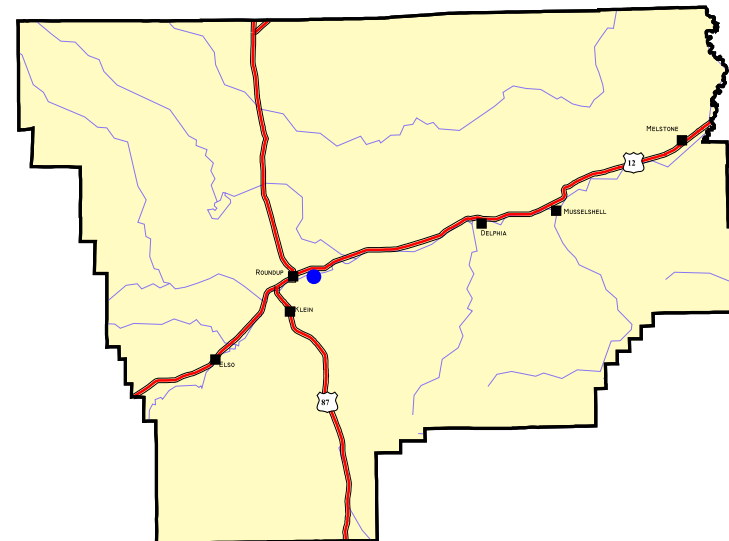
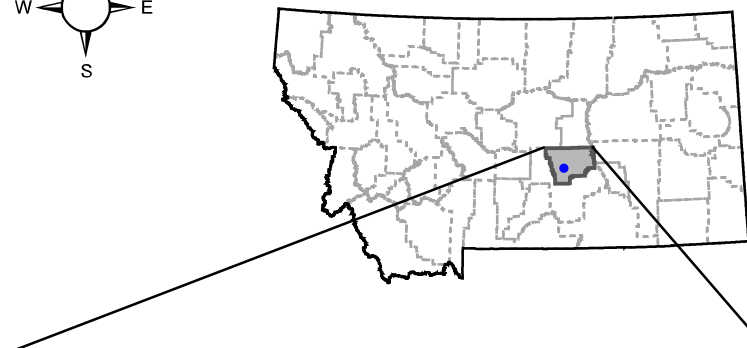
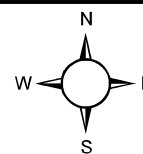
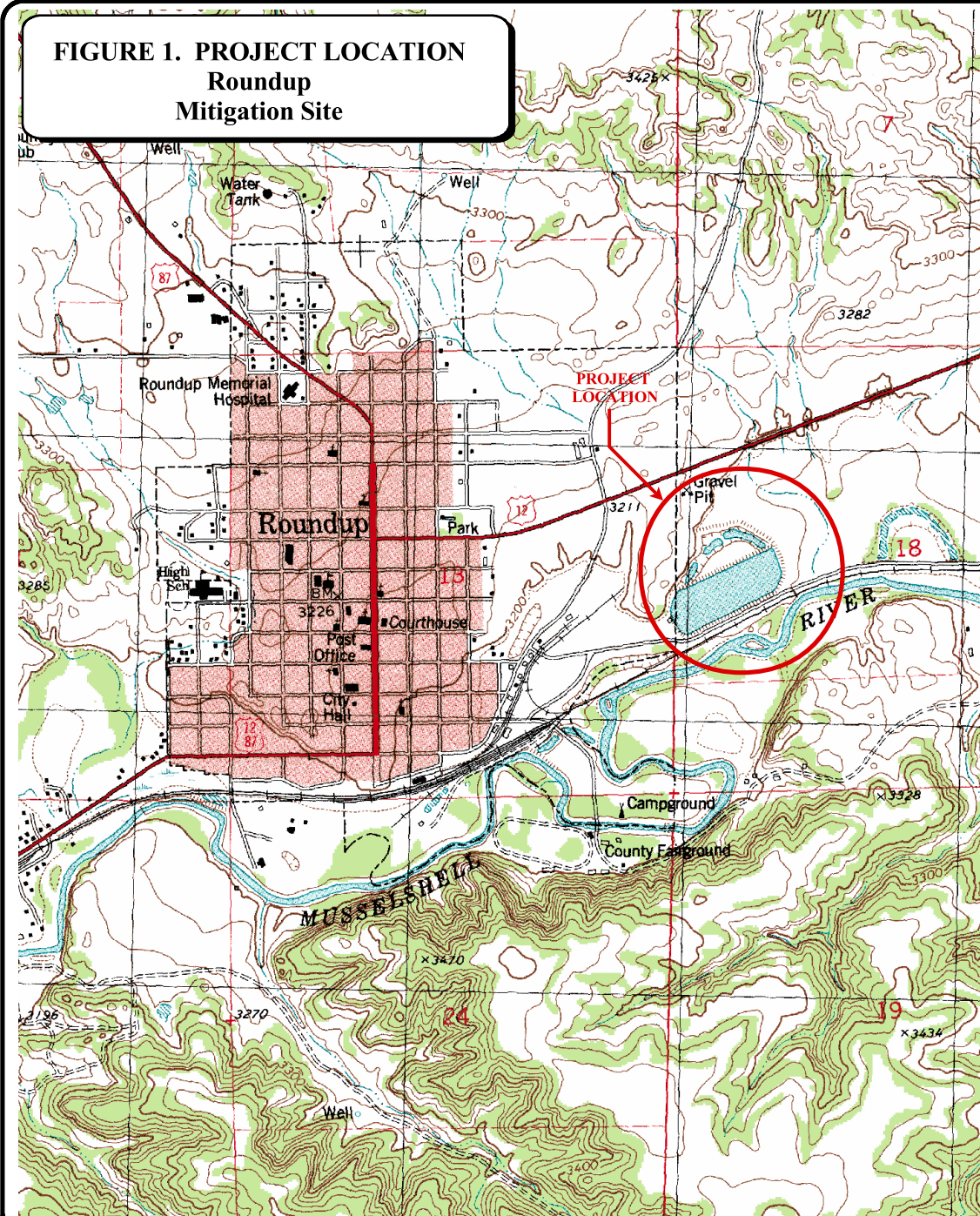
This annual report summarizes methods and results of the third year of monitoring at the Montana Department of Transportation's (MDT) Roundup mitigation site. The Roundup wetland site was created to provide wetland mitigation credits for MDT's reconstruction of U.S. Highway 12 in Watershed #10 located 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 m³, and 17,825 m³ of water for the 5- and 25-year event, respectively (MDT 2000). A second source of hydrology is treated wastewater from the new Roundup sewage treatment facility which is discharged into the wetland to maintain the design water level elevation. There is no physical "outlet" designed for the system; water leaves only through evaporation and evapotranspiration. The site has only been filling with the wastewater and stormwater since July of 2001. The Roundup lagoons are visited three times during the year: a spring and fall bird survey and during mid-summer to collect the monitoring data.

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

2.0 METHODS

2.1 Monitoring Dates and Activities

The Roundup wetland mitigation site was monitored on three dates in 2004: May 10 (bird observation), July 13 (monitoring event), and October 26 (bird observation). All information contained within the Wetland Mitigation Site Monitoring Form (**Appendix B**) was collected during the monitoring event. Activities and information conducted/collected included: wetland delineation; wetland/open water boundary mapping; vegetation community mapping; vegetation transects; soils data; hydrology data; bird and general wildlife use; photograph points; functional assessment; and maintenance need assessment at bird nesting structures and inflow and outflow structures.

2.2 Hydrology

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

All additional hydrologic data were recorded on the mitigation site monitoring form (**Appendix B**). The boundary between emergent vegetation and open water was mapped on the aerial photograph (**Figure 3, Appendix A**). Groundwater is monitored at one well that is located inside of the monitoring limits (**Detail: Final Plan, Appendix D**). Precipitation data for 2004 were compared to the 1914-2004 average (WRCC 2005).

2.3 Vegetation

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

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

2.4 Soils

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

2.5 Wetland Delineation

A wetland delineation was conducted within the assessment area according to the 1987 COE Wetland Delineation Manual. Wetland and upland areas within the monitoring area were investigated for the presence of wetland hydrology, hydrophytic vegetation and hydric soils. The indicator status of vegetation was derived from the National List of Plant Species that Occur in Wetlands: Northwest Region 9 (Reed 1988). The information was recorded on the Routine Wetland Delineation Forms (**Appendix B**). The wetland/upland and open water boundaries were used to calculate the wetland area.

2.6 Mammals, Reptiles, and Amphibians

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

2.7 Birds

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

2.8 Macroinvertebrates

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

2.9 Functional Assessment

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

2.10 Photographs

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

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

2.11 GPS Data

During the 2001 monitoring season survey points were collected using a resource grade Trimble Geoexplorer III hand-held GPS unit (**Appendix E**). Points collected included: photograph locations; bird box locations, and the jurisdictional wetland boundary. In addition, during the August 2001 monitoring season survey points were collected at four (4) landmarks recognizable on the air photo for purposes of line fitting to the topography. GPS points were not collected during the 2004 season; wetland boundaries and community types were mapped on an aerial photograph.

2.12 Maintenance Needs

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

3.0 RESULTS

3.1 Hydrology

During the July 2004 monitoring event, depth to groundwater within well number #3 was 8.50 feet and has averaged 8.76 since 2001 with a range from 8.50 to 9.17 feet (July – August collection times). The approximate location of well #3 is shown on **Figure 2, Appendix B**.

As mentioned previously, water was designed to enter the system through two methods and locations. One method of water entry is through a drainage channel which funnels storm water and roadway runoff from the northeastern section of the city of Roundup and U.S. Highway 12 into the southwestern end of the wetland (**Detail: Site Plan, Appendix D**). Drought has decreased the amount of water that enters the wetland through the stormwater system. 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 Montana Department of Environmental Quality (MTDEQ) and the

Environmental Protection Agency (EPA) primarily due to issues with heavy metals/contaminants in sewage system. The COE did not want it to be part of the treatment system. Water levels in the wetland decrease through evaporation and evapotranspiration during the growing season.

During the July 13, 2004 visit, approximately 45% (9.9 acres) of the assessment area was inundated with less than 4 feet of standing water. More than 50% of that water is located in the south lagoon where it was likely less than 6" deep and is highly intermittent in nature. At the time of the investigation, the gross wetland area was comprised of 2.51 acres of exposed soil where open water in the south lagoon had evaporated.

According to the Western Regional Climate Center (WRCC), the Roundup station's annual mean (1914-2004) precipitation was 12.28 inches; the average precipitation through the month of July for that period was 8.4 inches (2005). For the year 2004, precipitation through July was 6.35 inches or 76% of the mean (WRCC 2005). The Roundup area has not received precipitation greater than the yearly average since 1999.

3.2 Vegetation

Vegetation species identified on the site are presented in **Table 1** and in the monitoring form (**Appendix B**). Five vegetation communities were mapped on the mitigation area map (**Figure 3, Appendix A**). The communities include: Type 1, *Kochia scoparia*; Type 2, *Chenopodium species*; Type 3, *Alopecurus arundinaceus*; Type 4, *Kochia scoparia* / *Alopecurus arundinaceus* (dominant species in this type have changed since 2002); 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) continue to 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 (*Kochia scoparia*) and foxtail (*Alopecurus arundinaceus*). 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, particularly in the south lagoon. At the time of the monitoring event in July of 2004 a majority of the south lagoon was inundated with 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 hybridum* 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**), **Table 2**, and **Charts 1** and **2**. Vegetation species along the transect have not changed; the wetland area remains dominated by kochia, a FAC species (**Chart 1**). No other hydrophytic species have ever been observed along the transect since its installation in 2002.

Table 1: 2001-2004 Roundup Wetland Vegetation Species List

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

¹ **Bolded** species indicate those documented within the analysis area for the first time in 2004.

"-" = Species either not included or classified as "non-indicator" in the *National List of Plant Species that Occur in Wetlands: Northwest (Region 9)* (Reed 1988); status in parentheses are probable and based on the biologist's experience.

² *Eleocharis* and *Scirpus acutus* identifications are not positive as both grew in inundated areas and could not be collected.

Table 2: 2001-2004 transect data summary.

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

¹ Transect moved in 2002.

² Vegetation 100% comprised of *Kochia scoparia*, a FAC species in "Upland" and "Wetland" communities.

Chart 1: Length of vegetation communities along Transect 1.

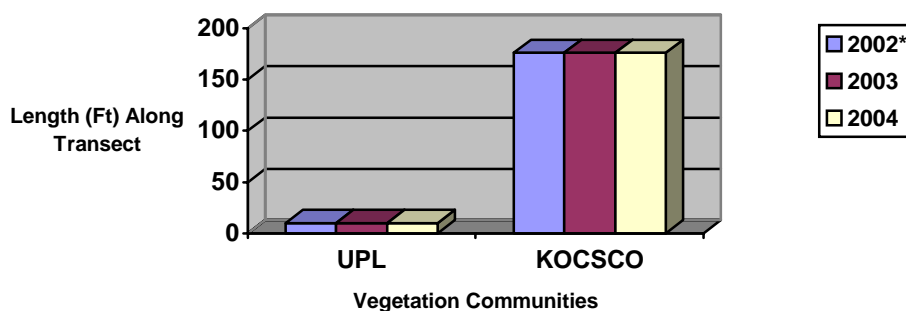
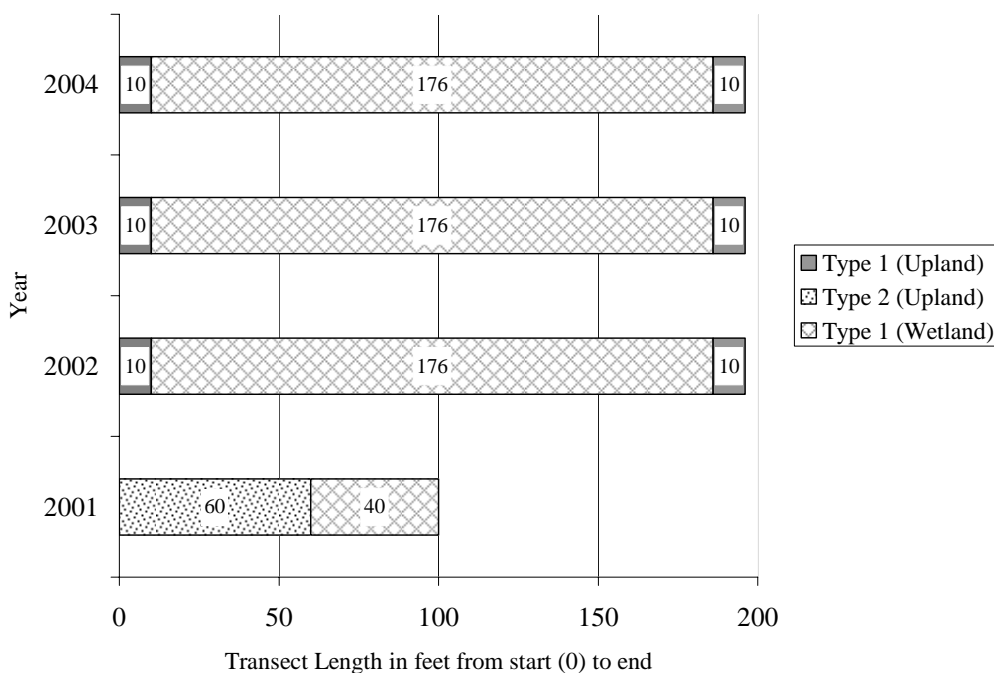


Chart 2: Transect maps showing vegetation types from start of transect (0 feet) to the end of transect (100 feet in 2001; 196 feet in 2002-2004).



* 2001 transect was moved and data is not presented in bar graph.

3.2.1 Weed management

The MDT is in the process of developing a weed management plan comprised of several methods of control. Given it is generally not recommended to chemically treat weeds adjacent to water, burning prior to seed maturation in mid to late summer may be a preferred alternative. Repeating this procedure for 4 to 5 years mid to late summer will ensure that the seed bank is also being eradicated. Flooding the area would also substantially decrease the kochia infestation; however, drought has decreased stormwater releases into the wetland as originally intended by the MDT. Herbicide methods are included in **Appendix G**.

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 Ustifluent. The old lagoons were constructed entirely within this complex. The Havre component is a loamy texture and the Glendive component tends to be a fine, sandy loam. Construction of the lagoons has probably changed the accuracy of this soil mapping.

Soils were sampled at one wetland site (SP-1) and one upland site (SP-2); SP-1 is located between the old dike that historically separated the north and south lagoons and SP-2 is on the constructed island adjacent to the northern lagoon pond. At SP-1 (wetland) soils were a black (7.5YR 2/1) sandy loam at a depth of 10 inches. Common and distinct strong brown (7.5YR 5/8) mottles were also observed. Soils were wet but not saturated. At SP-2 (upland) on the island, the soil was a reddish brown (2.5YR 5/4) rocky silt loam at a depth of 10 inches. No moisture was noted in the pit.

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 2004 delineation resulted in a total of 22 acres of developing aquatic habitats. Of that, 9.99 acres are shallow, open water and 2.51 acres are intermittently exposed soil for a net emergent wetland area of 9.52 acres. In 2003, the net wetland area was 11.09 acres as a result of an area of kochia in the south lagoon. In 2004, this area of kochia had disappeared, likely the result of inundation and subsequent drowning. In effect, though the net wetland acreage appears to be declining, it is a result of the removal of an undesirable FAC weed. As water levels increase, and/or the weeds are treated and removed, the net wetland area will likely decrease because of the extirpation of the FAC weed species. A more consistent period of inundation in the south lagoon and in the area between the transect ends will encourage the colonization of more desirable wetland species. The COE data forms are included in **Appendix B**

3.5 Wildlife

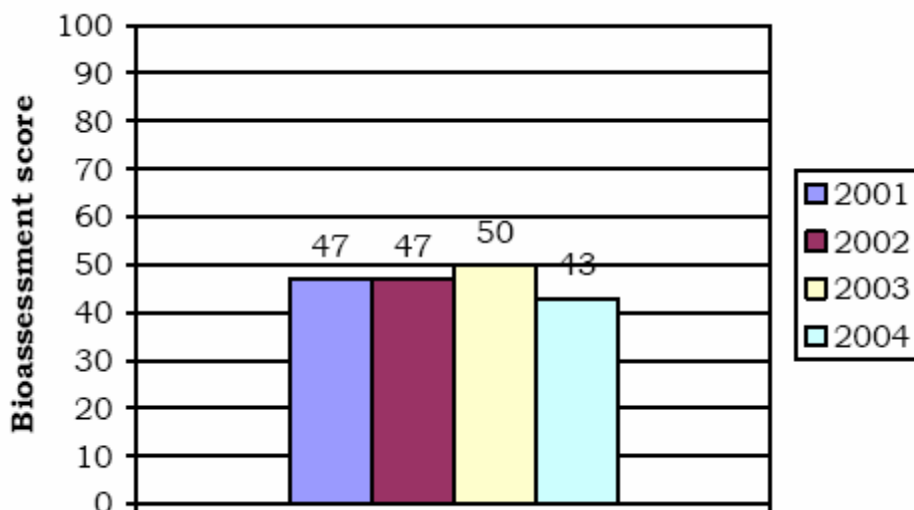
Wildlife species are listed in **Table 3**. Activities and densities associated with these observations are included on the monitoring form in **Appendix B**. A mule deer fawn, muskrat, domestic cat and red fox were observed in the wetland during the summer field visits by LWC and MDT personnel. Four mule deer, including one buck, were observed in the wetland during the fall October visit; scrapings on the newly planted willow springs, and uprooting of some sprigs, were also noted.

Four wood duck boxes are located with the site as shown on **Figure 2, Appendix B**. No signs of habitation were observed in July (nesting materials sticking out of hole, droppings on box front, scratches) although they have been used in past years. Wood Duck chicks and adults observed in July suggest the boxes are in fact utilized.

3.6 Macroinvertebrates

Scores indicated poor biotic conditions at the Roundup site for all 4 studied years (**Bollman, 2004, Appendix F**) (**Chart 3**). Taxa richness remained low, and even worsened in 2004. The composition of the assemblage suggests nutrient enrichment and/or warm water temperatures. *Chironomus* sp. remained important to the taxonomic composition of the assemblage. Monotonous substrates and few other habitat options may limit invertebrate diversity here, although cladocerans were more common in 2004 than in 2003. This resulted in a greater diversity of function for the assemblage, which is perhaps a sign of increasing diversity of energy sources.

Chart 3: Bioassessment scores from 2001 to 2004.



3.7 Functional Assessment

Completed functional assessment forms are included in **Appendix B** and summarized below in **Table 4**. The site rated as an overall Category 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 with the survival and proliferation of a willow shrub community.

3.8 Photographs

Representative photos taken from photo points and transect ends are included in **Appendix C**. A 2004 aerial photograph is also included in **Appendix C**.

3.9 Maintenance Needs/Recommendations

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

Table 3. 2001-2004 wildlife species observed on the Roundup Wetland Mitigation Site¹.

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

¹**Bolded** species indicate those documented within the analysis area for the first time in 2004.

Table 4: Summary of 2001-2004 wetland function/value ratings and functional points at the Roundup Wetland Mitigation Project.

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

3.10 Current Credit Summary

The 2004 delineation showed a total of 22 acres of developing aquatic habitats. Of that, 9.97 acres are shallow, open water and 2.51 acres are intermittently exposed soil for a net emergent wetland area of 9.52 acres. In 2003, the net wetland area was 11.09 acres as a result of an area of kochia in the south lagoon. In 2004, this area of kochia had disappeared, likely the result of inundation and subsequent drowning. In effect, though the net wetland acreage appears to be declining, it is a result of the removal of an undesirable FAC weed. As water levels increase, and/or the weeds are treated and removed, the net wetland area will likely initially decrease because of the extirpation of the FAC weed species, then eventually increase as more desirable wetland species colonize the site. The Roundup wetland continues to rate as a Category II wetland with little change in overall area since 2001.

Burning areas infested with kochia prior to seed maturation in mid to late summer for 4 to 5 years may be a preferred alternative to chemical application of weed control. Flooding the area would also substantially decrease the kochia infestation, however drought has decreased stormwater releases into the wetland as originally intended by the MDT.

4.0 REFERENCES

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Appendix A

FIGURES 2 - 3

*MDT Wetland Mitigation Monitoring
Roundup Wetland
Roundup, Montana*

Figure 2 Monitoring Activity Locations 2004

Legend

- Monitoring Area Limit
- Photograph Point
- Aerial Reference Point
- Vegetation Transect
- Wood Duck Box
- Macro-invertebrate Sample Point
- Soil Sample Point
- Well
- Base photograph July, 11, 2000



PROJECT NAME MDT Roundup Lagoon Wetland Mitigation		DRAWING TITLE Monitoring Activity Locations 2004	
PROJ NO: 330054.510	DRAWN: RA/SH	FILE NAME: TASKS10BASE2004.dwg	CHECKED:
SCALE: 1"= 150ft	APPROV: BD	LOCATION: Roundup Lagoon	PROJ MGR: BD
LAND & WATER CONSULTING, INC. P.O. BOX 8254 Missoula, MT 59807		SHEET NUMBER 2 OF	
REV 02		DATE: 06/23/05	

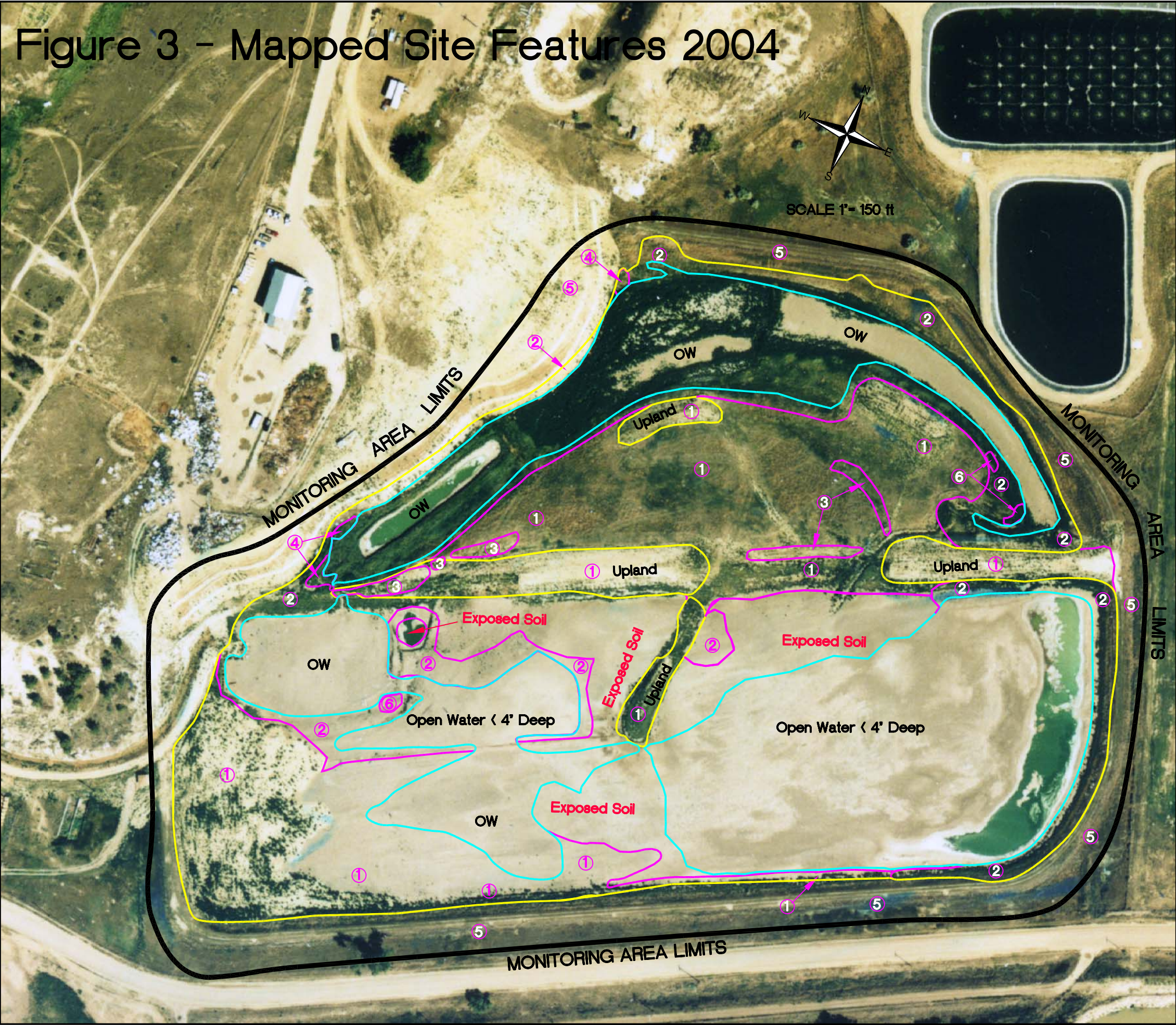
Figure 3 - Mapped Site Features 2004

Legend

- Monitoring Area Limit —
- Wetland Boundary —
- Vegetation Community Boundary —
- Open Water Boundary —
- Base photograph July 11, 2000
- Wetland Area 2004
- | | |
|--------------|-------------|
| Gross Area | 22.00 Acres |
| Open Water | 9.99 Acres |
| Exposed Soil | 2.51 Acres |
| Net Area | 9.50 Acres |

VegetationTypes:

- ① Kochia scoparia.
- ② Chenopodium spp.
- ③ Alopecurus arundinaceus
- ④ Kochia scoparia/Alopecurus arundinaceus
- ⑤ Agropyron cristatum/ Kochia scoparia
- ⑥ Scirpus maritimus



PROJECT NAME MDT Roundup Lagoon Wetland Mitigation		DRAWING TITLE Mapped Site Features 2004	
PROJ NO: 330054.510	DRAWN: RA/SH	CHECKED: LB	APPVD: JB
FILE NAME: TASKS10BASE2004.dwg	SCALE: 1"= 150ft	LOCATION: Roundup Lagoon	PROJ MGR: JB
LAND & WATER CONSULTING, INC. P.O. BOX 8254 Missoula, MT 59807		SHEET NUMBER 3 OF 3	
REV 02		DATE: 06/23/05	

Appendix B

2004 WETLAND MITIGATION SITE MONITORING FORM

2004 BIRD SURVEY FORMS

2004 WETLAND DELINEATION FORMS

2004 FUNCTIONAL ASSESSMENT FORMS

MDT Wetland Mitigation Monitoring

Roundup Wetland

Roundup, Montana

LWC / MDT WETLAND MITIGATION SITE MONITORING FORM

Project Name: Roundup Project Number: B43054.510 Assessment Date: 7/13/04

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: 8/30/03 Visit #: 4 Monitoring Year: 2004

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: 45 %

Depth at emergent vegetation-open water boundary: 0.5 ft

If assessment area is not inundated are the soils saturated w/in 12" of surface: Yes X No

Other evidence of hydrology on site (drift lines, erosion, stained vegetation etc.):

Area partially inundated, saturated, evidence of inundation, and marginally saturated/moist soils in Kochia area.

Groundwater

Monitoring wells: Present X Absent_____

Record depth of water below ground surface

Well #	Depth	Well #	Depth	Well #	Depth
3	8.5 feet				

Additional Activities Checklist:

X Map emergent vegetation-open water boundary on air photo

X Observe extent of surface water during each site visit and look for evidence of past surface water elevations (drift lines, erosion, vegetation staining etc.)

____GPS survey groundwater monitoring wells locations if present

COMMENTS/PROBLEMS: _____

VEGETATION COMMUNITIES

Community No.: 1 Community Title (main species): Kochia scoparia

Dominant Species	% Cover	Dominant Species	% Cover
<i>Kochia scoparia</i>	99		
<i>Chenopodium leptophyllum</i>	<1		
<i>Chenopodium hybridum</i>	<1		
<i>Elymus cinereus</i>	<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
<i>Chenopodium leptophyllum</i>	<5	<i>Alopecurus arundinacea</i>	<1
<i>Chenopodium hybridum</i>	90	<i>Hordeum jubatum</i>	<1
<i>Kochia scoparia</i>	5	<i>Carex sp. (grazed by geese or deer)</i>	<1
<i>Rumex maritimus</i>	<1	<i>Scirpus maritimus</i>	<1
<i>Rumex Crispus</i>	<1		

COMMENTS/PROBLEMS: _____

Community No.: 3 Community Title (main species): Alopecurus arundinaceus

Dominant Species	% Cover	Dominant Species	% Cover
<i>Alopecurus arundinacea</i>	100		
willow sprigs	<1		

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
<i>Alopecurus arundinacea</i>	40	<i>Eleocharis spp.</i>	<5
<i>Lemna minor.</i>	<1	<i>Scirpus acutus</i>	<1
<i>Polygonum spp.</i>	<1	<i>Kochia scoparia</i>	40
<i>Puccinellia nuttalliana</i>	<1	<i>Chenopodium leptophyllum</i>	10
<i>Rumex crispus</i>	<1	<i>Rumex maritimus</i>	<1
<i>Scirpus pungens</i>	<1	<i>Scirpus maritimus</i>	<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
<i>Agropyron cristatum</i>	40	<i>Rhus trilobata</i>	<1
<i>Chenopodium leptophyllum</i>	10	<i>Ribes aureum</i>	<1
<i>Cirsium arvense</i>	<5		
<i>Grindelia spp.</i>	<5		
<i>Kochia scoparia</i>	40		
<i>Melilotus officinalis</i>	<5		

COMMENTS/PROBLEMS:

Community No.: 6 Community Title (main species): Scirpus spp.

Dominant Species	% Cover	Dominant Species	% Cover
<i>Scirpus maritimus</i>	(100)		
<i>Scirpus actus</i>	(100)		

COMMENTS/PROBLEMS: Very small areas of Scirpus spp. were observed colonizing a few locations. On map they are indicated as "SCIMAR" or "SCIACU". These were mapped to monitor colonization progress.

COMPREHENSIVE VEGETATION LIST

[illegible]

Bold denotes observed in 2004 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

[illegible]

COMMENTS/PROBLEMS: _____Remains unknown where shrubs were planted, species planted not found (see report). No shrubs found in wetland. **___Willow sprigs planted by MDT biologist spring 2004. In central area near dike ~20 sprigs observed with very small leaves; no sprigs found near island as a result of *Kochia* overgrowth.**

[illegible]

BIRDS

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*__

[illegible]

Additional Activities Checklist:

__X__ Macroinvertebrate sampling (if required)

COMMENTS/PROBLEMS: _____

[illegible]

PHOTOGRAPHS

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

Checklist:

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

Location	Photo Frame #	Photograph Description	Compass Reading
A		wetland view	N
B		upland use	S
C		wetland view	E
D		wetland view	W
E		wetland view	S
F		wetland view	E
G		transect end on island	S
H		transect end on old dike	N

COMMENTS/PROBLEMS:

GPS SURVEYING

Using a resource grade GPS survey the items on the checklist below. Collect at least 3 location points with the GPS unit set at 5 second recording rate. Record file numbers for site in designated GPS field notebook

Checklist:

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

COMMENTS/PROBLEMS: ☒ *Data hand-drawn during 2004 monitoring event. _____

WETLAND DELINEATION

(Attach Corps of Engineers delineation forms)

At each site conduct the items on the checklist below:

- ☒ Delineate wetlands according to the 1987 Army Corps manual.
☒ Delineate wetland-upland boundary on the air photo
☒ Survey wetland-upland boundary with a resource grade GPS survey

COMMENTS/PROBLEMS: ☐ *Hand-drawn 2004. _____

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 ☒ 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 ☒

If yes, are the structures working properly and in good working order? YES ☐ NO ☐

If no, describe the problems below.

COMMENTS/PROBLEMS:

MDT WETLAND MONITORING – VEGETATION TRANSECT

Site: Roundup Date: 7/13/04 Examiner: LB/LWC Transect # 1

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

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

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

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

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

MDT WETLAND MONITORING – VEGETATION TRANSECT (back of form)

Cover Estimate

+= <1%	3 = 11-20%
1 = 1-5%	4 = 21-50%
2 = 6-10%	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 foot 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 hybridum* but this species has no indicator status (not in manual). Because this perimeter was saturated it is assumed it is a FAC-OBL spp.

[illegible]

BIRD SURVEY – FIELD DATA SHEET

Page__1_of_1__

Date: **see below**

SITE: Roundup: 2004 May, July and October Surveys

Bird Species	#	Behavior	Habitat	Bird Species	#	Behavior	Habitat
<u>SPRING: (5/10/05)</u>				<u>MID-SEASON (7/13-14/04):</u>			
American Avocet	8	BR/F/FO	OW/MA	American Avocet	16	BR/F	OW/MF
American Wigeon	8*	F	OW	Black-necked Stilt	2	BR(defense)	OW/MF
Blue-winged teal	6*	F	OW	Brewers Blackbird		F	MA
Canada Goose	15*	BD	OW/UPL	Canada Goose	70*	BD(defense)	OW
Canvasback	2	BD	OW	Franklin's Gull	3	LO	MF
Cinnamon Teal	4	F	OW				
Eared Grebe	3	OW/MA	F	Killdeer	40	BD/F	MA
Gadwall	10*	F/L	OW				
Green-winged Teal	10*	F	OW	Least Sandpiper	2	F	MF
Mallard	4*	F	OW	Lesser Yellowlegs	3	F	MF
Northern Shoveler	20*	F	OW	Mallard	30*	F	OW
Pied-billed Grebe	1	F	OW	Red-wing Blackbird	15*	BD	MA
Red-winged Blackbird	10*	BD	MA	Ring-necked Pheasant	1	flew out	MA
Song Sparrow	2	BD	MA	Ruddy Duck	2	F	OW
Tree swallow	20*	F	OW/MA	Song Sparrow	1	BD	MA
Willet	2	F/BD	OW/MF	Spotted Sandpiper	3	F	MF/OW
Wilson's Phalarope	30*	F	OW/MA				
Wood Duck	2	OW	F	Tree Swallow	10*	F	OW/MA
				Willet	1	L	MF
				Wilson's Phalarope	18	BD(defense)	MA
				Wood Duck	5	F	OW
				unidentified swallows	many	F/FO	OW/MA
				Unidentified grebe ?	1	F	OW
				<u>FALL (date):</u>			
				American Wigeon	>10	F	OW
				Green-winged Teal	>40	F	OW
				Mallard	>50	F	OW
				Wood Duck	>7	F	OW

Notes:

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

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

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

Project/Site: <u>Roundup</u> Applicant/Owner: <u>MDT</u> Investigator: <u>LB/LWC</u>	Date: <u>7/13/04</u> County: <u>Musselshell</u> State: <u>MT</u>
Do Normal Circumstances exist on the site: <u>X</u> Yes <u> </u> No Is the site significantly disturbed (Atypical Situation)? <u>X</u> Yes <u> </u> No Is the area a potential Problem Area?: <u> </u> Yes <u>X</u> No (If needed, explain on reverse.)	Community ID: <u>Kochia (btw stake G and H)</u> Transect ID: <u>1</u> Plot ID: <u>SP-1</u>

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1 <u>Kochia scoparia</u>	<u>H</u>	<u>FAC</u>	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

<u>X</u> Recorded Data (Describe in Remarks): <u> </u> Stream, Lake, or Tide Gauge <u>X</u> Aerial Photographs <u> </u> Other <u> </u> No Recorded Data Available	Wetland Hydrology Indicators: Primary Indicators: <u> </u> Inundated <u> </u> Saturated in Upper 12 Inches <u> </u> Water Marks <u> </u> Drift Lines <u> </u> Sediment Deposits <u>X</u> Drainage Patterns in Wetlands Secondary Indicators (2 or more required): <u> </u> Oxidized Root Channels in Upper 12 Inches <u> </u> Water-Stained Leaves <u> </u> Local Soil Survey Data <u> </u> FAC-Neutral Test <u> </u> Other (Explain in Remarks)
Field Observations: Depth of Surface Water: <u> - </u> (in.) Depth to Free Water in Pit: <u> - </u> (in.) Depth to Saturated Soil: <u> - </u> (in.)	
Remarks: Soil moist from recent rains but not saturated at time of investigation.	

SOILS

Map Unit Name (Series and Phase):	Havre-Glendive Complex (11A)	Drainage Class: <u>well</u>	Field Observations
Taxonomy (Subgroup):	<u>NA</u>	Confirm Mapped Type? <u> </u> Yes <u><u>X</u></u> No	

Profile Description:					
Depth inches	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
10"	A	7.5YR 2/1	7.5YR 5/8	lg., common, distinct	sandy loam

Hydric Soil Indicators:	
<input type="checkbox"/> Histosol <input type="checkbox"/> Histic Epipedon <input type="checkbox"/> Sulfidic Odor <input type="checkbox"/> Aquic Moisture Regime <input type="checkbox"/> Reducing Conditions <input checked="" type="checkbox"/> Gleyed or Low-Chroma Colors	<input type="checkbox"/> Concretions <input type="checkbox"/> High Organic Content in surface Layer in Sandy Soils <input type="checkbox"/> Organic Streaking in Sandy Soils <input type="checkbox"/> Listed on Local Hydric Soils List <input type="checkbox"/> Listed on National Hydric Soils List <input type="checkbox"/> Other (Explain in Remarks)

Hydric soil; damp but not saturated.

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	<u> X </u>	Yes	<u> </u>	No	Is this Sampling Point Within a Wetland? <u> X </u> Yes <u> </u> No
Wetland Hydrology Present?	<u> X </u>	Yes	<u> </u>	No	
Hydric Soils Present?	<u> X </u>	Yes	<u> </u>	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: <u>Roundup</u> Applicant/Owner: <u>MDT</u> Investigator: <u>LB/LWC</u>	Date: <u>7/13/04</u> County: <u>Musselshell</u> State: <u>MT</u>
Do Normal Circumstances exist on the site: <u>X</u> Yes No Is the site significantly disturbed (Atypical Situation)? <u>X</u> Yes No Is the area a potential Problem Area?: Yes <u>X</u> No (If needed, explain on reverse.)	Community ID: <u>Kochia (Stake G on island)</u> Transect ID: <u>1</u> Plot ID: <u>SP-2</u>

VEGETATION

Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1 <i>Kochia scoparia</i>	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

<u>X</u> Recorded Data (Describe in Remarks): Stream, Lake, or Tide Gauge <u>X</u> Aerial Photographs Other No Recorded Data Available	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)
Field Observations: Depth of Surface Water: - (in.) Depth to Free Water in Pit: - (in.) Depth to Saturated Soil: - (in.)	
Remarks: This SP is located on the constructed island and though it has the same spp. profile as SP-1 the island would likely have less hydrology because it is elevated.	

SOILS

Map Unit Name		Havre-Glendive Complex (11A)		Drainage Class:	well
(Series and Phase):				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.
0-4	B	2.5YR 5/4			rocky silt loam
4+	fill	rocks			impenetrable
Hydric Soil Indicators:					
<input type="checkbox"/> Histosol		<input type="checkbox"/> Concretions			
<input type="checkbox"/> Histic Epipedon		<input type="checkbox"/> High Organic Content in surface Layer in Sandy Soils			
<input type="checkbox"/> Sulfidic Odor		<input type="checkbox"/> Organic Streaking in Sandy Soils			
<input type="checkbox"/> Aquic Moisture Regime		<input type="checkbox"/> Listed on Local Hydric Soils List			
<input type="checkbox"/> Reducing Conditions		<input type="checkbox"/> Listed on National Hydric Soils List			
<input type="checkbox"/> Gleyed or Low-Chroma Colors		<input type="checkbox"/> Other (Explain in Remarks)			
Non-hydric soil.					

WETLAND DETERMINATION

Hydrophytic Vegetation Present? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Is this Sampling Point Within a Wetland? Yes <input checked="" type="checkbox"/> No
Wetland Hydrology Present? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
Hydric Soils Present? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
Remarks:	
Island is not within WL boundary.	

Approved by HQUSACE 2/92

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

3. Evaluation Date: 7/13/2004 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

B. Purpose of Evaluation:

☐ Wetlands potentially affected by MDT project

☐ Mitigation wetlands; pre-construction

☒ Mitigation wetlands; post-construction

☐ Other

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

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

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	45
Depression	Palustrine	None	Aquatic Bed	Permanently Flooded	Excavated	5
---	---	---	---	---	---	

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

Common **Comments:**

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

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

Comments: (types of disturbance, intensity, season, etc.) roads and dump and searge 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 plant to east, dump and industry to west.

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

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

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

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

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

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

Highest Habitat Level	doc/primary	sus/primary	doc/secondary	sus/secondary	doc/incidental	sus/incidental	none
Functional Point and Rating	---	---	---	---	---	---	0 (L)

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

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

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

Primary or Critical habitat (**list species**) ☐ D ☒ S Rana sp. observed, may be primary habitat
 Secondary habitat (**list species**) ☐ D ☐ S _____
 Incidental habitat (**list species**) ☐ D ☐ S _____
 No usable habitat ☐ D ☐ S _____

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

Highest Habitat Level:	doc/primary	sus/primary	doc/secondary	sus/secondary	doc/incidental	sus/incidental	none
Functional Point and Rating	---	.8 (H)	---	---	---	---	---

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

14C. General Wildlife Habitat Rating

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

☒ **Substantial** (based on any of the following)

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

☐ **Low** (based on any of the following)

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

☐ **Moderate** (based on any of the following)

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

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

Structural Diversity (from #13)	<input type="checkbox"/> High								<input checked="" type="checkbox"/> Moderate								<input type="checkbox"/> Low			
Class Cover Distribution (all vegetated classes)	<input type="checkbox"/> Even				<input type="checkbox"/> Uneven				<input checked="" type="checkbox"/> Even				<input type="checkbox"/> Uneven				<input type="checkbox"/> 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)			
	<input type="checkbox"/> Exceptional	<input checked="" type="checkbox"/> High	<input type="checkbox"/> Moderate	<input type="checkbox"/> Low
Substantial	--	.9 (H)	--	--
Moderate	--	--	--	--
Low	--	--	--	--

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

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

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

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

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

Duration of Surface Water in AA	<input type="checkbox"/> Permanent/Perennial			<input type="checkbox"/> Seasonal / Intermittent			<input type="checkbox"/> 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)			
	<input type="checkbox"/> Exceptional	<input type="checkbox"/> High	<input type="checkbox"/> Moderate	<input type="checkbox"/> Low
Native game fish	--	--	--	--
Introduced game fish	--	--	--	--
Non-game fish	--	--	--	--
No fish	--	--	--	--

Comments: _____

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

Applies only to wetlands subject to flooding via in-channel or overbank flow.

If wetlands in AA do not 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	<input checked="" type="checkbox"/> ≥ 10 acres			<input type="checkbox"/> <10, >2 acres			<input type="checkbox"/> ≤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.	<input checked="" type="checkbox"/> >5 acre feet			<input type="checkbox"/> <5, >1 acre feet			<input type="checkbox"/> ≤1 acre foot		
Duration of surface water at wetlands within the AA	P/P	S/I	T/E	P/P	S/I	T/E	P/P	S/I	T/E
Wetlands in AA flood or pond ≥ 5 out of 10 years	1 (H)	--	--	--	--	--	--	--	--
Wetlands in AA flood or pond < 5 out of 10 years	--	--	--	--	--	--	--	--	--

Comments: _____

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

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

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

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

Sediment, Nutrient, and Toxicant Input Levels Within AA	AA receives or surrounding land use has potential to deliver low to moderate levels of sediments, nutrients, or compounds such that other functions are not substantially impaired. Minor sedimentation, sources of nutrients or toxicants, or signs of eutrophication present.				Waterbody on MDEQ list of waterbodies in need of TMDL development for "probable causes" related to sediment, nutrients, or toxicants or AA receives or surrounding land use has potential to deliver high levels of sediments, nutrients, or compounds such that other functions are substantially impaired. Major sedimentation, sources of nutrients or toxicants, or signs of eutrophication present.			
% cover of wetland vegetation in AA	<input type="checkbox"/> ≥ 70%		<input checked="" type="checkbox"/> < 70%		<input type="checkbox"/> ≥ 70%		<input type="checkbox"/> < 70%	
Evidence of flooding or ponding in AA	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> 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 of a river, stream, or other natural or man-made drainage, or on the shoreline of a standing water body that is subject to wave action. If this does not apply, check NA above.

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

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

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

14I. PRODUCTION EXPORT / FOOD CHAIN SUPPORT

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

A	<input checked="" type="checkbox"/> Vegetated component >5 acres						<input type="checkbox"/> Vegetated component 1-5 acres						<input type="checkbox"/> Vegetated component <1 acre					
B	<input type="checkbox"/> High		<input checked="" type="checkbox"/> Moderate		<input type="checkbox"/> Low		<input type="checkbox"/> High		<input type="checkbox"/> Moderate		<input type="checkbox"/> Low		<input type="checkbox"/> High		<input type="checkbox"/> Moderate		<input type="checkbox"/> Low	
C	<input type="checkbox"/> Y	<input type="checkbox"/> N	<input type="checkbox"/> Y	<input checked="" type="checkbox"/> N	<input type="checkbox"/> Y	<input type="checkbox"/> N	<input type="checkbox"/> Y	<input type="checkbox"/> N	<input type="checkbox"/> Y	<input type="checkbox"/> N	<input type="checkbox"/> Y	<input type="checkbox"/> N	<input type="checkbox"/> Y	<input type="checkbox"/> N	<input type="checkbox"/> Y	<input type="checkbox"/> N	<input type="checkbox"/> Y	<input type="checkbox"/> N
P/P	--	--	--	.8H	--	--	--	--	--	--	--	--	--	--	--	--	--	--
S/I	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
T/E/A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

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

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

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

ii. ☐ **Recharge Indicators**

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

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

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

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

14K. UNIQUENESS

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

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

Comments: excellent bird watching area.

FUNCTION, VALUE SUMMARY, AND OVERALL RATING

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

Category I Wetland: (Must satisfy **one** of the following criteria. If not proceed to Category II.)

- ☐ Score of 1 functional point for Listed/Proposed Threatened or Endangered Species; **or**
☐ Score of 1 functional point for Uniqueness; **or**
☐ Score of 1 functional point for Flood Attenuation **and** answer to Question 14E(ii) is "yes"; **or**
☐ Percent of total Possible Points is > 80%.

Category II Wetland: (Criteria for Category I not satisfied **and** meets any **one** of the following Category II criteria. If not satisfied, proceed to Category IV.)

- ☐ Score of 1 functional point for Species Rated S1, S2, or S3 by the MT Natural Heritage Program; **or**
☒ Score of .9 or 1 functional point for General Wildlife Habitat; **or**
☐ Score of .9 or 1 functional point for General Fish/Aquatic Habitat; **or**
☐ "High" to "Exceptional" ratings for **both** General Wildlife Habitat **and** General Fish / Aquatic Habitat; **or**
☐ Score of .9 functional point for Uniqueness; **or**
☒ Percent of total possible points is > 65%.

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

Category IV Wetland: (Criteria for Categories I or II are not satisfied **and** all of the following criteria are met; If not satisfied, proceed to Category III.)

- ☐ "Low" rating for Uniqueness; **and**
☐ "Low" rating for Production Export / Food Chain Support; **and**
☐ Percent of total possible points is < 30%.

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

☐ **I**

☒ **II**

☐ **III**

☐ **IV**

Appendix C

REPRESENTATIVE PHOTOGRAPHS 2004 AERIAL PHOTOGRAPH

*MDT Wetland Mitigation Monitoring
Roundup Wetland
Roundup, Montana*



Location: A Description: Wetland view Compass Reading: N



Location: B Description: Wetland view Compass Reading: S



Location: C Description: Wetland view Compass Reading: E



Location: D Description: Wetland view Compass Reading: W



Location: E **Description:** Wetland view with flock of geese
Compass Reading: S



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



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



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

JOB:ROUNDUP LAGOON WETLAND ROLL:000 SCALE:1:6000 FLT:31 07/25/2004 16:09:44



Roundup 2004

FS160 1/ 200 f/5.6

FF4.0 EC 0 SIN

dt937.7

27.4V -5

Appendix D

ROUNDUP EAST LAGOON WETLAND FINAL PLAN

MDT Wetland Mitigation Monitoring
Roundup Wetland
Roundup, Montana

Figure 2

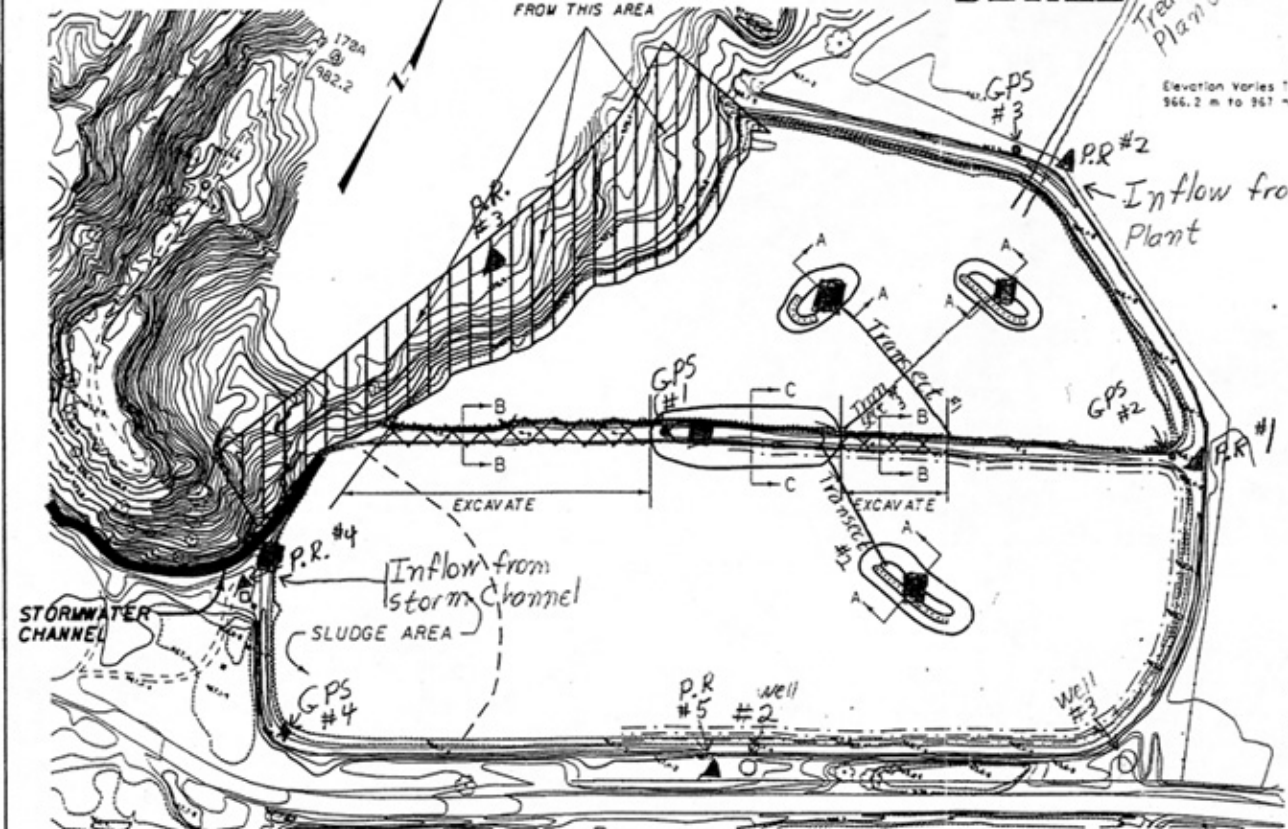
REMOVE HOUSEHOLD AND
AUTOMOTIVE SCRAP/DEBRIS
FROM THIS AREA

DETAIL

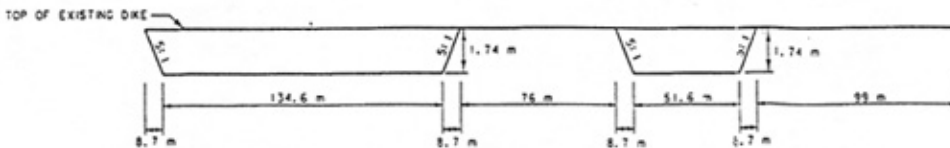
Treatment
Plant

LAND & WATER D-1

STATE	PROJECT NUMBER	SHEET
MONTANA	STPP 14-5151169	2

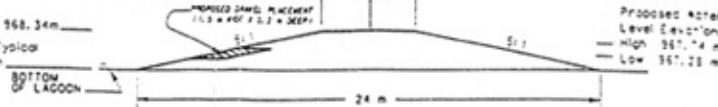


PLAN VIEW - GRAVEL AREAS



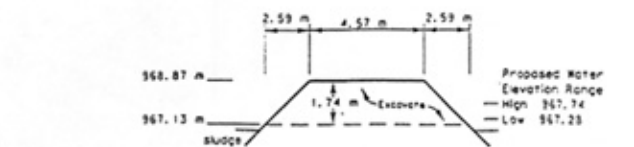
LONGITUDINAL SECTION OF EXISTING DIKE (between north & south lagoon cells)

NOT TO SCALE



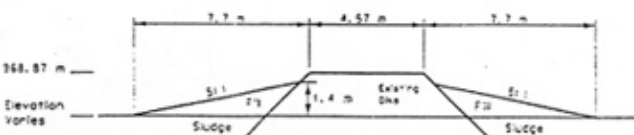
SECTION A-A (Islands)

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
- GPS Point
- Wood Duck Box

SCALE = 1:1250

ROUNDUP EAST
LAGOON WETLAND

FINAL PLAN

Appendix E

BIRD SURVEY PROTOCOL GPS PROTOCOL

*MDT Wetland Mitigation Monitoring
Roundup Wetland
Roundup, Montana*

BIRD SURVEY PROTOCOL

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

Species Use within the Mitigation Wetland: Survey Method

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

Sites that can be circumambulated or walked throughout.

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

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

Sites that cannot be circumambulated.

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

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

Species Use within the Mitigation Wetland: Data Recording

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

1. Bird Species List

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

2. Bird Density

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

3. Bird Behavior

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

4. Bird Species Habitat Use

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

GPS Mapping and Aerial Photo Referencing Procedure

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

2004 MACROINVERTEBRATE SAMPLING PROTOCOL AND DATA

MDT Wetland Mitigation Monitoring

Roundup Wetland

Roundup, Montana

AQUATIC INVERTEBRATE SAMPLING PROTOCOL

Equipment List

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

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

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

Site Selection

Select the sampling site with these considerations in mind:

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

Sampling

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

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

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

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



This step is optional, but it gives you a chance to 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 - 2004

METHODS

Among other monitoring activities, aquatic invertebrate assemblages were collected at a number of mitigation wetlands throughout Montana. This report summarizes data generated from four 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 using a statistical software package, and distributions, median values, ranges, and quartiles for each metric were examined. All sites in all years of sampling were used. Camp Creek, which was sampled in 2002, 2003, and 2004, was assessed using the tested metric battery developed for montane streams of Western Montana (Bollman 1998). The fauna at the Camp Creek site was different from that of the other sites, and suggested montane stream conditions rather than wetland conditions. 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 in all years.

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

Sample processing

Aquatic invertebrate samples were collected at mitigation wetland sites in the summer months of 2001, 2002, 2003, and 2004 by personnel of Land and Water Consulting, Inc. Sampling procedures utilized were based on the protocols developed by the Montana Department of Environmental Quality (MT DEQ). Sampling consisted of D-frame net sweeps through emergent vegetation (when present), the water column, over the water surface, and included disturbing and scraping substrates at each sampled sites. Samples were preserved in ethanol at each wetland site and subsequently delivered to Rhithron Associates, Inc. for processing, taxonomic determinations, and data analysis.

At Rhithron's laboratory, Caton subsamplers and stereomicroscopes with 10X magnification were used to randomly select a minimum of 100 organisms, when possible, from each sample. In some cases, the entire sample contained fewer than 100 organisms; in these cases, all organisms from the sample were taken. Taxa were identified in general accordance with the taxonomic resolution standards set out in the MT DEQ Standard Operating Procedures for Sampling and Sample Analysis (Bukantis 1998). All samples were re-identified by a second taxonomist for quality assurance purposes. The identified samples have been archived at Rhithron's laboratory. Taxonomic data and organism counts were entered into an Excel 2000 spreadsheet, and metrics were calculated and scored using spreadsheet formulae.

Bioassessment metrics

An index based on the performance of 12 metrics was constructed, as described above. Table 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, %Orthocladinae of Chironomidae, %Crustacea + %Mollusca, and %Amphipoda) measure the relative contributions of certain taxonomic groups that may have significant responses to habitat and/or water quality impacts. For example, amphipods have been demonstrated to increase in abundance in alkaline conditions. Short-lived, relatively mobile taxa such as chironomids dominate ephemeral environments; many are hemoglobin-bearers capable of tolerating de-oxygenated conditions.

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

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

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. In 2004, 25 sites were re-visited, and 6 new sites were sampled. Thus, the 2004 database contains data for 122 sampling events at 50 unique sites. Table 2 summarizes sites and sampling years.

Metric scoring criteria were re-developed each year as new data was added. For 2004, all 122 records were utilized. Ranges of individual metrics, as well as median metric values remained remarkably consistent in each of the 4 years; minimal changes resulted from the addition of new data in 2004. The summary metric values and scores for the 2004 samples are given in Tables 3a-3d.

Literature cited

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

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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 1. Aquatic invertebrate metrics employed in the MTDI mitigation wetland monitoring study, 2001- 2004.

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

Table 2. Montana Department of Transportation Mitigated Wetlands Monitoring Project sites. 2001 – 2004.

2001	2002	2003	2004
Beaverhead 1	Beaverhead 1	Beaverhead 1	Beaverhead 1
Beaverhead 2	Beaverhead 2		
Beaverhead 3	Beaverhead 3		Beaverhead 3
Beaverhead 4	Beaverhead 4	Beaverhead 4	
Beaverhead 5	Beaverhead 5	Beaverhead 5	Beaverhead 5
Beaverhead 6	Beaverhead 6	Beaverhead 6	Beaverhead 6
Big Sandy 1			
Big Sandy 2			
Big Sandy 3			
Big Sandy 4			
Johnson-Valier			
VIDA			
Cow Coulee	Cow Coulee	Cow Coulee	
Fourchette - Puffin	Fourchette - Puffin	Fourchette - Puffin	Fourchette - Puffin
Fourchette - Flashlight	Fourchette - Flashlight	Fourchette - Flashlight	Fourchette - Flashlight
Fourchette - Penguin	Fourchette - Penguin	Fourchette - Penguin	Fourchette - Penguin
Fourchette - Albatross	Fourchette - Albatross	Fourchette - Albatross	Fourchette - Albatross
Big Spring	Big Spring	Big Spring	Big Spring
Vince Ames			
Ryegate			
Lavinia			
Stillwater	Stillwater	Stillwater	Stillwater
Roundup	Roundup	Roundup	Roundup
Wigeon	Wigeon	Wigeon	Wigeon
Ridgeway	Ridgeway	Ridgeway	Ridgeway
Musgrave - Rest. 1	Musgrave - Rest. 1	Musgrave - Rest. 1	Musgrave - Rest. 1
Musgrave - Rest. 2	Musgrave - Rest. 2	Musgrave - Rest. 2	Musgrave - Rest. 2
Musgrave - Enh. 1	Musgrave - Enh. 1	Musgrave - Enh. 1	Musgrave - Enh. 1
Musgrave - Enh. 2			
	Hoskins Landing	Hoskins Landing	Hoskins Landing
	Peterson - 1	Peterson - 1	Peterson - 1
	Peterson - 2		Peterson - 2
	Peterson - 4	Peterson - 4	Peterson - 4
	Peterson - 5	Peterson - 5	Peterson - 5
	Jack Johnson - main	Jack Johnson - main	
	Jack Johnson - SW	Jack Johnson - SW	
	Creston	Creston	Creston
	Lawrence Park		
	Perry Ranch		
	SF Smith River	SF Smith River	SF Smith River
	Camp Creek	Camp Creek	Camp Creek
	Kleinschmidt	Kleinschmidt - pond	Kleinschmidt - pond
		Kleinschmidt - stream	Kleinschmidt - stream
		Ringling - Galt	
			Circle
			Cloud Ranch Pond
			Cloud Ranch Stream
			Colloid
			Jack Creek
			Norem

Table 3a.

	BEAVER HEAD #1	BEAVER HEAD #3	BEAVER HEAD #5	BEAVER HEAD #6	BIG SPRING CREEK	CIRCLE	CLOUD RANCH POND	CLOUD RANCH STREAM	COLLOID	CRESTON
Total taxa	27	12	21	18	25	16	16	20	8	18
POET	3	0	2	3	4	2	2	4	2	3
Chironomidae taxa	7	5	5	5	8	5	6	11	1	2
Crustacea + Mollusca	7	3	4	6	7	1	6	1	1	7
% Chironomidae	0.33636	0.18888	0.39285	0.57547	0.44329	0.55855	0.41666	0.84	0.09090	0.06087
Orthoclaadiinae/Chir	0.05405	0.35294	0.06818	0.36065	0.27907	0.69354	0.4	0.16666	0	0
%Amphipoda	0.03636	0	0.01785	0.05660	0.05154	0	0.00925	0	0	0
%Crustacea + %Mollusca	0.31818	0.73333	0.05357	0.12264	0.18556	0.03603	0.36111	0.01	0.09090	0.73913
HBI	7.97169	7.88888	8.36363	8.15789	7.61855	7.19090	7.32291	4.84	6	6.92173
%Dominant taxon	0.2	0.57777	0.23214	0.25471	0.23711	0.38738	0.13888	0.38	0.27272	0.37391
%Collector-Gatherers	0.40909	0.75555	0.51785	0.62264	0.78350	0.05405	0.67592	0.74	0.18181	0.29565
%Filterers	0.12727	0	0	0	0.01030	0.15315	0.09259	0.17	0	0.06087
Total taxa	5	1	5	3	5	3	3	3	1	3
POET	3	1	1	3	5	1	1	5	1	3
Chironomidae taxa	5	3	3	3	5	3	3	5	1	1
Crustacea + Mollusca	5	1	3	5	5	1	5	1	1	5
% Chironomidae	3	3	3	1	1	1	1	1	5	5
Orthoclaadiinae/Chir	1	3	1	3	3	5	3	1	1	1
%Amphipoda	5	5	5	3	3	5	5	5	5	5
%Crustacea + %Mollusca	5	1	5	5	5	5	3	5	5	1
HBI	1	1	1	1	1	3	3	5	5	3
%Dominant taxon	5	1	5	5	5	3	5	3	5	3
%Collector-Gatherers	1	3	3	3	3	1	3	3	1	1
%Filterers	1	3	3	3	3	1	1	1	3	1
	40	26	38	38	44	32	36	38	34	32
	0.666667	0.433333	0.633333	0.633333	0.733333	0.533333	0.6	0.633333	0.566667	0.533333
	sub-optimal	poor	sub-optimal	sub-optimal	optimal	sub-optimal	sub-optimal	sub-optimal	sub-optimal	sub-optimal

Table 3b.

	FOURCHETTE CREEK ALBATROSS RESERVOIR	FOURCHETTE CREEK FLASHLIGHT RESERVOIR	FOURCHETTE CREEK PENGUIN RESERVOIR	FOURCHETTE CREEK PUFFIN RESERVOIR	JACK CREEK	MDT CAMP CREEK	MDT HOSKINS LANDING	MDT KLEINSCHMIDT CREEK	MDT KLEINSCHMIDT POND
Total taxa	18	23	19	22	23	35	25	19	19
POET	3	5	4	3	5	12	4	4	6
Chironomidae taxa	6	9	6	4	8	14	4	6	4
Crustacea + Mollusca	3	4	5	8	7	1	6	2	4
% Chironomidae	0.135135	0.265306	0.066116	0.247934	0.352113	0.37963	0.036697	0.438776	0.047619
Orthocladinae/Chir	0.2	0.346154	0.625	0.3	0.52	0.585366	0.5	0.627907	0.8
%Amphipoda	0.126126	0.336735	0.578512	0.041322	0.028169	0	0.018349	0.010204	0.009524
%Crustacea + %Mollusca	0.684685	0.387755	0.77686	0.371901	0.380282	0.111111	0.541284	0.061224	0.190476
HBI	7.972973	7.216495	7.7	6.950413	7.647059	4.570093	6.59633	6.561224	6.67619
%Dominant taxon	0.495495	0.336735	0.561983	0.140496	0.15493	0.111111	0.366972	0.316327	0.552381
%Collector-Gatherers	0.873874	0.816327	0.702479	0.38843	0.394366	0.416667	0.091743	0.683673	0.114286
%Filterers	0	0.010204	0.132231	0.008264	0.042254	0.12037	0.018349	0.153061	0.047619
Total taxa									
POET	3	5	3	5	5	5	5	3	3
Chironomidae taxa	3	5	5	3	5	5	5	5	5
Crustacea + Mollusca	3	5	3	3	5	5	3	3	3
% Chironomidae	1	3	3	5	5	1	5	1	3
Orthocladinae/Chir	5	3	5	3	3	3	5	1	5
%Amphipoda	3	3	5	3	5	5	5	5	5
%Crustacea + %Mollusca	3	1	1	3	5	5	5	5	5
HBI	1	3	1	3	3	5	3	5	5
%Dominant taxon	1	3	1	3	1	5	5	5	5
%Collector-Gatherers	1	5	1	5	5	5	3	5	1
%Filterers	5	5	3	1	1	1	1	3	1
	3	3	1	3	3	1	3	1	3
	32	44	32	40	46	46	48	42	44
	0.533333	0.733333	0.533333	0.666667	0.766667	0.766667	0.8	0.7	0.733333
	sub-optimal	optimal	sub-optimal	optimal	optimal	optimal	optimal	optimal	optimal

Table 3d.

	ROUNDUP	SOUTH FORK SMITH RIVER	STILLWATER	WIGEON
Total taxa	9	20	23	16
POET	0	5	4	3
Chironomidae taxa	4	7	9	5
Crustacea + Mollusca	3	3	4	3
% Chironomidae	0.55	0.482143	0.466667	0.314815
Orthocladiinae/Chir	0.072727	0.055556	0.244898	0.647059
%Amphipoda	0	0.071429	0.12381	0.481481
%Crustacea + %Mollusca	0.42	0.116071	0.180952	0.574074
HBI	8.89	6.589286	6.47619	7.534653
%Dominant taxon	0.28	0.294643	0.133333	0.481481
%Collector-Gatherers	0.56	0.839286	0.628571	0.657407
%Filterers	0.14	0	0	0.083333
Total taxa				
POET	1	3	5	3
Chironomidae taxa	1	5	5	3
Crustacea + Mollusca	3	5	5	3
% Chironomidae	1	1	3	1
Orthocladiinae/Chir	1	1	1	3
%Amphipoda	1	1	3	5
%Crustacea + %Mollusca	5	3	3	1
HBI	3	5	5	3
%Dominant taxon	1	5	5	3
%Collector-Gatherers	5	5	5	3
%Filterers	3	5	3	3
	1	3	3	1
	26	42	46	32
	0.433333	0.7	0.766667	0.533333
	poor	optimal	optimal	Sub-optimal

Aquatic Invertebrate Taxonomic Data

Site Name ROUNDUP

Date Collected

Order	Family	Taxon	Count	Percent	Unique	BI	FFG
		Ostracoda	27	27.00%	Yes	8	CG
Coleoptera		Copepoda	1	1.00%	Yes	8	CG
	Dytiscidae	Dytiscidae	1	1.00%	Yes	5	PR
	Hydrophilidae	Berosus	2	2.00%	Yes	5	PR
Diplostraca							
		Cladocera	14	14.00%	Yes	8	CF
Diptera	Chironomidae						
		<i>Chironomus</i>	28	28.00%	Yes	10	CG
		<i>Cricotopus (Isocladius)</i>	4	4.00%	Yes	7	SH
		<i>Glyptotendipes</i>	1	1.00%	Yes	10	SH
		<i>Psectrotanypus</i>	22	22.00%	Yes	10	PR
Grand Total			100				

Aquatic Invertebrate Data Summary

Project ID: MDT04LW

STORET Station ID:

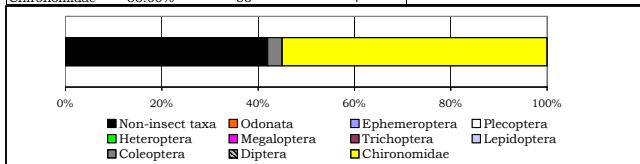
Station Name: ROUNDUP

Activity ID:

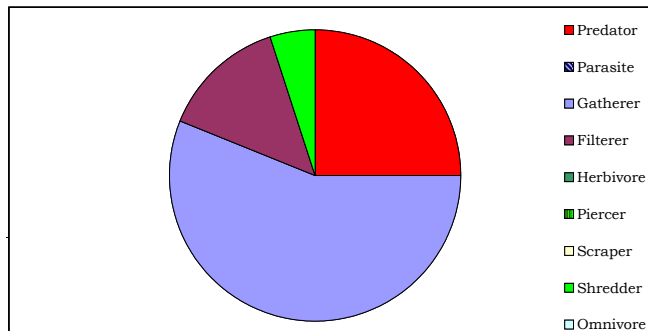
Sample Date:

Sample type	
SUBSAMPLE TOTAL ORGANISMS	100
Portion of sample used	
Estimated number in total sample	0
Conversion factor	#VALUE!
Estimated number in 1 square meter	#VALUE!
Sampling effort	
Habitat type	
EPT abundance	0
Taxa richness	9
Number EPT taxa	0
Percent EPT	0.00%

TAXONOMIC COMPOSITION				TAXONOMIC RATIOS	
GROUP	PERCENT	ABUNDANCE	#TAXA	METRIC	VALUE
Non-insect taxa	42.00%	42	3	EPT/Chironomidae	0.00
Odonata	0.00%	0	0	Baetidae/Ephemeroptera	#DIV/0!
Ephemeroptera	0.00%	0	0	Hydropsychidae/Trichoptera	#DIV/0!
Plecoptera	0.00%	0	0		
Heteroptera	0.00%	0	0		
Megaloptera	0.00%	0	0		
Trichoptera	0.00%	0	0		
Lepidoptera	0.00%	0	0		
Coleoptera	3.00%	3	2		
Diptera	0.00%	0	0		
Chironomidae	55.00%	55	4		



FUNCTIONAL COMPOSITION				FUNCTIONAL RATIOS	
GROUP	PERCENT	ABUNDANCE	#TAXA	METRIC	VALUE
Predator	25.00%	25	3	Scraper/Filterer	0.00
Parasite	0.00%	0	0	Scraper/Scraper + Filterer	0.00
Gatherer	56.00%	56	3		
Filterer	14.00%	14	1		
Herbivore	0.00%	0	0		
Piercer	0.00%	0	0		
Scraper	0.00%	0	0		
Shredder	5.00%	5	2		
Omnivore	0.00%	0	0		
Unknown	0.00%	0	0		



COMMUNITY TOLERANCES	
Sediment tolerant taxa	0
Percent sediment tolerant	0.00%
Sediment sensitive taxa	0
Percent sediment sensitive	0.00%
Metals tolerance index (McGuire)	4.10
Cold stenotherm taxa	0
Percent cold stenotherms	0.00%

HABITUS MEASURES	
Hemoglobin bearer richness	3
Percent hemoglobin bearers	51.00%
Air-breather richness	2
Percent air-breathers	3.00%
Burrower richness	2
Percent burrowers	29.00%
Swimmer richness	1
Percent swimmers	2.00%

DOMINANCE		
TAXON	ABUNDANCE	PERCENT
Chironomus	28	28.00%
Ostracoda	27	27.00%
Psectrotanydus	22	22.00%
Cladocera	14	14.00%
Cricotopus (Isocladius)	4	4.00%
SUBTOTAL 5 DOMINANTS	95	95.00%
Berosus	2	2.00%
Copepoda	1	1.00%
Dytiscidae	1	1.00%
Glyptotendipes	1	1.00%
Turbellaria	0	0.00%
TOTAL DOMINANTS	100	100.00%

TOLERANCE/CONDITION INDICES	
Community Tolerance Quotient (CTQa)	93.60
Hilsenhoff Biotic Index	8.89

DIVERSITY	
Shannon H (loge)	1.94
Shannon H (log2)	1.35
Margalef D	1.73
Simpson D	0.21
Evenness	0.15

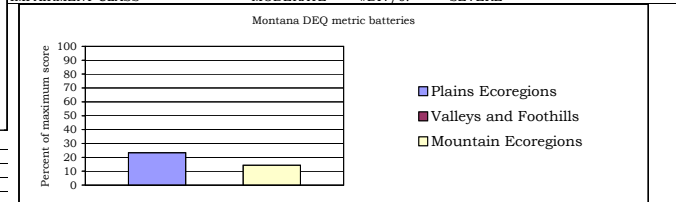
VOLTINISM			
TYPE	ABUNDANCE	# TAXA	PERCENT
Multivoltine	97	7	97.00%
Univoltine	0	0	0.00%
Semivoltine	3	2	3.00%

TAXA CHARACTERS		
	#TAXA	PERCENT
Tolerant	4	53.00%
Sensitive	0	0.00%
Clinger	1	4.00%

BIOASSESSMENT INDICES

B-IBI (Karr et al.)		
METRIC	VALUE	SCORE
Taxa richness	9	1
E richness	0	1
P richness	0	1
T richness	0	1
Long-lived	2	1
Sensitive richness	0	1
%tolerant	53.00%	1
%predators	25.00%	5
Clinger richness	1	1
%dominance (3)	77.00%	1
TOTAL SCORE	14	28%

MONTANA DEQ INDICES (Bukantis 1998)				
METRIC	VALUE	Plains Ecoregions	Valleys and Foothills Ecoregions	Mountain Ecoregions
Taxa richness	9	0	0	0
EPT richness	0	0	0	0
Biotic Index	8.89	0	0	0
%Dominant taxon	28.00%	3	3	2
%Collectors	70.00%	2	2	1
%EPT	0.00%	0	0	0
Shannon Diversity	1.35	0	0	0
%Scrapers + Shredders	5.00%	1	0	0
Predator taxa	3	1	0	0
%Multivoltine	97.00%	0	0	0
%H of T	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
TOTAL SCORES	7	#DIV/0!	3	3
PERCENT OF MAXIMUM	23.33	#DIV/0!	14.29	14.29
IMPAIRMENT CLASS	MODERATE	#DIV/0!	SEVERE	SEVERE



Montana Valleys and Foothills revised index (Bollman 1998)

Percent max.	5.56%	Impairment class	SEVERE
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Montana Plains ecoregions metrics (Bramblett and Johnson 2002)			
Riffle	Pool		
EPT richness	0	E richness	0
Percent EPT	0.00%	T richness	0
Percent Oligochaetes and Leeches	0.00%	Percent EPT	0.00%
Percent 2 dominants	55.00%	Percent non-insect	42.00%
Filterer richness	1	Filterer richness	1
Percent intolerant	0.00%	Univoltine richness	0
Univoltine richness	0	Percent supertolerant	93.00%
Percent clingers	4.00%		
Swimmer richness	1		

Appendix G

WEED MANAGEMENT

MDT Wetland Mitigation Monitoring

Roundup Wetland

Roundup, Montana

***Kochia scoparia* Characteristics**

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

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

Herbicide Control

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

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

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

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

Management Suggestions

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

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

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

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

Herbicide	Active Ingredient	Area of Use	Target Species
Rodeo	2,4-D, glyphosate	riparian ¹	non-target ²
Garlon	triclopyr	riparian	selective ⁴
Redeem	triclopyr	riparian, upland	selective
Vista	fluroxypyr	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