MONTANA DEPARTMENT OF TRANSPORTATION WETLAND MITIGATION MONITORING REPORT: YEAR 2003

Stillwater River
Absarokee, Montana

Prepared for:

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

Prepared by:

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

March 2004

Project No: 130091.032

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1.0 INTRODUCTION

The Stillwater River wetland was constructed in the spring of 1999 to mitigate wetland impacts associated with a proposed Federal Aviation Administration expansion of the Columbus airport and a proposed MDT roadway improvement project between Absarokee and Columbus in watershed #13 in the Billings District. The site is located in Stillwater County approximately eight miles southwest of the interstate interchange at Columbus, Section 22, Township 3 South, Range 19 East **(Figure 1)**. Elevations within the assessment area range from approximately 3,382 to 3,387 feet above sea level. The surrounding land uses include pastures, cropland and residential areas.

The project was intended to develop approximately 10.7 acres of wetlands within a 20-acre conservation easement on property owned by Virginia K. Thompson. Two dikes were constructed across a former channel of the Stillwater River to impound return irrigation water from the nearby Whitebird irrigation ditch and groundwater. The two dikes were to create 3.79 acres of wetland behind Dike #1 and 6.90 acres of wetland behind Dike #2 (total 10.69 acres). The mitigation activities were to impact approximately 3.77 acres of existing wetlands.

The impoundments have standing water with depths ranging from 0-6 feet. Outflow from the west (#1) to the east impoundment (#2) is through a beaver control device installed in the central dike separating the two impoundments. A similar device allows outflow through the second dike into a small stream connecting to the Stillwater River. The site boundary is illustrated on **Figure 2, Appendix A**.

2.0 METHODS

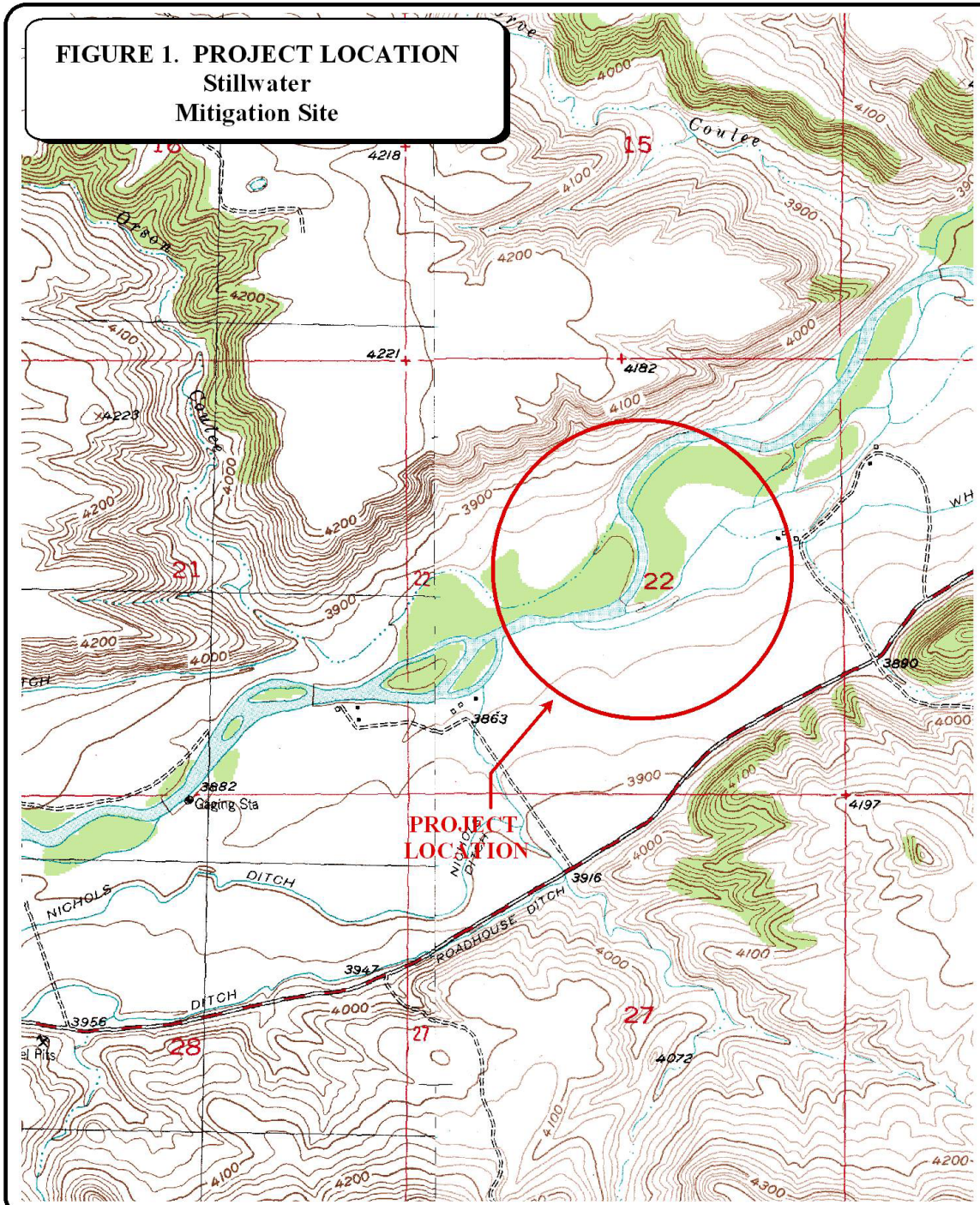
2.1 Monitoring Dates and Activities

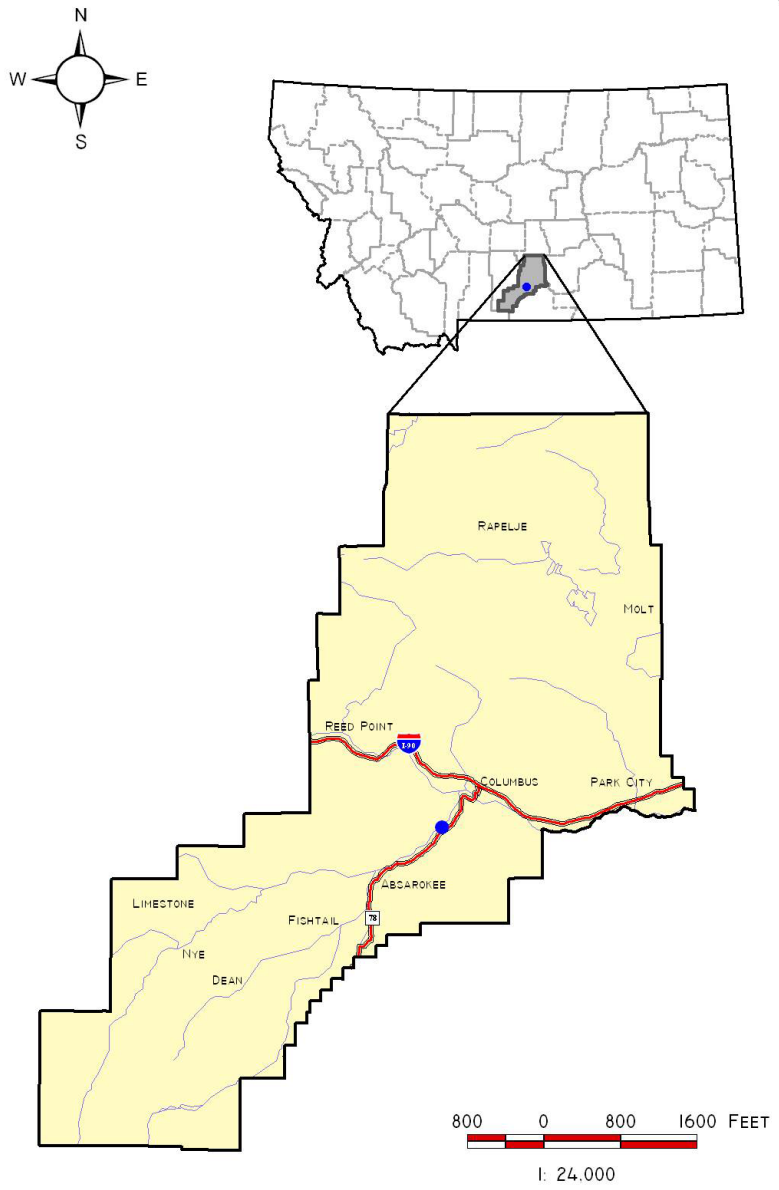
The site was visited during 2003 on May 12 for spring avian migration use, and on August 12 to collect the wetland monitoring form data **(Appendix B)**. Activities and information conducted/collected during the monitoring event included: wetland delineation; wetland/open water boundary mapping; vegetation community mapping; vegetation transects; soils data; hydrology data; bird and general wildlife use; photograph points; macroinvertebrate sampling; GPS data points; functional assessment; and, maintenance needs of any bird nesting structures and inflow and outflow structures (non-engineering).

2.2 Hydrology

Wetland hydrology indicators were recorded using procedures outlined in the COE 1987 Wetland Delineation Manual. Hydrology data were recorded on the COE Routine Wetland Delineation Data Form **(Appendix B)** at each wetland determination point. Precipitation data for the year 2003 were compared to the 1971-2000 average (WRCC 2003).

FIGURE 1. PROJECT LOCATION
Stillwater
Mitigation Site





PROJECT #: 130091.032
DATE: APRIL 2001
LOCATION:
PROJECT MANAGER: B. DUTTON
DRAWN BY: B. NOECKER
M. ARTHUR

LAND & WATER CONSULTING, INC.
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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)**. There are no groundwater monitoring wells within the assessment area.

2.3 Vegetation

General vegetation types were delineated on the aerial photograph during the August 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. The assessment area is fenced and woody species were not planted on this site.

Two transects were established during the 2001 monitoring event to represent the range of current vegetation conditions; the transect in the vicinity of impoundment #2 was relocated during 2002. These transects locations are shown on **Figure 2, Appendix A**. Percent cover for each species was recorded on the vegetation transect form **(Appendix B)**. The transects will be used to evaluate changes over time, especially the establishment and increase of hydrophytic vegetation. Transect ends are marked with metal fence posts and their locations recorded with the GPS unit. Photos of each transect were taken during the mid-season visit.

2.4 Soils

Soils were evaluated during the mid-season visit according to the procedure outlined in the COE 1987 Wetland Delineation Manual (Environmental Laboratory 1987). 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 information was recorded on the COE Routine Wetland Delineation Forms **(Appendix B)**. The indicator status of vegetation was derived from the National List of Plant Species that Occur in Wetlands: Northwest Region 9 (Reed 1988). The wetland/upland and open water boundaries were used to calculate the wetland area developed at the Stillwater River wetland. A pre-construction wetland map was completed by the MDT (Urban 1998) and is included in **Appendix D**.

2.6 Mammals, Reptiles, and Amphibians

Mammal, reptile, and amphibian species observations were recorded on the wetland monitoring form during each 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).** 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 composite sample was collected during the site visit following the protocol **(Appendix F)**; a sample was collected from each impoundment and mixed. Samples were preserved as outlined in the sampling procedure and sent to Rhithron Associates for analysis. The approximate sampling locations are indicated on **Figure 2, Appendix A**. Results are included in **Appendix F**.

2.9 Functional Assessment

A functional assessment form was completed for the 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. Pre-construction functional assessments were completed by MDT and are included in the 2001 monitoring report.

2.10 Photographs

Photographs were taken showing the current land use surrounding the site, the wetland buffer, the monitored area, and the vegetation transects **(Appendix C)**. 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. The approximate locations are shown on **Figure 2, Appendix A**. Photos were taken from the same locations during the 2002 and 2003 mid-season visits. All photographs were taken using a digital camera.

2.11 GPS Data

During the 2002 monitoring season survey points were collected using a resource grade Trimble, Geoexplorer III hand-held GPS unit **(Appendix E)**. Points collected included: the beginning and end locations of the vegetation transects, the jurisdictional wetland boundary, and the sample point (SP) locations. In addition, GPS data were collected for four (4) landmarks recognizable on the air photo for purposes of line fitting to the topography. In 2003, the wetland delineation boundary was recorded on an aerial photo; GPS data were not used.

2.12 Maintenance Needs

The condition of inflow and outflow structures, habitat enhancement structures or other mitigation related structures were evaluated. Minor maintenance needs and recommendations can be found in **Section 3.9**. This examination did not entail an engineering-level analysis.

3.0 RESULTS

3.1 Hydrology

The source of hydrology for the Stillwater River mitigation wetland includes groundwater from the river and irrigation return water from the nearby Whitebird irrigation ditch. The historic river channel to the south and adjacent to the Stillwater River was excavated and diked to create the mitigation wetlands. Water is conveyed from the first to the second impoundment through a "beaver-proofed" outflow device. A similar device allows outflow through the second dike into a small stream connecting to the Stillwater River.

During the August 12, 2003 monitoring visit approximately 68% of the assessment area was inundated with 0-6 feet of standing water and was at full-pond level, partly because the outflow devises were partially clogged with beaver debris. Open water, or the area without emergent vegetation, is depicted on **Figure 3, Appendix A**.

According to the Western Regional Climate Center (WRCC, 2003), the Columbus station annual mean (1971-2000) precipitation was 15.73 inches; the average precipitation through the month of August was 11.6 inches. For the year 2003, precipitation through August was 9.7 inches or 83% of the mean. Though the drought has persisted in this area for 4 to 5 years, the placement of sticks into the outflow structures by beaver has likely negated the affects of the drought by maintaining an optimum water level in the impoundments.

3.2 Vegetation

Vegetation species identified on the site are presented in **Table 1** and in the monitoring form **(Appendix B)**. The upland community is decreasing in size as a result of the increase in wetland acreage within the cottonwood area **(Figure 3, Appendix A)**.

The Stillwater vegetation types include: Type 1, *Typha latifolia*; Type 2, *Carex* spp./*Juncus* spp./*Scirpus* spp; Type 3, *Agropyron trachycaulus/Poa pratensis;* and, Type 4, Dead Cottonwoods in Open Water. Dominant species within each community are listed on the monitoring form **(Appendix B)**. Hydrophytic vegetation communities have also increased in diversity over time; changes in communities along the vegetation transects are presented in **Tables 2** and **3** and the adjoining figure.

The site has developed wetland vegetation along nearly 100% of the upland periphery around the impoundments and the shallow fingers of open water within the cottonwood area. There are approximately 30 known species of wetland plants with a FACW to OBL status within the assessment area.

The vegetation transect results are detailed in the monitoring form **(Appendix B)** and are summarized below in the transect maps, **Tables 2** and **3,** and **Charts 1** and **2**. Both transects are located on the northwest side of the impoundments; one adjacent to each impoundment. Transect 2 on the east impoundment was moved during 2002 to better represent wetland changes over time.

Over the three monitoring seasons the upland areas have decreased as the wetland communities, Types 1 and 2, have increased in size. The complexity of the community transitions has therefore also increased. Community types 1 and 2 have also become more distinct with some species crossover but less was observed during 2003. As the saturation zones expand into the upland areas, distinct bands of hydrophytic vegetation are expected to continue to develop according to saturation tolerances.

Noxious weeds are still present at the site, including species on the State of Montana list (spotted knapweed, leafy spurge and Canada thistle) as well as one on the Stillwater County list (common mullein). These areas were not mapped on the 2003 **Figure 3** as they do not constitute discreet vegetation communities. However, size of the communities have increased since 2001 and are likely to keep expanding. It is unlikely that knapweed or spurge will expand into wetland communities, but they do out-compete the more wildlife-palatable species with the zones of infestation. Most of the knapweed is located in the vicinity of the north end of the central berm and spurge is primarily located on the northwest peninsula (where the beaver house is located).

Fallen cottonwoods within the ponded areas are increasing because of beaver kill. These downed trees provide protective cover for waterfowl, although more light is filtering into the wetland because of canopy loss. A few of the large cottonwoods were also removed to accommodate utility needs for new house construction north of the wetland.

Table 1: ***2001-2003 Stillwater River Vegetation Species List***

Scientific Name[1]	Region 4 (Northwest) Wetland Indicator Status
Agropyron trachycaulum	FAC
Agrostis alba	FACW
Alnus incana	FACW
Alopecurus arundinaceus	NI (FAC+)
Beckmannia syzigachne	OBL
Bromus inermis	-(UPL)
Bromus japonicus	FACU
Calamagrostis canadensis	FACW+
Callitriche palustris (verna)	**OBL**
Carex hystericina	OBL
Carex limnophilia	FACW
Carex nebrascensis	OBL
Carex stipata	-(FACW)
Centaurea maculosa	-(UPL)
Cirsium arvense	FACU+
Cynoglossum officinale	-(UPL)
Dactylis glomerata	FACU
Eleocharis palustris	OBL
Epilobium spp.	-(OBL)
Equisetum arvense	FAC
Euphorbia esula	-(UPL)
Glyceria grandis (=G. maxima)	OBL
Hordeum jubatum	FAC+
Juncus balticus	OBL
Juncus ensifolius (confirm 2004)	**FACW**
Juncus nevadensis	FACW
Juncus tenuis	FAC
Juniperus scopulorum	-(UPL)
Lemna minor	OBL
Linaria sp. (may be State Noxious Weed)	**-(UPL)**
Melilotus officinalis	FACU
Mimulus spp.	-(OBL)
Phalaris arundinacea	FACW
Phleum pretense	FACU
Poa pratensis	FACU+
Polygonum amphibium	OBL
Populus angustifolia	FACW
Potentilla argentea	FAC-
Prunus virginiana	FACU
Ranunculus sceleratus	OBL
Ribes spp.	-(FACU)
Rumex crispus	FACW
Salix bebbiana	**FACW**
Salix exigua	OBL
Salix lasiandra	FACW+
Scirpus pallidus	OBL
Scirpus validus	OBL
Solanum dulcamara	**FAC**
Symphoricarpos albus	FACU
Typha latifolia	OBL
Verbascum thapsus (Stillwater CO. Noxious Weed)	-(UPL)
Veronica wormskjoldii (?)	FAC+

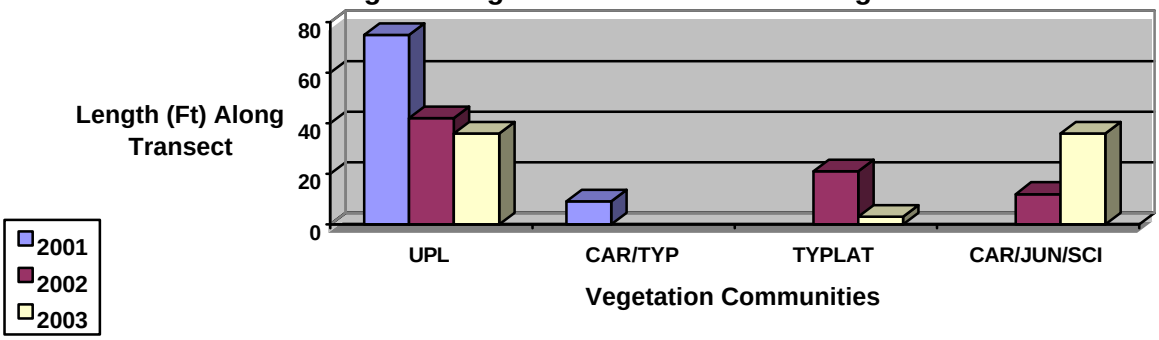
[1]**Bolded species indicate those documented within the analysis area for the first time in 2003**.

- : Species not listed in the National List of Plant Species that Occur in Wetlands (Reed 1988); parenthetical status is assumed.

Table 2: ***2001-2003 Transect 1 Data Summary***

Monitoring Year	2001	2002	2003
Transect Length	75 feet	75 feet	75 feet
# Vegetation Community Transitions along Transect	2	3	3
# Vegetation Communities along Transect	1	2	3
# Hydrophytic Vegetation Communities along Transect	1	2	2
Total Vegetative Species	7	19	20
Total Hydrophytic Species	2	16	17
Total Upland Species	5	3	3
Estimated % Total Vegetative Cover	99%	100%	100%
% Transect Length Comprised of Hydrophytic Vegetation Communities	11%	26%	46%
% Transect Length Comprised of Upland Vegetation Communities	89%	74%	54%
% Transect Length Comprised of Unvegetated Open Water	0%	0%	0%
% Transect Length Comprised of Bare Substrate	0%	0%	0%

Chart 1: Length of Vegetation Communities along Transect 1



Transect 1 Map[1]--2001

Transect 1 Start	WL Type 2 (9')	UPL Vegetation Type 3 (66')	Total 75'	End Transect 1

2002

Transect 1 Start	WL Type 2 (12')	UPL Type 3 (42')	WL Type 1 (21')	Total 75'	End Transect 1

2003

Transect 1 Start	WL Type 2 (21')	UPL Type 3 (36')	WL Type 2 (15')	WL Type 1 (3')	Total 75'	End Transect 1

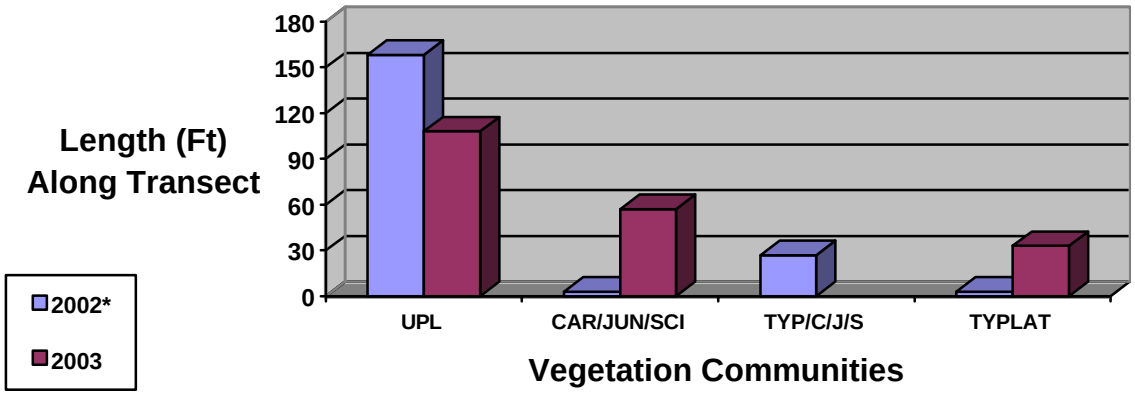
[1]Vegetation species within community types are not static across years.

Table 3: ***2001-2003 Transect 2 Data Summary***

Monitoring Year	2001	2002	2003
Transect Length	60 feet[1]	198 feet	198 feet
# Vegetation Community Transitions along Transect	2	2	9
# Vegetation Communities along Transect	1	1	3
# Hydrophytic Vegetation Communities along Transect	1	1	2
Total Vegetative Species		17	19
Total Hydrophytic Species	6	13	15
Total Upland Species	6	4	4
Estimated % Total Vegetative Cover	85%	78%	99%
% Transect Length Comprised of Hydrophytic Vegetation Communities	20%	38%	44%
% Transect Length Comprised of Upland Vegetation Communities	80%	61%	56%
% Transect Length Comprised of Unvegetated Open Water	6%	0%	0%
% Transect Length Comprised of Bare Substrate	0%	0%	0%

[1] Transect moved in 2002.

Chart 2: Length of Vegetation Communities along Transect 2



***In 2002 transect 2 was moved to new location; data not included in bar graph.**

Transect 2 Map*--2001

Transect 2 Start	UPL Type 3 (75')	WL Type 2 (2')	Total 77'	End Transect 2

2002**

Transect 2 Start	WL Type 1 (3')	WL Type 2 (3')	UPL Type 3 (30')	WL Type 1/2 (27')	UPL Type 3 (114')	OW (12')	UPL Type 3 (9')	Total 198'	End Transect 2

*Transect moved in 2002.

2003

Transect 2 Start	WL Type 1 (3')	WL . Type 2 (6')	UPL Type 3 (24')	WL Type 2 (24')	WL Type 1 (18')	WL Type 2 (3')	UPL Type 3 (80')	WL Type 2 (24')	WL Type 1 (12')	UPL Type 3 (9')	Total 198'	End Transect 2

**Vegetation species within community types are not static across years.

3.3 Soils

The site was mapped as part of the Carter County Stillwater Soil Survey (USDA 1980). The dominant soil on the site is mapped as the undifferentiated Lolo and Nesda soils, flooded (38). These soils are found on low stream terraces and flood plains. Lolo is a very gravelly loam that is taxonomically classified as a Pachic Haploboroll and Nesda is a gravelly loam with the classification of Fluventic Haploboroll. The Lolo-Nesda soil complex has four inclusions with only the Larry inclusion being hydric; neither component is hydric. The Larry inclusion is typical of wooded terraces like the Stillwater site.

Soils were sampled at two (2) wetland sample points (SP-1, Transect 1 and SP-3, Transect 2). Soils at SP-1 (Transect 1) were black (10YR 2/1) loam from 0-3 inches; from 3-6 inches a very dark gray (10YR 3/1). Below 6 inches cobbles were observed. Saturation was observed to the surface. The soils at SP-3 (Transect 2) were very dark gray (7YR 2/1) slight sandy loam from 0-2 inches and 2-6 inches a very dark grayish brown (10YR 3/2) sandy loam with yellowish red (5YR 4/6) mottles. Below 6 inches the same cobble layer was observed; typical of river flood plains. The upland soil pits revealed the same soil profiles, suggesting the area is converting to wetland, however, the vegetation is still marginally dominated by upland species.

3.4 Wetland Delineation

The delineated wetland boundary is depicted on **Figure 3, Appendix A**. The COE data forms are included in **Appendix B**. Emergent vegetation has developed beyond the edge of the water for almost the entire circumference. Aquatic vegetation has also developed in the shallow backwater areas. Submerged aquatic vegetation (species not all identified) appears to occur throughout the wetland and as far into the open water as can be observed from shore. According to MDT (Urban, pers. comm.), submerged aquatics have been observed during the aerial flights throughout the open water component of the impoundments. The wetland boundary encompasses 9.39 acres of wetland and includes 6.29 acres of shallow open water (<6 feet deep). Gross wetland acreage increased 0.9 acre since 2001 and net wetland acreage has increased 1.15 acres.

3.5 Wildlife

Wildlife species observed on the site between 2001 and 2003 are listed in **Table 4.** Activities and densities associated with these observations are included on the monitoring form in **Appendix B**. Observations included recent beaver sign such as chewed and fallen trees; the overstory canopy appears to be decreasing as a result of beaver kill. The beaver slide observed in 2002 on the central dike has been repaired.

Bird nesting material was observed in most of the bluebird boxes but no bluebirds were observed. Tree swallows were observed using many of the bluebird houses. Larry Urban (MDT) observed a Common Merganser female using the wood duck box on the east corner of impoundment 2. During the May birding visit a female merganser was observed in the backwater of the impoundment.

Avian species diversity is high for the Stillwater wetland and totals 36 species. Painted turtles were also observed, as were several deer beds (see cover photo). A white-tailed deer fawn was flushed from the backwater area during the mid-season visit. No fish rises have been observed but it is assumed that colonization is occurring either from the ditch or human planting. The landowner will be asked for his observations regarding fish presence.

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

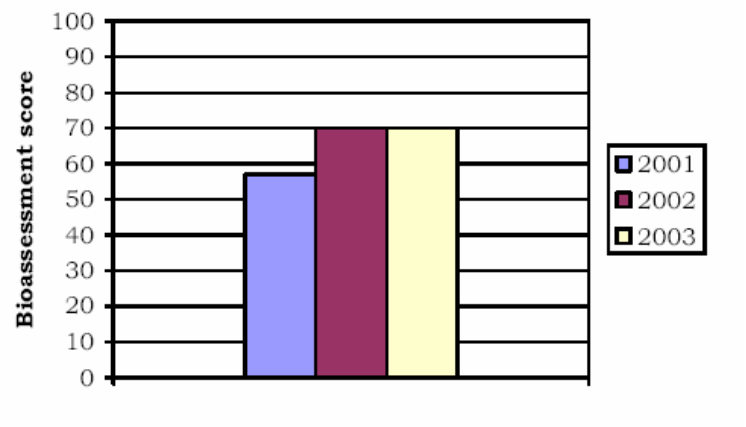
REPTILES and AMPHIBIANS	
Painted turtle (*Chrysemys picta*)	
Western Chorus Frog (*Pseudacris triseriata*)	
BIRDS	
American Robin (*Turdus migratorius*)	Killdeer (*Charadrius vociferous*)
American Coot (*Fulica americana*)	Least Flycatcher (*Empidonax minimus*)
Belted Kingfisher (*Ceryle alcyon*)	House Wren (*Troglodytes aedon*)
Black-capped Chickadee (*Poecile atricapillus*)	Mallard (*Anas platyrhynchos*)
Canada Goose (*Branta canadensis*)	Mourning Dove (*Zenaida macroura)*
Cedar Waxwing (*Bombycilla cedrorum*)	Northern Flicker (*Colaptes auratus*)
Cinnamon Teal (*Anas cyanoptera*)	Pied-billed Grebe (*Podilymbus podiceps*)
Common Grackle (*Quiscalus quiscula*)	Red-winged Blackbird (*Agelaius phoeniceus*)
Common Merganser (*Mergus merganser*)	Ruddy Duck (*Oxyura jamaicensis*)
Common Nighthawk (*Chordeiles minor*)	Sandhill Crane (*Grus canadensis*)
Common Snipe (*Gallinago gallinago*)	Song Sparrow *(Melospiza melodia*)
Common Yellowthroat (*Geothlypis trichas*)	Spotted Sandpiper (*Actitis macularia*)
Double-crested Cormorant (*Phalacrocorax auritus*)	Tree Swallow (*Tachycineta bicolor*)
Downy Woodpecker (*Picoides villosus*)	Western Meadowlark (*Sturnella neglecta*)
Eastern Kingbird (*Tyrannus tyrannus*)	Western Wood Pewee (*Contopus sordidulus*)
European Starling (*Sturnus vulgaris*)	Willet (*Catoptrophorus semipalmatus*)
Great Blue Heron (*Ardea herodias*)	Wood Duck (*Aix sponsa*)
Green-winged Teal (*Anas crecca*)	Yellow Warbler (*Dendroica petechia*)
Hairy Woodpecker (*Picoides villosus*)	Yellow-rumped Warbler (*Dendroica coronata*)
MAMMALS	
beaver (*Castor Canadensis*)	
white-tailed deer *(Odocoileus virginianus)*	
rabbit (*Lepus spp.*)	

Bolded species indicate those documented within the analysis area for the first time in 2003.
- : Species not listed in the National List of Plant Species that Occur in Wetland (Reed 1988); parenthetical status is assumed.

3.6 Macroinvertebrates

According to this bioassessment method, optimal biotic conditions persisted at the Stillwater River site in 2003 (**Bollman, 2003, Appendix F**). *Still, taxa richness diminished between 2002 and 2003, and assemblage tolerance increased. This might suggest that habitats suffered some impairments, that nutrient enrichment increased, or that water temperatures rose. The dominant taxon in 2003 was Nais sp., which relies heavily on bacterial food sources. This might suggest that water temperatures and enrichment account for most of the limitations to biotic integrity at this site. The taxonomic composition of the assemblage suggests that habitats were no less diverse than expected.* The macroinvertebrate sampling results are included in **Appendix F**.

Chart 3: *Bioassessment Scores 2001-2003*



3.7 Functional Assessment

Completed functional assessment forms are included in **Appendix B** and summarized in **Table 5**. Pre-construction functional assessments were completed for the wetlands by the MDT (Urban 1998) and results of that assessment are included in **Table 5.** The net functional units have gained 21 points since 2001 due to several high to exceptional ranking variables. The wetland attained Category 1 Wetland status in 2003 due to greater flood attenuation potential and greater recreational and educational opportunity.

3.8 Photographs

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

3.9 Maintenance Needs/Recommendations

All inflow and outflow structures were functioning, however some beaver debris was observed in the structures. Only two (2) wood duck boxes could be located and one of these is poorly hung (near northwest boundary). The fence around the wetland was intact.

The site has three (3) State of Montana Noxious Weeds (Canada thistle, spotted knapweed, and leafy spurge) and one (1) on the Stillwater County list (mullein). Active control measures are recommended for knapweed and spurge. Lastly, the cottonwood forest appears to be diminishing as a result of beaver kill and inevitably will likely be negatively affected by the expanding saturation zone. Recruitment is negligible. Discussion regarding the future of the cottonwood forest as it relates to the wetland mitigation goals is warranted.

Table 5: ***Summary of 1998, 2001-2003 Wetland Function/Value Ratings and Functional Points at the Stillwater River Wetland Mitigation Project***

Function and Value Parameters From the 1999 MDT Montana Wetland Assessment Method	Pre-construction 1998	Post-construction 2001	Post-construction 2002	Post-construction 2003
Listed/Proposed T&E Species Habitat	High (1.0)	Moderate (0.80)	Moderate (0.8)	Moderate (0.8)
MNHP Species Habitat	Low (0.1)	Moderate (0.7)	Low (.1)	Low (.1)
General Wildlife Habitat	Moderate (0.5)	Moderate (0.7)	Exceptional (1.0)	Exceptional (1.0)
General Fish/Aquatic Habitat	High (0.8)	Moderate (0.6)	High (0.8)	High (0.8)
Flood Attenuation	Moderate (0.5)	Moderate (0.6)	High (0.7)	High (0.9)
Short and Long Term Surface Water Storage	NA	High (1.0)	High (1.0)	High (1.0)
Sediment, Nutrient, Toxicant Removal	Moderate (0.5)	Moderate (0.6)	High (1.0)	High (1.0)
Sediment/Shoreline Stabilization	NA	High (1.0)	High (1.0)	High (1.0)
Production Export/Food Chain Support	High (1.0)	High (0.9)	High (0.9)	High (0.9)
Groundwater Discharge/Recharge	Low (0.1)	High (1.0)	High (1.0)	High (1.0)
Uniqueness	Moderate (0.4)	Moderate (0.5)	Moderate (0.6)	High (0.6)
Recreation/Education Potential	Low (0.1)	Low (0.3)	Moderate (0.7)	High (1.0)
Actual Points/Possible Points	5/10	8.7/12	9.6/12	10.1/12
% of Possible Score Achieved	50%	73%	80%	84%
Overall Category	III	II	II	I
Total Acreage of Assessed Wetlands within Easement	3.77	8.49 ac	9.24 ac	9.39 ac
Functional Units (acreage x actual points)	15fu	73.82 fu	88.7 fu	94.84 fu
Net Acreage Gain	NA	4.72 ac	9.24 ac	9.39 ac
Net Functional Unit Gain		58.82 fu	88.7 fu	94.84 fu
Total Functional Unit “Gain”		58.82 fu	88.7 fu	94.84 fu

3.10 Current Credit Summary

Emergent vegetation has developed around almost 100% of the wetland and open water circumference. Submerged aquatic vegetation has apparently colonized most of the open water area. The gross wetland boundary encompasses 9.39 acres and includes 6.29 acres of shallow open water (<6 feet deep). The gross wetland acreage has increased 0.9 acre since 2001 and net wetland acreage has increased 1.15 acres.

The net functional units have gained 21 points since 2001 due to several high to exceptional ranking variables. The wetland attained Category 1 Wetland status in 2003.

MDT anticipated creating 10.69 acres of wetland within a 15 to 20-acre conservation easement (MDT 1998). The mitigation efforts have thus far resulted in 9.39 gross wetland acres or 88% of the goal (the 10.69-acre goal included the pre-existing wetlands). Subtracting the original wetland impact that resulted from the wetland creation, 3.77 acres, the new net acreage of aquatic habitats totals 5.62 acres.

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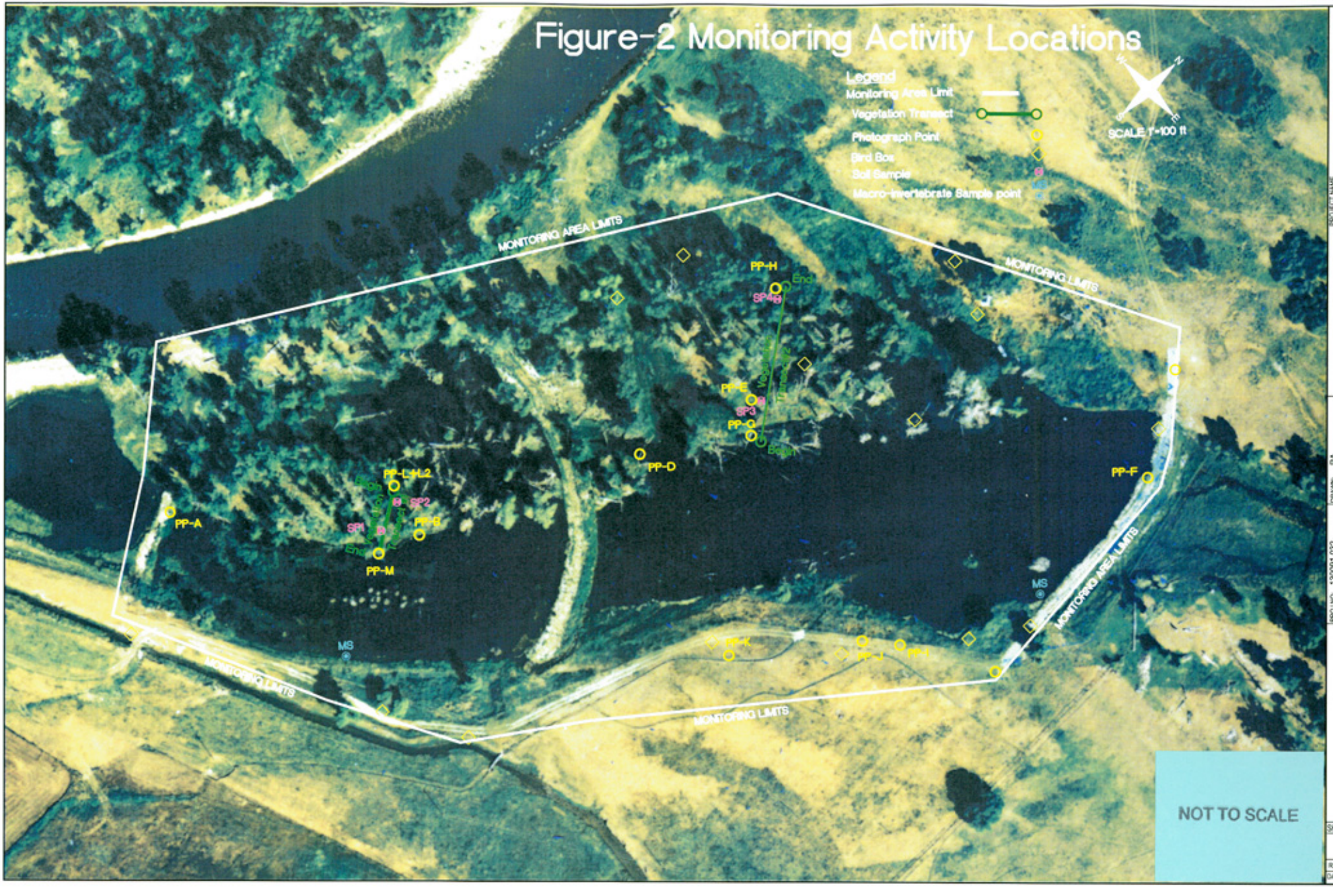
Appendix A

FIGURES 2 - 3

MDT Wetland Mitigation Monitoring
Stillwater River
Absarokee, Montana

LAND & WATER

Figure-2 Monitoring Activity Locations



PROJECT NAME: MDT Stillwater Wetland Mitigation

DRAWING TITLE: Monitoring Activity Locations

PROJ NO:	130091.032
FILE NAME:	TASK32BASE.dwg
SCALE:	1"= 100 ft
LOCATION:	Stillwater River
DRAWN:	RA
CHECKED:	
APPVD:	BD
PROJ MGR:	BD

LAND & WATER CONSULTING, INC.
P.O. BOX 1814
Missoula, MT 59807

SHEET NUMBER: 2 of

REV: -

DATE: 1-15-04


Figure 3 - Mapped Site Features 2003
Legend
Monitoring Area Limit
Wetland Boundary
Vegetation Community Boundary
Open Water Boundary
Vegetation Types:
1 Typha latifolia
2 Carex spp./Juncus spp./Scirpus spp.
3 Agropyron trachycaulus/Poapratensis
4 Dead Cottonwoods
Wetland Area
Gross Wetland Area 9.39 Acres
Open Water -6.30 Acres
Net Wetland Area 3.09 Acres
SCALE 1"=100 ft
MONITORING AREA LIMITS
MONITORING LIMITS
DIKE 1
DIKE 2
OW
NOT TO SCALE
PROJECT NAME
MDT Stillwater Wetland Mitigation
DRAWING TITLE
Mapped Site Features 2003
PROJ NO: 300-091TASK32
FILE NAME: TASK32BASE.dwg
SCALE: 1"= 100ft
LOCATION: Stillwater
DRAWN: RA
CHECKED: JH
APPVD: BD
PROJ MGR: BD
LAND & WATER CONSULTING, INC.
P.O. BOX 8254
Missoula, MT 59807
SHEET NUMBER
3
REV -
DATE: 1-13-04

Appendix B

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

MDT Wetland Mitigation Monitoring
Stillwater River
Absarokee, Montana

LAND & WATER

LWC / MDT WETLAND MITIGATION SITE MONITORING FORM

Project Name:___Stillwater___ Project Number:__130091-032____ Assessment Date:_8_/_12_/_03___
Location:____8.6 mi sw of Columbus__ MDT District:__Billings District #13_ Milepost:_37.31____
Legal description: T__3S__ R_19E___ Section_22___ Time of Day:___6:30 AM_____
Weather Conditions:__overcast/windy_____ Person(s) conducting the assessment:____LB/LWC__
Initial Evaluation Date:__8_/_12_/01____ Visit #:__3___ Monitoring Year:__2003_____
Size of evaluation area:___9.24_acres Land use surrounding wetland:___livestock grazing_____

HYDROLOGY

Surface Water Source:__Stillwater River_____
Inundation**:** Present__X__ Absent____ Average depths:__3__ft Range of depths:_0__-__6__ft
Assessment area under inundation:_68_%
Depth at emergent vegetation-open water boundary:__3__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.): __(all 3)_____

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

Well #	Depth	Well #	Depth	Well #	Depth

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

COMMENTS/PROBLEMS: _____

VEGETATION COMMUNITIES

Community No.:__1__ Community Title (main species):__*Typha latifolia*_____

Dominant Species	% Cover	Dominant Species	% Cover
Typha latifolia	95		
Epilobium spp.	<5		
Lemna minor	<5		
Polygonum amphibium	<5		

COMMENTS/PROBLEMS: ____this CT is in OW areas_____
_____
_____
_____

Community No.:__2__ Community Title (main species):___*Carex* spp./ *Juncus* spp./*Scirpus* spp._____

Dominant Species	% Cover	Dominant Species	% Cover
Carex nebrascensis	15	*J. tenuis*	10
C. stipata	15	*J. nevadensis*	<5
C. limnophilia	<5	*Scirpus pallidus*	<5
C. hystericina	<5	*S. validus*	<5
Juncus balticus	<5	*Typha latifolia*	10
Agrostis alba	35	*Glyceria grandis*	<5
Eleocharis palustris	10	*Populus angustifolia*	<5

COMMENTS/PROBLEMS: _____other spp observed in this rich community: LEMMIN, PHAARUN, VERsp., MIMsp., SOLDUL, RUMCRI, CARUTR, CARLAN_____
_____

Community No.:_3___ Community Title (main species):___*Agropyron trachycaulus/Poa pratensis*___

Dominant Species	% Cover	Dominant Species	% Cover
Agropyron trachycaulus	30		
Poa pratensis	30		
Bromus inermis	30		
Populus angustifolia (overstory)	35		

COMMENTS/PROBLEMS: _____
_____

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

Comprehensive Vegetation List

Species	Vegetation Community Number(s)	Species	Vegetation Community Number(s)
Agropyron trachycaulum	3	*Rumex crispus*	2
Agrostis alba	2	***Salix bebbiana***	**2**
Alnus incana	2	*Salix exigua*	2
Alopecurus arundinaceus	2	*Salix lasiandra*	2
Beckmannia syzigachne	2	*Scirpus pallidus*	2
Bromus inermis	3	*Scirpus validus*	2
Bromus japonicus	3	***Solanum dulcamara***	**2**
Calamagrostis Canadensis	2	*Symphoricarpos albus*	3
Callitriche palustris (verna)	**1**	*Typha latifolia*	1, 2
Carex hystericina	2	*Verbascum thapsus* **(Stillwater CO. Noxious Weed)**	2, 3
Carex limnophilia	2	*Veronica wormskjoldii (?)*	1, 2
Carex nebrascensis	2		
Carex stipata	2		
Centaurea maculosa	3		
Cirsium arvense	2, 3		
Cynoglossum officinale	3		
Dactylis glomerata	3		
Eleocharis palustris	1, 2		
Epilobium sp.	1		
Equisetum arvense	2		
Euphorbia esula	3		
Glyceria grandis (=G. maxima)	1, 2		
Hordeum jubatum	2		
Juncus balticus	2		
Juncus ensifolius (confirm 2004)	**2**		
Juncus nevadensis	2		
Juncus tenuis	1, 2		
Juniperus scopulorum	3		
Lemna minor	1,2		
Linaria sp. (may be State Noxious Weed)	**3**		
Melilotus officinalis	3		
Mimulus sp.	2		
Phalaris arundinacea	2		
Phleum pretense	2, 3		
Poa pratensis	2, 3		
Polygonum amphibium	1		
Populus angustifolia	2, 3		
Potentilla argentea	2		
Prunus virginiana	2	Bold denotes observed in 2003 for the first time.	
Ranunculus sceleratus	2		
Ribes sp.	3		

COMMENTS/PROBLEMS: _____

_____

_____

_____

_____

LAND & WATER

PLANTED WOODY VEGETATION SURVIVAL

Species	Number Originally Planted	Number Observed	Mortality Causes
none			

COMMENTS/PROBLEMS: _____

WILDLIFE

BIRDS

(Attach Bird Survey Field Forms)

Were man made nesting structures installed? Yes__X__ No____Type:_BB/Woodie_ How many?_10/2_____
Are the nesting structures being utilized? Yes_X ___ No____ Do the nesting structures need repairs?
Yes_X___ No____

MAMMALS AND HERPTILES

Species	Number Observed	Indirect indication of use			
		Tracks	Scat	Burrows	Other
painted turtles (MDT)	3				

Additional Activities Checklist:
__X___Macroinvertebrate sampling (if required)

COMMENTS/PROBLEMS: __Only 2 wood duck boxes remain attached to trees; one on north side near fence remains tilted. Reattached one bluebird box to fence during spring bird visit._____

PHOTOGRAPHS

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

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

Location	Photograph Description	Compass Reading
B	pond #1	SE
D	pond #2 interior OW finger	NE
E	pond #2	NE
F	pond #2	SW
G	Transect 2: pond #2 transect from WL end	NW
H	Transect 2: pond #2 transect from UPL end	SE
I	pond #2	NW
J	UPL adjacent to pond #2	SW
K	UPL/WL interface pond #2	SW
L	Transect 1: Pond #1 interior	SE
L-2	Transect 1: View into WL fingers inside pond #1 from L-stake	NW
M	Transect 1: from M-stake toward L-stake	NW

COMMENTS/PROBLEMS: _____

_____

_____

GPS SURVEYING

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

Checklist:

_ X___ Jurisdictional wetland boundary
__X___ 4-6 landmarks recognizable on the air photo
__X___ Start and end points of vegetation transect(s)
_2001_ Photo reference points
__-___ Groundwater monitoring well locations

COMMENTS/PROBLEMS: ____hand-drawn WL boundary 2003; GPS in 2004._____

_____

_____

WETLAND DELINEATION

(Attach Corps of Engineers delineation forms)

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

COMMENTS/PROBLEMS: __UPL is converting to WL in some areas; re-GPS in 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_X__ NO____
If yes, do they need to be repaired? YES_X___ 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__X__ NO____
If yes, are the structures working properly and in good working order? YES_X___ NO___
If no, describe the problems below.

COMMENTS/PROBLEMS: _ Only 2 wood duck boxes remain attached to trees and one of these (north one) is hanging askew. _____

__Outflow structures are clogged with debris but were still functioning.

MDT WETLAND MONITORING – VEGETATION TRANSECT

Site: Stillwater Date: 7/19/02 Examiner: LB/LWC Transect # 1

Approx. transect length: 75’ Compass Direction from Start (Upland): 148 deg

Vegetation type A:	CT 2	
Length of transect in this type:	21’	feet
Species:		Cover:
ELEPAL		40
CARLIM		<5
CLOVERsp.		15
AGRTRA		20
VERTHA		<5
CARNEB		5
TYPLAT		<5
POAPRA		20
Total Vegetative Cover:		100%

Vegetation type B:	CT 3	
Length of transect in this type:	36’	feet
Species:		Cover:
POAPRA		95
CLOVERsp.		<1
POPANG		<1
SYMALB		<1
AGRALB		<5
Total Vegetative Cover:		100%

Vegetation type C:	CT 2	
Length of transect in this type:	15’	feet
Species:		Cover:
JUNENS		20
JUNTEN		5
CARLIM		20
AGRALB		35
ELOPAL		20
AGRTRA		<5
CARSTI		<5
Total Vegetative Cover:		100%

Vegetation type D:	CT 1	
Length of transect in this type:	3’	feet
Species:		Cover:
TYPLAT		20
POLAMP		20
SCIVAL		10
SCIPAL		10
ELEPAL		20
RANSCE (?)		20
Total Vegetative Cover:		100%

MDT WETLAND MONITORING – VEGETATION TRANSECT

Site: Stillwater Date: 7/19/02 Examiner: LB/LWC Transect # 2 (pg 1/3)

Approx. transect length: 198’ Compass Direction from Start (Upland): 306 deg

Vegetation type A:	CT 1
Length of transect in this type:	3’ feet
Species:	Cover:
TYPLAT	85
ELEPAL	5
GLYGRA	5
SCIVAL	5
Total Vegetative Cover:	100%

Vegetation type B:	CT 2
Length of transect in this type:	6’ feet
Species:	Cover:
CARLIM	5
ELEPAL	15
JUNTEN	5
CARSTP	5
AGRALB	5
CARHIS	55
CARNEB	<5
TYPLAT	5
SCIVAL	<5
Total Vegetative Cover:	100%

Vegetation type C:	CT 3
Length of transect in this type:	24’ feet
Species:	Cover:
DACGLO	30
PHLPRA	30
AGRALB	<5
AGRTRA	30
POPANG	<5
Total Vegetative Cover:	100%

Vegetation type D:	CT 2
Length of transect in this type:	24’ feet
Species:	Cover:
ELEPAL	10
SCIPAL	10
JUNsp.	10
CARHYS	20
JUNTEN	<5
AGRALB	50
Total Vegetative Cover:	100%

MDT WETLAND MONITORING – VEGETATION TRANSECT (continued)

Site: _____ Date: 7/19/02 Examiner: LB/LWC Transect # 2 (pg 2/3)

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

Vegetation type E:	CT 1	
Length of transect in this type:	18’	feet
Species:		Cover:
open water		10
TYPLAT (CT1+OW)		75
GLYGRA		<5
POLAMP		<5
ELEPAL		10
Epilobium sp.		<5
Total Vegetative Cover:		90%

Vegetation type F:	CT 2	
Length of transect in this type:	3’	feet
Species:		Cover:
CARHYS		20
ELEPAL		10
JUNTEN		<5
PHAARU		20
AGRALB		50
Total Vegetative Cover:		100%

Vegetation type G:	CT 3	
Length of transect in this type:	75’	feet
Species:		Cover:
DACGLO		85
POPANG		5
PHLPRA		5
VERTHA		<1
AGRTRA		5
Total Vegetative Cover:		100%

Vegetation type H:	Type 2	
Length of transect in this type:	24’	feet
Species:		Cover:
CARHYS		55
ELEPAL		10
JUNTEN		<5
PHAARU		20
AGRALB		50
Total Vegetative Cover:		100%

MDT WETLAND MONITORING – VEGETATION TRANSECT (continued)

Site: _____ Date: 7/19/02 Examiner: LB/LWC Transect # 2 (pg 3/3)

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

Vegetation type E:	CT 1	
Length of transect in this type:	12’	feet
Species:		Cover:
open water		80
TYPLAT		<5
CARHYS		5
SCIVAL		<5
ELEPAL		10
LEMMIN		<5
POLAMP		<1
Total Vegetative Cover:		100%

Vegetation type F:	CT 2	
Length of transect in this type:	9’’	feet
Species:		Cover:
DACGLO		95
PHLPRA		5
Total Vegetative Cover:		100%

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

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

MDT WETLAND MONITORING – VEGETATION TRANSECT (back of form)

Cover Estimate

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

Indicator Class:

+ = Obligate
- = Facultative/Wet
0 = Facultative

Source:

P = Planted
V = Volunteer

Percent of perimeter 100% % developing wetland vegetation – excluding dam/berm structures.

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

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

Notes:

Wetland continuing to invade cottonwood area; cottonwoods may eventually die out because of high water table and loss to beaver kill.

[3]**BIRD SURVEY – FIELD DATA SHEET**

Page_1__of_1___
Date: see dates within

table

SITE: Stillwater

Survey Time: varied

Bird Species	#	Behavior	Habitat	Bird Species	#	Behavior	Habitat
Spring 2002-5/12/03							
American Robin	5	BD	MA/UPL				
Belted Kingfisher	1	F	MA				
Canada Goose	8	N/FO	OW/MA				
Common Grackle	4	BD	OW				
Common Merganser	1 (F)	F/L?	OW				
Common Snipe	1	F/?N	MA				
European Starling	1	FO	MA				
Great Blue Heron	1	(flushed)	MA/OW				
Hairy Woodpecker	1	F	MA/UPL				
House Wren	1	BD	MA?/UPL				
Mallard	1	BD	OW				
Mourning Dove	1	L?	UPL/MA				
Red-winged Blackbird	X	BD	MA/UPL				
Song Sparrow	1	F	MA				
Tree Swallow	X	F/B/N	OW/UPL/MA				
Wood Duck	3	F	MA				
Yellow Warbler	1	BD	UPL				
Mid-season – 8/12/03							
Belted Kingfisher	1	F	OW				
Great Blue Heron	1	F	OW				
Mallard	2	F	OW				
Wood Duck	2	F	OW				
Owner's son, Blake Thompson, reported that he saw a Bald Eagle fishing in pond; unsubstantiated but possible.							

Notes:
5/03
4 Canada Goose were 2 adults of 2 goslings, loafing on shore and moved into OW in defense of family
X=more than 10 individuals sighted
1st week June: Larry Urban (MDT) sightings: 2 broods Wood Ducks; 4 families of Canada Geese

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:	Stillwater			Date:	8/12/03
Applicant/Owner:	MDT			County:	Stillwater
Investigator:	LB/LWC			State:	MT
Do Normal Circumstances exist on the site:	X	Yes		No	Community ID: Impoundment #1
Is the site significantly disturbed (Atypical Situation)?		Yes	X	No	Transect ID: 1
Is the area a potential Problem Area?:		Yes	X	No	Plot ID: SP-1
(If needed, explain on reverse.)					

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1	ELEPAL	H	OBL	9			
2	JUNTEN	H	FAC	10			
3	JUNENS	H	FACW	11			
4	SCIVAL	H	OBL	12			
5	AGRALB	H	FACW	13			
6	CARLIM	H	FACW	14			
7				15			
8				16			

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-). 6/6

SP on edge of open water north of pond #1

HYDROLOGY

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

No Recorded Data Available

Field Observations:

Depth of Surface Water: - (in.)

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

Depth to Saturated Soil: 0 (in.)

Wetland Hydrology Indicators:

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

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

Remarks:
Saturated edge of OW area.

LAND & WATER

SOILS

Map Unit Name (Series and Phase): Lolo - Nesda

Drainage Class: well

Field Observations

Taxonomy (Subgroup): Pachic Haploboroll; Fluventic Haploboroll.

Confirm Mapped Type? X Yes ____ No

Profile Description:

Depth inches	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-3	A	10YR 2/1			loam
3-6	B	10YR 3/2	10YR 5/8	40% prom.	sand
6+	C				cobbles

Hydric Soil Indicators:

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

Hydric soil

WETLAND DETERMINATION

Hydrophytic Vegetation Present? X Yes ____ No

Wetland Hydrology Present? X Yes ____ No

Hydric Soils Present? X Yes ____ No

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

Remarks:

Wetland boundary gaining ground into cottonwood upland area.

Approved by HQUSACE 2/92

LAND & WATER

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

Project/Site: Stillwater					Date: 8/12/03		
Applicant/Owner: MDT					County:		
Investigator: LB/MDT					State: MT		
Do Normal Circumstances exist on the site:	X	Yes		No	Community ID:	Impoundment #1; CT 3	
Is the site significantly disturbed (Atypical Situation)?		Yes	X	No	Transect ID:	1	
Is the area a potential Problem Area?:		Yes	X	No	Plot ID:	SP-2	
(If needed, explain on reverse.)							

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1	VERTHA	H	no listing	9			
2	SYMALB	S	UPL	10			
3	POPANG	T	FACW	11			
4	AGRALB	H	FACW	12			
5	POAPRA	H	FACU+	13			
6				14			
7				15			
8				16			

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-). 2/5

UPL veg area decreasing in size.

HYDROLOGY

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

No Recorded Data Available

Field Observations:

Depth of Surface Water: - (in.)

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

Depth to Saturated Soil: ? (in.)

Wetland Hydrology Indicators:

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

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

Remarks:

Area increasingly hard to dig a pit as upland shrinks; cobbles are close to surface.

LAND & WATER

SOILS

Map Unit Name (Series and Phase):	Lolo - Nesda	Drainage Class:	well
Taxonomy (Subgroup):	Pachic Haploboroll; Fluventic Haploboroll.	Field Observations Confirm Mapped Type?	X Yes ____ No

Profile Description:

Depth inches	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-5	A	10YR 2/1			loam
5+					lg. cobbles

Hydric Soil Indicators:

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

Hydric because of low-chroma.

WETLAND DETERMINATION

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

Remarks:

Area may continue to convert to wetland if water table remains high.

Approved by HQUSACE 2/92

LAND & WATER

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

Project/Site:	Stillwater	Date:	8/12/03
Applicant/Owner:	MDT	County:	Stillwater
Investigator:	LB/LWC	State:	MT

Do Normal Circumstances exist on the site:	X	Yes		No	Community ID: Impoundment #2
Is the site significantly disturbed (Atypical Situation)?		Yes	X	No	Transect ID: 2
Is the area a potential Problem Area?:		Yes	X	No	Plot ID: SP-3
(If needed, explain on reverse.)					

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1	TYPLAT	H	OBL	9	SCIVAL	H	OBL
2	GLYGRA	H	OBL	10	CARNEB	H	OBL
3	ELEPAL	H	OBL	11			
4	JUNsp.	H	OBL	12			
5	CARHYS	H	OBL	13			
6	CARLIM	H	FACW	14			
7	CARSTI (likely FACW-OBL)	H	no ind.	15			
8	POLAMP	H	FACW	16			

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-). 10/10

Diverse wetland community.

HYDROLOGY

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

No Recorded Data Available

Field Observations:

Depth of Surface Water: - (in.)

Depth to Free Water in Pit: 2 (in.)

Depth to Saturated Soil: surface (in.)

Wetland Hydrology Indicators:

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

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

Remarks:

Pit excavated adjacent to finger of shallow open water.

SOILS

Map Unit Name (Series and Phase):	Lolo - Nesda	Drainage Class:	well
Taxonomy (Subgroup):	Pachic Haploboroll; Fluventic Haploboroll.	Field Observations Confirm Mapped Type?	X Yes ____ No

Profile Description:

Depth inches	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-2	A	10 YR 2/1			loam
2-6	B	2.5Y 3/1			sandy silt loam
6-8	C1	no colors read			sandy cobbly loam
8+	C2				cobbles

Hydric Soil Indicators:

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

Pits difficult to excavate; cobbles close to surface.

WETLAND DETERMINATION

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

Remarks:

Diverse wetland community continues to expand into upland.

Approved by HQUSACE 2/92

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

Project/Site:	Stillwater	Date:	8/12/03
Applicant/Owner:	MDT	County:	Stillwater
Investigator:	LB/LWC	State:	MT

Do Normal Circumstances exist on the site:	X	Yes		No	Community ID:	Impoundment #2
Is the site significantly disturbed (Atypical Situation)?		Yes	X	No	Transect ID:	2
Is the area a potential Problem Area?:		Yes	X	No	Plot ID:	SP-4
(If needed, explain on reverse.)						

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1	DACGLO	H	FACU	9			
2	POAPRA	H	FACU+	10			
3	*Linaria* sp.	H	no listing	11			
4				12			
5				13			
6				14			
7				15			
8				16			

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-). 0/3

Will ID *Linaria* to species; may be State of MT noxious weed.

HYDROLOGY

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

No Recorded Data Available

Field Observations:

Depth of Surface Water: NA (in.)

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

Depth to Saturated Soil: 0 (in.)

Wetland Hydrology Indicators:

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

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

Remarks:

Area may be converting to wetland.

LAND & WATER

SOILS

Map Unit Name (Series and Phase): Lolo - Nesda

Drainage Class: well

Field Observations

Taxonomy (Subgroup): Pachic Haploboroll; Fluventic Haploboroll.

Confirm Mapped Type? X Yes ____ No

Profile Description:

Depth inches	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-2	A	7.5YR 3/1			sandy loam
2-6	B	10YR 3/2	5YR 4/6		loamy sand
6+	C				cobbly sand

Hydric Soil Indicators:

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

Hydric soil given low-chroma.

WETLAND DETERMINATION

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

Remarks:

Area may be converting to WL.

Approved by HQUSACE 2/92

LAND & WATER

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

1. Project Name: Stillwater **2. Project #:** -130091032 **Control #:** _____

3. Evaluation Date: 8/12/2003 **4. Evaluator(s):** LB/LWC **5. Wetland / Site #(s):** _____

6. Wetland Location(s) i. T: 3 S **R:** 19 E **S:** 22 **T:** __ N **R:** __ E **S:** _____

ii. Approx. Stationing / Mileposts: _____

iii. Watershed: 10070005 **GPS Reference No. (if applies):** _____

Other Location Information: _____

7. A. Evaluating Agency LWC

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

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

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

10. CLASSIFICATION OF WETLAND AND AQUATIC HABITATS IN AA

HGM CLASS [1]	SYSTEM [2]	SUBSYSTEM [2]	CLASS [2]	WATER REGIME [2]	*MODIFIER* [2]	% OF AA
Depression	Palustrine	None	Emergent Wetland	Permanently Flooded	Excavated	
Riverine	Riverine	Lower Perennial	Aquatic Bed	Permanently Flooded	Excavated	
---	---	---	---	---	---	
---	---	---	---	---	---	

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

11. ESTIMATED RELATIVE ABUNDANCE (of similarly classified sites within the same Major Montana Watershed Basin)
Common **Comments:** HGM:Depression also includes AB, SS, and FO classes.

12. GENERAL CONDITION OF AA

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

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

ii. Prominent weedy, alien, & introduced species: knapweed, mullien, butter 'n eggs, leafy spurge, thistle: all likely noxious weed species

iii. Briefly describe AA and surrounding land use / habitat: grazing agricultural

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

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

Comments: cottonwoods are being taken down by beaver and prolonged saturation to cottonwood areas may drown out eventually.

LAND & WATER

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

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

Primary or Critical habitat **(list species)**	☐ D ☐ S	
Secondary habitat **(list species)**	☒ D ☐ S	Bald Eagle
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	---	---	.8 (M)	---	---	---	---

If documented, list the source (e.g., observations, records, etc.)**:** Land owner's son, Blake, noted Bald Eagle fishing in ponds; sighting unsubstantiated but likely possible.

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

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

Primary or Critical habitat **(list species)**	☐ D ☐ S	
Secondary habitat **(list species)**	☐ D ☐ S	
Incidental habitat **(list species)**	☐ D ☒ S	yellowstone cutthroat
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	---	---	---	---	---	.1 (L)	---

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

14C. General Wildlife Habitat Rating

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

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

☐ **Low** (based on any of the following)
- ☐ few or no wildlife observations during peak use periods
- ☐ little to no wildlife sign
- ☐ sparse adjacent upland food sources
- ☐ interviews with local biologists with knowledge of AA

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

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

Structural Diversity (from #13)	☒High								☐Moderate								☐Low			
Class Cover Distribution (all vegetated classes)	☐Even				☒Uneven				☐Even				☐Uneven				☐Even			
Duration of Surface Water in ? 10% of AA	P/P	S/I	T/E	A	P/P	S/I	T/E	A	P/P	S/I	T/E	A	P/P	S/I	T/E	A	P/P	S/I	T/E	A
Low disturbance at AA (see #12)	--	--	--	--	E	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Moderate disturbance at AA (see #12)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
High disturbance at AA (see #12)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

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

Evidence of Wildlife Use from 14C(i)	**Wildlife Habitat Features Rating** from 14C(ii)			
	☒ Exceptional	☐ High	☐ Moderate	☐ Low
Substantial	1 (E)	--	--	--
Moderate	--	--	--	--
Low	--	--	--	--

Comments:

14D. GENERAL FISH/AQUATIC HABITAT RATING ☐ **NA** (proceed to 14E)
If the AA is not or was not historically used by fish due to lack of habitat, excessive gradient, then check the NA box above.
Assess if the AA is used by fish or the existing situation is "correctable" such that the AA could be used by fish [*e.g.* fish use is precluded by perched culvert or other barrier, etc.]. If fish use occurs in the AA but is not desired from a resource management perspective (*e.g.* fish use within an irrigation canal], then Habitat Quality [14D(i)] below should be marked as "Low", applied accordingly in 14D(ii) below, and noted in the comments.

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

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

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

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

Types of Fish Known or Suspected Within AA	**Modified Habitat Quality** from 14D(ii)			
	☐ Exceptional	☒ High	☐ Moderate	☐ Low
Native game fish	--	--	--	--
Introduced game fish	--	.8 (H)	--	--
Non-game fish	--	--	--	--
No fish	--	--	--	--

Comments: uknown if native game fish thrive in ponds

14E. FLOOD ATTENUATION ☐ **NA** (proceed to 14G)
Applies only to wetlands subject to flooding via in-channel or overbank flow.
If wetlands in AA do not flooded from in-channel or overbank flow, check NA above.

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

Estimated wetland area in AA subject to periodic flooding	☒ ≥ 10 acres			☐ <10, >2 acres			☐ ≤2 acres		
% of flooded wetland classified as forested, scrub/shrub, or both	75%	25-75%	<25%	75%	25-75%	<25%	75%	25-75%	<25%
AA contains **no outlet or restricted outlet**	--	.9 (H)	--	--	--	--	--	--	--
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:** homes, ranches

14F. SHORT AND LONG TERM SURFACE WATER STORAGE ☐ **NA** (proceed to 14G)
Applies to wetlands that flood or pond from overbank or in-channel flow, precipitation, upland surface flow, or groundwater flow.
If no wetlands in the AA are subject to flooding or ponding, check NA above.

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

Estimated maximum acre feet of water contained in wetlands within the AA that are subject to periodic flooding or ponding.	☒ >5 acre feet			☐ <5, >1 acre feet			☐ ≤1 acre foot		
Duration of surface water at wetlands within the AA	P/P	S/I	T/E	P/P	S/I	T/E	P/P	S/I	T/E
Wetlands in AA flood or pond [3] **5 out of 10 years**	1 (H)	--	--	--	--	--	--	--	--
Wetlands in AA flood or pond **< 5 out of 10 years**	--	--	--	--	--	--	--	--	--

Comments: _____

14G. SEDIMENT/NUTRIENT/TOXICANT RETENTION AND REMOVAL ☐ **NA** (proceed to 14H)
Applies to wetlands with potential to receive excess sediments, nutrients, or toxicants through influx of surface or ground water or direct input.
If no wetlands in the AA are subject to such input, check NA above.

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

Sediment, Nutrient, and Toxicant Input Levels Within AA	AA receives or surrounding land use has potential to deliver low to moderate levels of sediments, nutrients, or compounds such that other functions are not substantially impaired. Minor sedimentation, sources of nutrients or toxicants, or signs of eutrophication present.				Waterbody on MDEQ list of waterbodies in need of TMDL development for "probable causes" related to sediment, nutrients, or toxicants **or** AA receives or surrounding land use has potential to deliver high levels of sediments, nutrients, or compounds such that other functions are substantially impaired. Major sedimentation, sources of nutrients or toxicants, or signs of eutrophication present.			
% cover of wetland vegetation in AA	☒ ≥ 70%		☐ < 70%		☐ ≥ 70%		☐ < 70%	
Evidence of flooding or ponding in AA	☒ Yes	☐ No	☐ Yes	☐ No	☐ Yes	☐ No	☐ Yes	☐ No
AA contains **no or restricted outlet**	1 (H)	--	--	--	--	--	--	--
AA contains **unrestricted outlet**	--	--	--	--	--	--	--	--

Comments: _____

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

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

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

% Cover of wetland streambank or shoreline by species with deep, binding rootmasses.	***Duration of Surface Water Adjacent to Rooted Vegetation***		
	☒Permanent / Perennial	☐Seasonal / Intermittent	☐Temporary / Ephemeral
[3] **65 %**	1 (H)	--	--
35-64 %	--	--	--
< 35 %	--	--	--

Comments:

14I. PRODUCTION EXPORT / FOOD CHAIN SUPPORT

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

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

Comments:

14J. GROUNDWATER DISCHARGE/RECHARGE (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	1 (H)
No Discharge/Recharge indicators present	--
Available Discharge/Recharge information inadequate to rate AA D/R potential	--

Comments:

14K. UNIQUENESS

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

Replacement Potential	AA contains fen, bog, warm springs or mature (>80 yr-old) forested wetland or plant association listed as "S1" by the MTNHP.			AA does not contain previously cited rare types and structural diversity (#13) is high or contains plant association listed as "S2" by the MTNHP.			AA does not contain previously cited rare types or associations and structural diversity (#13) is low-moderate.		
Estimated Relative Abundance from #11	☐rare	☐common	☐abundant	☐rare	☒common	☐abundant	☐rare	☐common	☐abundant
Low disturbance at AA (#12i)	--	--	--	--	.6M	--	--	--	--
Moderate disturbance at AA (#12i)	--	--	--	--	--	--	--	--	--
High disturbance at AA (#12i)	--	--	--	--	--	--	--	--	--

Comments: 80 yr old cottonwood forest should be acknowledged in this rating.

14L. RECREATION / EDUCATION POTENTIAL

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

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

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

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

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

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

Comments: though private it should be rated as High.

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	M	0.80	1	
B. MT Natural Heritage Program Species Habitat	L	0.10	1	
C. General Wildlife Habitat	E	1.00	1	
D. General Fish/Aquatic Habitat	H	0.80	1	
E. Flood Attenuation	H	0.90	1	
F. Short and Long Term Surface Water Storage	H	1.00	1	
G. Sediment/Nutrient/Toxicant Removal	H	1.00	1	
H. Sediment/Shoreline Stabilization	H	1.00	1	
I. Production Export/Food Chain Support	H	0.90	1	
J. Groundwater Discharge/Recharge	H	1.00	1	
K. Uniqueness	M	0.60	1	
L. Recreation/Education Potential	H	1.00	1	
	Totals:	10.10	12.00	94
	Percent of Total Possible Points:		**82%** (Actual / Possible) x 100 [rd to nearest whole #]	

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

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

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

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

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

☒ **I** ☐ **II** ☐ **III** ☐ **IV**

Appendix C

REPRESENTATIVE PHOTOGRAPHS
2003 AERIAL PHOTOGRAPH

MDT Wetland Mitigation Monitoring
Stillwater River
Absarokee, Montana

LAND & WATER

Location: B **Photo Frame:** 4/4A **Description:** Pond #1 **Compass Reading:** SE

Location: D **Photo Frame:** 4/1A **Description:** Pond #2 interior OW finger **Compass Reading:** NE

Location: E **Photo Frame:** 4/11A **Description:** Pond #2 **Compass Reading:** NE

Location: F **Photo Frame:** 2/18A **Description:** Pond #2 **Compass Reading:** SW

Location: G **Photo Frame:** 4/0A **Description:** Transect 2: pond #2 transect from WL end **Compass Reading:** NW

Location: H **Photo Frame:** 2/23A **Description:** Transect 2: pond #2 transect from WL end **Compass Reading:** SE

Location: I **Photo Frame:** 2/19A **Description:** Pond #2 **Compass Reading:** NW

Location: J **Photo Frame:** 2/20A **Description:** UPL adjacent to pond #2 **Compass Reading:** SW

Location: K **Photo Frame:** 2/21A **Description:** UPL/WL interface pond #2 **Compass Reading:** SW

Location: L **Photo Frame:** 4/3A **Description:** Transect 1:pond #1 interior **Compass Reading:** SE

Location: L-2 **Photo Frame:** 4/2A **Description:** Transect 1: view into WL fingers inside pond #1 from L-stake **Compass Reading:** NW

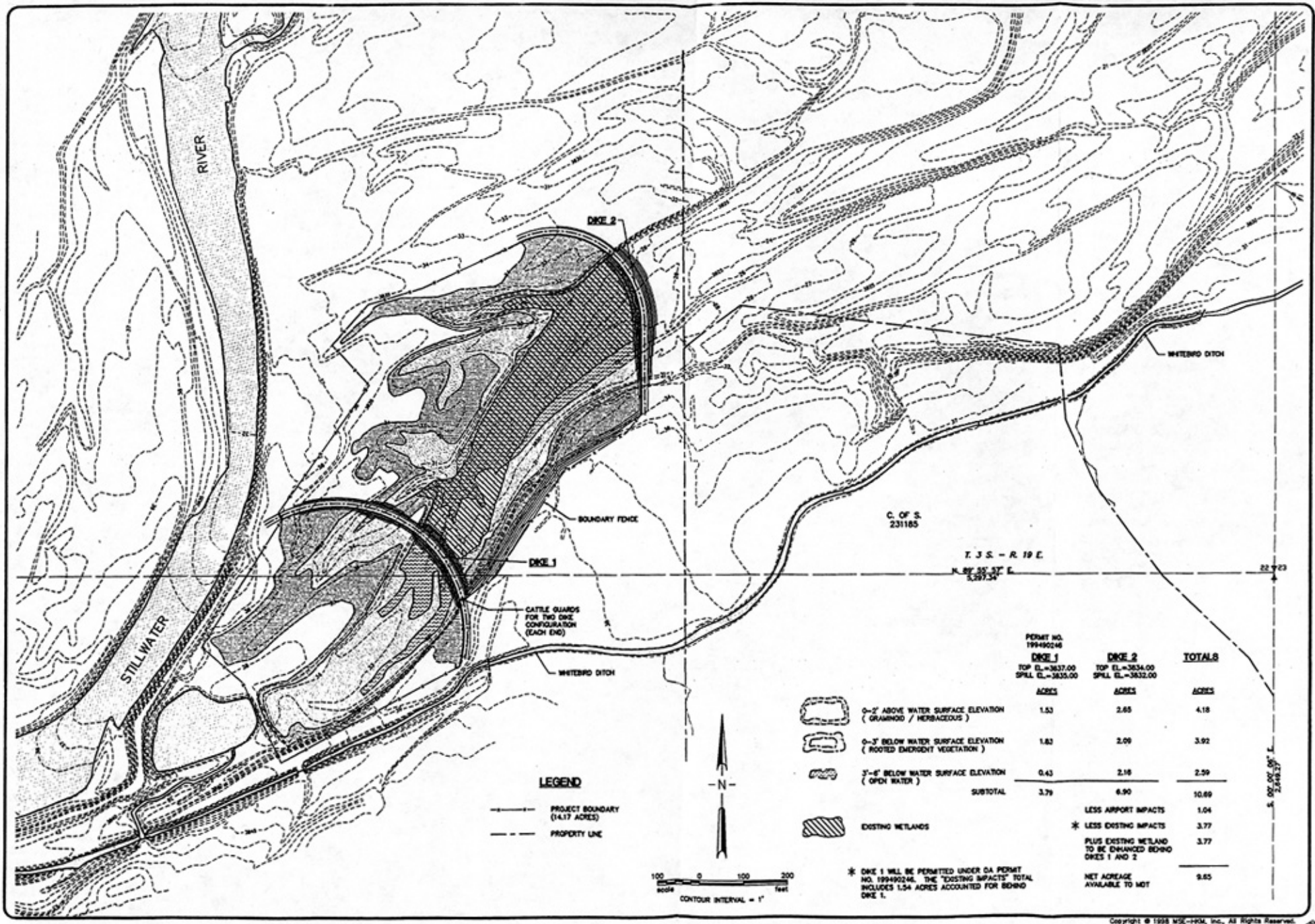
Location: M **Photo Frame:** 4/5A **Description:** Transect 1: from M-stake toward L-stake **Compass Reading:** NW


R GPS ER DAS1160 P=-1.1 R=0.4 Y=1.3
7-28-03 Stillwater Wetland
1:6000 Horizons, Inc.
E13-052
Stillwater 2003

Appendix D

PROPOSED WETLAND MITIGATION SITE MAP

MDT Wetland Mitigation Monitoring
Stillwater River
Absarokee, Montana



	PERMIT NO. 199490246 DIKE 1 TOP EL.=3837.00 SPILL EL.=3835.00	DIKE 2 TOP EL.=3834.00 SPILL EL.=3832.00	TOTALS
	ACRES	ACRES	ACRES
0-2" ABOVE WATER SURFACE ELEVATION (GRAMINOID / HERBACEOUS)	1.53	2.65	4.18
0-3" BELOW WATER SURFACE ELEVATION (ROOTED EMERGENT VEGETATION)	1.82	2.09	3.92
3"-6" BELOW WATER SURFACE ELEVATION (OPEN WATER)	0.43	2.16	2.59
SUBTOTAL	3.79	6.90	10.69
		LESS AIRPORT IMPACTS	1.04
EXISTING WETLANDS		* LESS EXISTING IMPACTS	3.77
		PLUS EXISTING WETLAND TO BE ENHANCED BEHIND DIKES 1 AND 2	3.77
		NET ACREAGE AVAILABLE TO MDT	9.65

* DIKE 1 WILL BE PERMITTED UNDER DA PERMIT NO. 199490246. THE "EXISTING IMPACTS" TOTAL INCLUDES 1.54 ACRES ACCOUNTED FOR BEHIND DIKE 1.

STILLWATER RIVER WETLAND MITIGATION PLAN

WETLAND MITIGATION SITE

WARNING: IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

No.	Revision	By	Date

Project No. 2605A.135 • FIG-2B.DWG • Date JULY 1998 • Designed RLG • Drawn KMK • Checked RLG • Approved RLG

MSE-HKM, Inc.
2727 Central Avenue
P.O. Box 31318
Billings, MT 59107-1318
(406) 656-6399
FAX (406) 656-6398

MSE HKM ENGINEERING

FIGURE 2b

Appendix E

BIRD SURVEY PROTOCOL
GPS PROTOCOL

MDT Wetland Mitigation Monitoring
Stillwater River
Absarokee, Montana

BIRD SURVEY PROTOCOL

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

Species Use within the Mitigation Wetland: Survey Method

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

Sites that can be circumambulated or walked throughout.

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

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

Sites that cannot be circumambulated.

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

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

Species Use within the Mitigation Wetland: Data Recording

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

1. Bird Species List

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

2. Bird Density

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

3. Bird Behavior

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

4. Bird Species Habitat Use

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

GPS Mapping and Aerial Photo Referencing Procedure

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

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

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

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

Appendix F

2003 MACROINVERTEBRATE SAMPLING PROTOCOL AND DATA

MDT Wetland Mitigation Monitoring
Stillwater River
Absarokee, Montana

LAND & WATER

AQUATIC INVERTEBRATE SAMPLING PROTOCOL

Equipment List

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

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

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

Site Selection

Select the sampling site with these considerations in mind:

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

Sampling

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

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

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

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

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

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

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

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

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

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

Photograph the sampled site.

Sample Handling/Shipping

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

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

METHODS

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

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

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

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

Sample Processing

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

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

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

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

Bioassessment Metrics

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

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

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

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

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

RESULTS

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

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

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

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

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

Table 2. Sampled MDT Mitigation Sites by Year

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

Aquatic Invertebrate Taxonomic Data

Site Name STILLWATER **Date Collected**

Order	Family	Taxon	Count	Percent	Unique	BI	FFG
		Ostracoda	3	3.30%	Yes	8	CG
Amphipoda							
	Talitridae						
		Hyalella	2	2.20%	Yes	8	CG
Basommatophora							
	Physidae						
		Physidae	1	1.10%	Yes	8	SC
	Planorbidae						
		Gyraulus	7	7.69%	Yes	8	SC
Diptera							
	Ceratopogonidae						
		Ceratopogoninae	2	2.20%	Yes	6	PR
	Chironomidae						
		Cladotanytarsus	1	1.10%	Yes	7	CG
		Cricotopus (Cricotopus)	4	4.40%	Yes	7	SH
		Dicrotendipes	1	1.10%	Yes	8	CG
		Paratanytarsus	9	9.89%	Yes	6	CG
		Pseudochironomus	4	4.40%	Yes	5	CG
	Culicidae						
		Anopheles	1	1.10%	Yes	8	CF
Ephemeroptera							
	Baetidae						
		Callibaetis	1	1.10%	Yes	9	CG
	Caenidae						
		Caenis	8	8.79%	Yes	7	CG
Haplotaxida							
	Naididae						
		Nais	29	31.87%	Yes	8	CG
Heteroptera							
	Corixidae						
		Corixidae	1	1.10%	Yes	10	PH
Odonata							
	Coenagrionidae						
		Enallagma	16	17.58%	Yes	7	PR
Trichoptera							
	Phryganeidae						
		Phryganea	1	1.10%	Yes	4	SH
Grand Total			**91**				

Aquatic Invertebrate Data Summary

Project ID: MDT03LW
STORET Station ID:
Station Name: STILLWATER

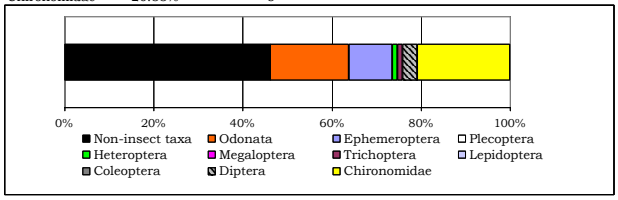
Activity ID:

Sample Date:

Sample type	
SUBSAMPLE TOTAL ORGANISMS	91
Portion of sample used	6.67%
Estimated number in total sample	1365
Sampling effort	
Time	
Distance	
Jabs	
Habitat type	
EPT abundance	10
Taxa richness	17
Number EPT taxa	3
Percent EPT	10.99%

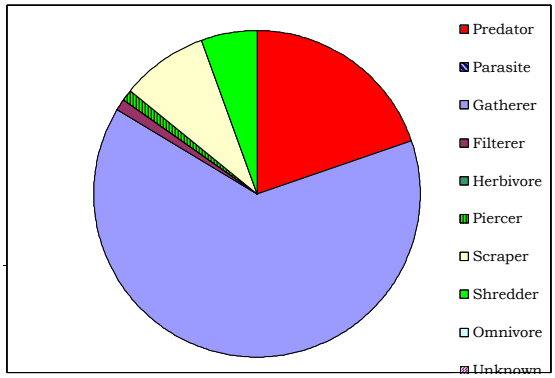
TAXONOMIC COMPOSITION

GROUP	PERCENT	#TAXA
Non-insect taxa	46.15%	5
Odonata	17.58%	1
Ephemeroptera	9.89%	2
Plecoptera	0.00%	0
Heteroptera	1.10%	1
Megaloptera	0.00%	0
Trichoptera	1.10%	1
Lepidoptera	0.00%	0
Coleoptera	0.00%	0
Diptera	3.30%	2
Chironomidae	20.88%	5



FUNCTIONAL COMPOSITION

GROUP	PERCENT	#TAXA
Predator	19.78%	2
Parasite	0.00%	0
Gatherer	63.74%	9
Filterer	1.10%	1
Herbivore	0.00%	0
Piercer	1.10%	1
Scraper	8.79%	2
Shredder	5.49%	2
Omnivore	0.00%	0
Unknown	0.00%	0



COMMUNITY TOLERANCES

Sediment tolerant taxa	1
Percent sediment tolerant	7.69%
Sediment sensitive taxa	0
Metals tolerance index (McGuire)	6.14
Cold stenotherm taxa	0
Percent cold stenotherms	0.00%

HABITUS MEASURES

Hemoglobin bearer richness	3
Percent hemoglobin bearers	13.19%
Air-breather richness	1
Percent air-breathers	1.10%
Burrower richness	3
Percent burrowers	7.69%
Swimmer richness	3
Percent swimmers	7.69%

DOMINANCE

TAXON	ABUNDANCE	PERCENT
Nais	29	31.87%
Enallagma	16	17.58%
Paratanytarsus	9	9.89%
Caenis	8	8.79%
Gyraulus	7	7.69%
SUBTOTAL 5 DOMINANTS	69	75.82%
Cricotopus (Cricotopus)	4	4.40%
Pseudochironomus	4	4.40%
Ostracoda	3	3.30%
Hyalella	2	2.20%
Ceratopogoninae	2	2.20%
TOTAL DOMINANTS	84	92.31%

SAPROBITY

Hilsenhoff Biotic Index	7.29

DIVERSITY

Shannon H (loge)	3.07
Shannon H (log2)	2.13
Margalef D	3.54
Simpson D	0.15
Evenness	0.13

VOLTINISM

TYPE	# TAXA	PERCENT
Multivoltine	6	20.88%
Univoltine	10	78.02%
Semivoltine	0	0.00%

TAXA CHARACTERS

	#TAXA	PERCENT
Tolerant	6	20.88%
Intolerant	0	0.00%
Clinger	1	4.40%

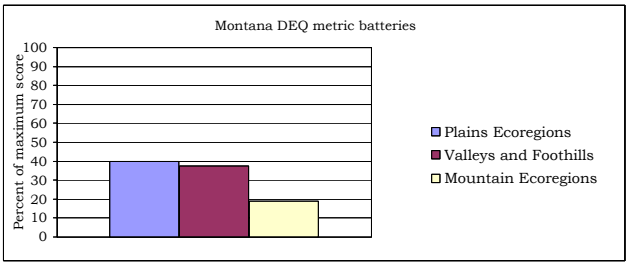
BIOASSESSMENT INDICES

B-IBI (Karr et al.)

METRIC	VALUE	SCORE	
Taxa richness	17	1	
E richness	2	1	
P richness	0	1	
T richness	1	1	
Long-lived	0	1	
Sensitive richness	0	1	
%tolerant	20.88%	3	
%predators	19.78%	3	
Clinger richness	1	1	
%dominance (3)	59.34%	3	
	TOTAL SCORE	16	32%

MONTANA DEQ METRICS (Bukantis 1998)

METRIC	VALUE	Plains Ecoregions	Valleys and Foothills	Mountain Ecoregions
Taxa richness	17	1	1	0
EPT richness	3	1	0	0
Biotic Index	7.29	0	0	0
%Dominant taxon	31.87%	2	2	2
%Collectors	64.84%	2	2	2
%EPT	10.99%	1	0	0
Shannon Diversity	2.13	1		
%Scrapers +Shredders	14.29%	1	1	0
Predator taxa	2	0		
%Multivoltine	20.88%	3		
%H of T	0.00%		3	
TOTAL SCORES		12	9	4
PERCENT OF MAXIMUM		40.00	37.50	19.05
IMPAIRMENT CLASS		MODERATE	MODERATE	SEVERE



Montana Plains ecoregions metrics (Bramblett and Johnson)

Riffle		*Pool*	
EPT richness	3	E richness	2
Percent EPT	10.99%	T richness	1
Percent Oligochaetes and Leeches	31.87%	Percent EPT	10.99%
Percent 2 dominants	49.45%	Percent non-insect	46.15%
Filterer richness	1	Filterer richness	1
Percent intolerant	0.00%	Univoltine richness	10
Univoltine richness	10	Percent supertolerant	50.55%
Percent clingers	4.40%		
Swimmer richness	3		