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**MONTANA DEPARTMENT OF TRANSPORTATION  
WETLAND MITIGATION MONITORING REPORT: YEAR 2006**

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*Peterson Ranch  
Hall, Montana*



Prepared for:

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

Prepared by:

**POST, BUCKLEY, SCHUH, & JERNIGAN**  
P.O. Box 239  
Helena, MT 59624

December 2006

Project No: B43054.00 - 0118



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## 1.0 INTRODUCTION

The Peterson Ranch Wetland Mitigation Site was developed to mitigate wetland impacts associated with the Montana Department of Transportation (MDT) reconstruction of Highway 1 between Maxville and Drummond and as a potential reserve for future highway projects in Watershed # 2. This report documents the fifth year of monitoring at the site.

The Peterson Ranch is located in Granite County, Watershed # 2, in the Upper Clark Fork region. The mitigation site is located south and east of Hall, Montana (**Figure 1**). Elevation is approximately 4,200 feet with slight topographic variation throughout the project site. The approximate mitigation boundary is illustrated on **Figure 2** in **Appendix A**, and the original site plans are included in **Appendix D**. The mitigation site boundary starts along the southern edge of Montana Highway 512. Fence lines run south and are located on both the west and east sides of the mitigation site. On the west side of the site, an older fence line is still in place, preventing livestock from grazing within the project boundary. On the east side, the fence line follows the parcel boundary that is adjacent to an active timber mill. The fence lines form a distinct perimeter, encompassing the newly created/enhanced wetlands. Electric fence is used to close off the southern most boundary of the mitigation site near the southern end of pond #1.

Seasonal flooding of Flint Creek and a shallow groundwater table influenced by the Flint Creek Canal and irrigation are intended to provide the primary wetland hydrology. The local groundwater systems are also influenced by the adjacent Flint Creek and the movement of subsurface flow through the highly permeable alluvium substrate located within the floodplain of the Flint Creek Valley.

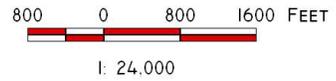
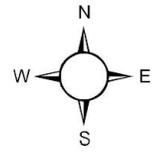
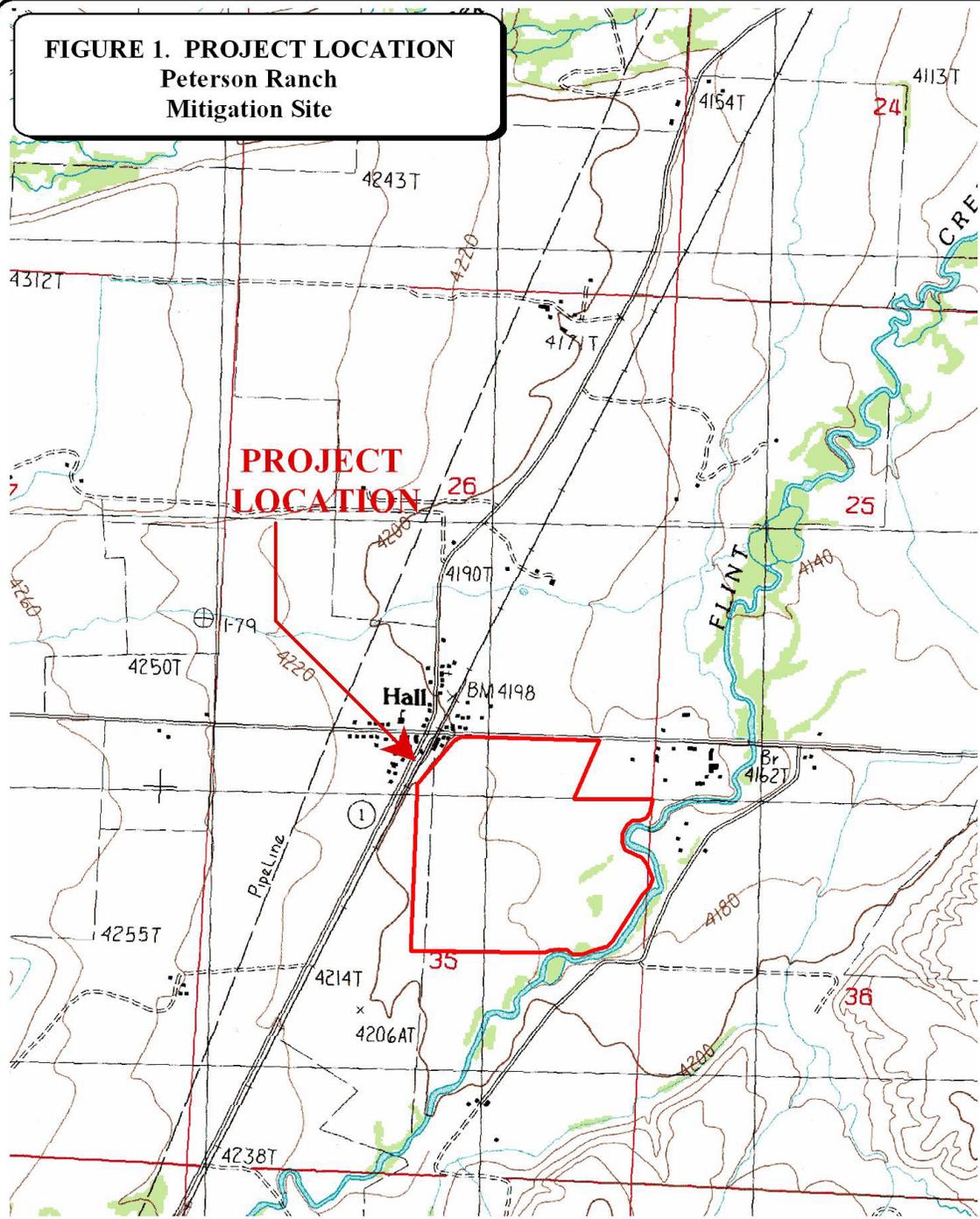
The site was designed to mitigate for specific wetland functions and values impacted by MDT roadway projects. These include riparian, wet meadow, emergent wetland, and open water areas lost to MDT construction. Impacted functions include sediment and nutrient retention, water quality, groundwater recharge, and waterfowl/wildlife habitat. Project goals for the Peterson Ranch wetland mitigation site include the following:

- Creation of a protective easement.
- Creation of 17.5 acres of wetlands.
- Grazing management plan developed to enhance 80.6 acres.
- Enhancement of riparian vegetation through plantings and seeding.
- Creation of new wetlands with open water habitat.
- Improved functions and values ratings.

Construction was completed in the spring of 2002; diagrams are presented in **Appendix D**. Revegetation work was also completed in the spring of 2002; planting specifications are presented in **Appendix E**. The primary components of construction include:

- Construction of existing uplands into 8.2 acres of four shallow water pools and adjoining emergent wetlands.
- Construction of degraded wet meadow into 9.4 acres of shallow open water and emergent/scrub-shrub wetlands.

**FIGURE 1. PROJECT LOCATION**  
**Peterson Ranch**  
**Mitigation Site**



<p>PROJECT #: 130091.010          DATE: Dec 2002          LOCATION: HALL, MT          PROJECT MANAGER: B. DUTTON          DRAWN BY: B. STEINEBACH</p>	 <p><b>LAND &amp; WATER CONSULTING, INC.</b>          1120 CEDAR PO BOX 8254 MISSOULA, MT 59807</p>
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## 2.0 METHODS

### 2.1 Monitoring Dates and Activities

The site was visited on May 22<sup>nd</sup> (spring season) and August 17<sup>th</sup> (mid-season) of 2006. The spring visit was conducted to sample seasonal bird and other wildlife use. The mid-season visit was conducted to document vegetation, soil, and hydrologic conditions used to map jurisdictional wetlands. All information contained on the Wetland Mitigation Site Monitoring Form ) was collected at this time (**Appendix B**. Activities and information conducted/collected included: wetland delineation; wetland/open water aquatic habitat boundary mapping; vegetation community mapping; vegetation transect; soils data; hydrology data; bird and general wildlife use; photograph points; macroinvertebrate sampling; GPS data points; functional assessment; and (non-engineering) examination of topographic features. Fall visits were conducted during previous monitoring years, but were deemed unproductive and were discontinued at this site as of 2004.

### 2.2 Hydrology

Wetland hydrology indicators were recorded during the mid-season visit using procedures outlined in the COE 1987 Wetland Delineation Manual (Environmental Laboratory 1987). Hydrology data were recorded on COE Routine Wetland Delineation Data Forms (**Appendix B**). Additional hydrologic data were recorded on the Wetland Mitigation Site Monitoring Form (**Appendix B**). No groundwater monitoring wells were installed at the site

### 2.3 Vegetation

General dominant species-based vegetation community types (e.g., *Eleocharis/Carex*) were delineated on an aerial photograph during the mid-season visit. Standardized community mapping was not employed as many of these systems are geared towards climax vegetation and do not reflect yearly changes. Estimated percent cover of the dominant species in each community type was listed on the Wetland Mitigation Site Monitoring Form (**Appendix B**).

Two 10-foot wide belt transects were established during the mid-season monitoring event to represent the range of current vegetation conditions. Percent cover was estimated for each vegetative species within each successive vegetative community encountered within the “belt” using the following values: T (few plants); P (1-5%); 1 (5-15%); 2 (15-25%); 3 (25-35%); 4 (35-45%); 5 (45-55%) and so on to 9 (85-95%). The transect locations are illustrated on **Figure 2** in **Appendix A**. The transects will be used to evaluate changes over time, especially the establishment and increase of hydrophytic vegetation. The transect locations were marked on the air photo and all data were recorded on the mitigation site monitoring form. Transect endpoint locations were recorded with the GPS unit in 2002. A photograph was taken from both ends of each transect looking along the transect path. A comprehensive plant species list for the site was compiled and updated as new species were encountered.

## 2.4 Soils

Soils were evaluated during the mid-season site visit using the hydric soils determination procedures 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 Forms (**Appendix B**). The most current NRCS terminology was used to describe hydric soils (USDA 1998).

## 2.5 Wetland Delineation

Wetland delineation was conducted during the mid-season visit according to the 1987 COE Wetland Delineation Manual (Environmental Laboratory 1987). 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 onto COE Routine Wetland Delineation Data Forms (**Appendix B**). The wetland/upland boundary was originally delineated on the air photo and recorded with a resource grade GPS unit using the procedures outlined in **Appendix E**. Modifications to these boundaries in 2006 were accomplished by hand-mapping onto the 2006 aerial photograph. The wetland/upland boundary in combination with the wetland/open water boundary was used to calculate the final wetland acreage.

## 2.6 Mammals, Reptiles, and Amphibians

Mammal, reptile, and amphibian species observations and other positive indicators of use, such as vocalizations, were recorded on the wetland monitoring form during site visits. Indirect use indicators, including tracks, scat, burrows, eggshells, skins, bones, etc. were also recorded. Observations were recorded as the observer traversed the site while conducting other required activities. Direct sampling methods, such as snap traps, live traps, and pitfall traps, were not used.

## 2.7 Birds

Bird observations were recorded during both the spring and mid-season visit. No formal census plots, spot mapping, point counts, or strip transects were conducted. The spring birding visit was conducted in accordance with the Bird Survey Protocols (**Appendix E**). During the mid-season visit, the bird survey was conducted incidental to other monitoring activities. Bird species observations were categorized by species, activity code, and general habitat association on the Bird Survey Field Data Sheet (**Appendix B**).

## 2.8 Macroinvertebrates

Macroinvertebrate samples were collected during the mid-season site visit at four separate locations (**Figure 2** in **Appendix A**). Collection occurred using the Macroinvertebrate Sampling Protocol (**Appendix F**). Samples were preserved as outlined in the sampling procedure and sent to Rhithron Associates, Inc. in Missoula, Montana for analysis (**Appendix F**).

## 2.9 Functional Assessment

Functional assessment forms were completed using the 1999 MDT Montana Wetland Assessment Method (Berglund 1999) (**Appendix B**). Field data necessary for this assessment were collected during the mid-season visit. Turnstone Biological completed the baseline functional assessment during the initial wetland delineation using the 1996 MDT Montana Wetland Field Evaluation Form.

## 2.10 Photographs

The July 7, 2006 aerial photograph was used to make **Figures 2 and 3 (Appendix A)**. Photographs were taken to illustrate the current land use surrounding the site, upland buffer, monitored area, and vegetation transects (**Appendix C**). Each photograph point location was recorded with a resource grade GPS in 2002 onto **Figure 2 (Appendix A)**. All photographs were taken using a digital camera.

## 2.11 GPS Data

During the 2002 monitoring season, point data were collected with a resource grade GPS unit at the vegetation transect beginning and ending locations and at all photograph locations. Wetland boundaries were also recorded with a resource grade GPS unit in 2002, but were modified via hand mapping onto 2005 aerial photographs in 2006. Procedures used for GPS mapping and aerial photograph referencing are included in **Appendix E**.

## 2.12 Maintenance Needs

Observations were made of existing structures and of erosion/sediment problems to identify maintenance needs. This did not constitute an engineering-level structural inspection, but rather a cursory examination. Current/future potential problems were documented on the monitoring form.

## 3.0 RESULTS

### 3.1 Hydrology

The main source of hydrology is seasonal flooding by Flint Creek. This mitigation site occurs in Flint Creek Valley floodplain consisting of areas of low topography, small side channels (irrigation ditches) and ponds. Another primary source of hydrology is the high groundwater table influenced by irrigation ditches and persistent upwelling and lateral movement of groundwater through the alluvial materials located throughout the floodplain.

Open water (OW) occurred across approximately 1.08 acre or 2% of the 48-acre mitigation site during the mid-season visit (**Figure 3 in Appendix A**). Shallow OW/ponds 1, 2, 3, 4, and 5 (**Figure 3 in Appendix A**) were constructed to depths of less than 6.6 feet. Shallow OW/ponds 1 and 2 were mapped as wetland areas instead of open water during 2004. During the 2006

monitoring similar conditions were observed, with a slight increase in shallow open water observed during the mid-season visit. Water levels within the OW/ponds 1 and 2 during 2004-2006 decreased to a level suitable for emergent and aquatic vegetation to dominate throughout the entirety of both ponds. The outer fringes of OW/ponds 3, 4, and 5 were inundated and surrounded by more extensive emergent vegetation. The outer pond fringes are developing into emergent vegetation types. Open water habitat was dominated by non-rooted aquatic vegetation and algae.

Approximate percentages of inundation at OW/ponds 1-5 were observed during spring and summer visits (**Table 1**).

**Table 1: Approximate inundation percentage of open water (OW) / ponds observed in 2006.**

Visit	OW/Pond 1	OW/Pond 2	OW/Pond 3	OW/Pond 4	OW/Pond 5
Spring	40%	50%	60%	80%	80%
Summer	60%	60%	100%	100%	100%

Large excavated (proposed) wetland cells west of the main ditch bisecting the property do not appear to be receiving water as originally intended. With the exception of the small ponds, most of these areas were completely dry during both site visits. This is apparently due to the unavailability of directly applied irrigation water as originally proposed. The use of irrigation water for these sites was denied by the DNRC as a result of the water rights permitting process. The landowners are attempting to address this issue.

### 3.2 Vegetation

Seventy-four plant species were identified at the site and are listed in **Table 2**. The majority of these species are herbaceous. Two general wetland types were identified; these include emergent and scrub-shrub/emergent wetlands. A few small shrub communities exist along an active side channel/irrigation ditch. Several mature black cottonwood (*Populus trichocarpa*) and aspen (*Populus tremuloides*) were also observed along the same side channel and its associated wet fringes. Most the site consists of open wet meadows and emergent wetland vegetation.

Ten wetland types and one upland community type were identified at the mitigation site (**Figure 3** in **Appendix A**). The ten wetland community types include Type 1: *Agrostis*, Type 3: *Salix*, Type 4: *Eleocharis/Carex*, Type 5: *Carex/Typha*, Type 6: *Agrostis/Juncus*, Type 7: *Carex/Alopecurus*, Type 8: *Phleum/Agrostis*, Type 9: *Typha/Eleocharis*, Type 10: *Agrostis/Veronica* and Type 11: *Veronica/Myriophyllum*. The one upland community observed, Type 2: *Agropyron* covers a vast majority of the mitigation site. Plant species observed within each of these communities are listed on the attached COE Form (**Appendix B**).

Types 4, 9, 10 and 11 are the wettest communities and occurred as aquatic bed/emergent wetlands in the shallow waters of the created wetlands ponds 1, 2, 3, 4 and 5 (**Figure 3** in **Appendix A**).

**Table 2: 2002 - 2006 vegetation species list for the Peterson Ranch Wetland Mitigation Site.**

Scientific Name	Common Name	Region 9 (Northwest) Wetland Indicator
<i>Achillea millefolium</i>	common yarrow	FACU
<i>Agropyron repens</i>	quack grass	FACU
<i>Agropyron smithii</i>	western wheatgrass	FACU
<i>Agropyron trachycaulum</i>	slender wheatgrass	FAC
<i>Agrostis alba</i>	redtop	FAC+
<i>Alopecurus pratensis</i>	meadow foxtail	FACW
<i>Amaranthus retroflexus</i>	red-root amaranth	FACU+
<i>Beckmannia syzigachne</i>	American sloughgrass	OBL
<i>Betula occidentalis</i>	birch	FACW
<i>Bidens cernua</i>	nodding beggar-ticks	FACW+
<i>Bromus inermis</i>	smooth brome	--
<i>Bromus tectorum</i>	cheatgrass	--
<i>Carduus nutans</i>	musk thistle	--
<i>Carex microptera</i>	small winged sedge	FAC
<i>Carex nebrascensis</i>	Nebraska sedge	OBL
<i>Carex utriculata</i>	beaked sedge	OBL
<i>Centaurea maculosa</i>	spotted knapweed	--
<i>Chenopodium album</i>	white goosefoot	FAC
<b><i>Chrysanthemum leucanthemum</i></b>	oxeye daisy	--
<i>Cirsium arvense</i>	Canada thistle	FACU+
<i>Cornus stolonifera</i>	red-osier dogwood	FACW
<i>Crataegus douglasii</i>	Douglas hawthorn	FAC
<i>Cynoglossum officinale</i>	hounds tongue	FACU
<i>Dactylis glomerata</i>	orchardgrass	FACU
<i>Descurainia sophia</i>	tansy mustard	--
<i>Elaeagnus commutata</i>	silverberry	NI
<i>Eleocharis palustris</i>	creeping spike rush	OBL
<i>Elymus cinereus</i>	big basin wildrye	FACU
<i>Elymus triticoides</i>	creeping wildrye	FAC
<i>Epilobium ciliatum</i>	hairy willow-herb	FACW-
<i>Equisetum arvense</i>	field horsetail	FAC
<i>Festuca pratensis</i>	meadow fescue	FACU+
<i>Glyceria striata</i>	fowl mannagrass	OBL
<i>Helianthus annuus</i>	common sunflower	FACU+
<i>Hordeum jubatum</i>	barley fox-tail	FAC+
<i>Iris missouriensis</i>	rocky mountain iris	OBL
<i>Juncus balticus</i>	Baltic rush	FACW+
<i>Juncus confusus</i>	Colorado rush	FAC
<i>Juncus ensifolius</i>	three-stamen rush	FACW
<i>Juncus mertensianus</i>	Mertens's rush	OBL
<i>Juncus nodosus</i>	knotted rush	OBL
<i>Kochia scoparia</i>	summer-cypress	FAC
<i>Lepidium perfoliatum</i>	clasping pepper-grass	FACU+
<i>Lomatium spp.</i>	biscuit root	--
<i>Lychnis alba</i>	white campion	--
<i>Malva neglecta</i>	mallow	--
<i>Medicago sativa</i>	alfalfa	--
<i>Mentha arvensis</i>	mint	FAC
<i>Myriophyllum spicatum</i>	Eurasian water-milfoil	OBL
<i>Phalaris arundinaceae</i>	reed canarygrass	FACW

**Table 2 (continued): 2002 - 2006 vegetation species list for the Peterson Ranch Wetland Mitigation Site.**

Scientific Name	Common Name	Region 9 (Northwest) Wetland Indicator
<i>Phleum pratense</i>	timothy	FAC-
<i>Plantago major</i>	common plantain	FAC+
<i>Poa ampla</i>	big bluegrass	--
<i>Polygonum amphibium</i>	water smartweed	OBL
<i>Polygonum aviculare</i>	prostrate knotweed	FACW+
<i>Populus tremuloides</i>	aspen	FAC+
<i>Populus trichocarpa</i>	black cottonwood	FAC
<i>Potentilla anserina</i>	silverweed	OBL
<i>Potentilla gracilis</i>	northwest cinquefoil	FAC
<i>Prunus virginiana</i>	serviceberry	FACU
<i>Ribes aureum</i>	swamp current	FAC+
<i>Rosa woodsii</i>	woods rose	FACU
<i>Rumex crispus</i>	curly dock	FACW
<i>Salix bebbiana</i>	Bebbs willow	FACW
<i>Salix exigua</i>	sandbar willow	OBL
<i>Salix geyeriana</i>	Geyer willow	FACW+
<i>Scirpus acutus</i>	hard stem bulrush	OBL
<i>Sisymbrium altissimum</i>	tall tumble mustard	FACU-
<b><i>Sisyrinchium spp.</i></b>	blue-eyed grass	--
<i>Solidago missouriensis</i>	Missouri goldenrod	--
<i>Taraxacum officinale</i>	common dandelion	FACU
<i>Thlaspi arvensis</i>	pennycress	NI
<i>Triglochin maritimum</i>	seaside arrowgrass	OBL
<i>Trifolium pratense</i>	red clover	FACU
<i>Typha latifolia</i>	common cattail	OBL
<i>Veronica americana</i>	American speedwell	OBL

<sup>1</sup> **Bolded** species indicate those documented in the analysis area for the first time in 2006.

Type 4 is dominated by creeping spike rush (*Eleocharis palustris*), Nebraska sedge (*Carex nebrascensis*) and common cattail (*Typha latifolia*). Type 9 is also dominated by cattail, creeping spike rush and American sloughgrass (*Beckmannia syzigachne*). Type 10 is dominated by redtop (*Agrostis alba*) and American speedwell (*Veronica americana*). During previous monitoring the Type 11 areas were recorded as open water within the constructed ponds # 1 and 2. During the 2004 monitoring, Type 11 was dominated by American speedwell and Eurasian milfoil (*Myriophyllum spicatum*). Water levels in the constructed ponds 1 and 2 decreased to a level suitable for emergent and aquatic vegetation to flourish. Similar conditions were present during 2005 and 2006 monitoring with less vegetative cover and standing water. Types 5 and 7 are the next wettest areas, consisting of emergent vegetation occurring in depressions and side channels throughout the wet meadow complexes. Types 5 and 7 are dominated by Nebraska sedge, broad-leaf cattail, and meadow foxtail (*Alopecurus pratensis*).

Type 3 is the next wettest wetland type and is classified as scrub-shrub wetland. This area has mature shrub communities growing adjacent to the active side channel (irrigation ditch). Type 3 vegetation is dominated by Bebbbs willow (*Salix bebbiana*), black cottonwood, Geyer willow (*Salix geyeriana*), and swamp current (*Ribes aureum*). The remaining Types 1, 6, and 8 are the least wet areas. These areas function as the transitional zone between the wettest areas and drier

upland vegetation boundary. These types are dominated by mostly wetter species, but also include a minor component of upland species. Types 1, 6, and 8 combined make up most of the wet meadows located within the mitigation site.

At this site only one upland type is present. The Type 2 upland area is dominated by slender wheatgrass (*Agropyron trachycaulum*) and quackgrass (*Agropyron repens*). The Type 2 community was mapped in areas of degraded pasture, as well as on upland slopes created around the pond excavations and spoil piles.

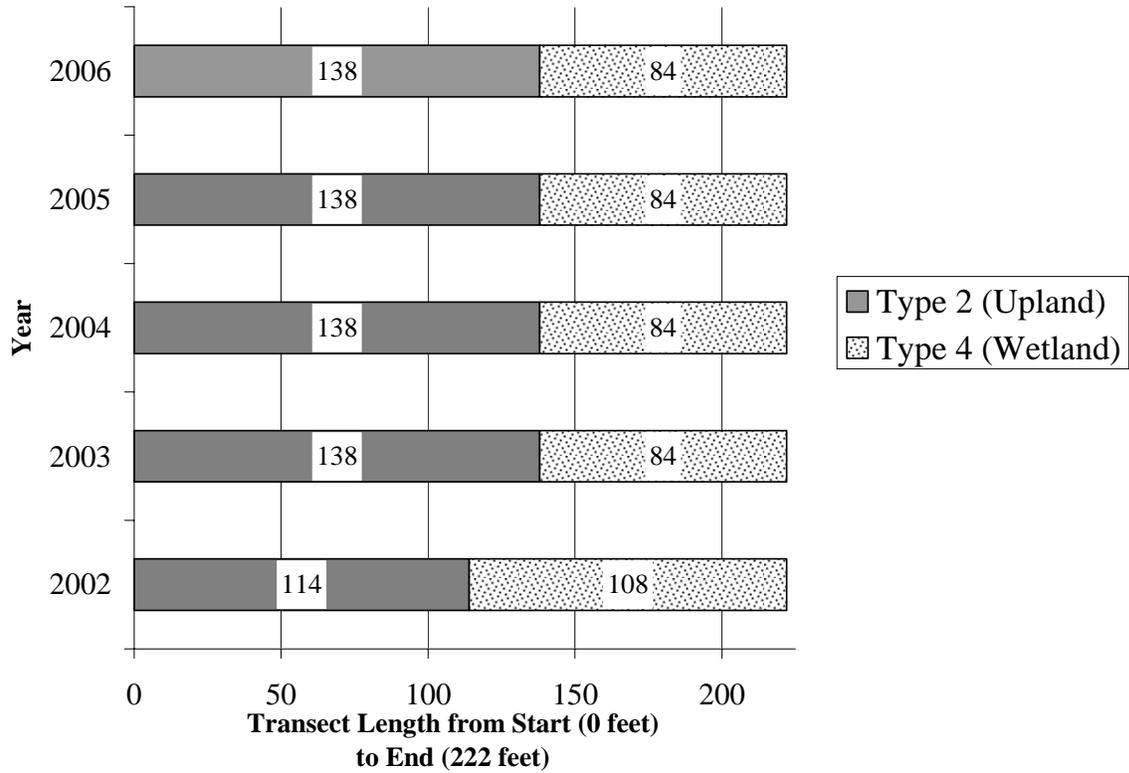
Several noxious weeds were observed throughout the Peterson Ranch site including spotted knapweed (*Centaurea maculosa*), oxeye daisy (*Chrysanthemum leucanthemum*), Canada thistle (*Cirsium arvense*), and hound's-tongue (*Cynoglossum officinale*). These generally consist of scattered individuals with very low coverage. However, a large population of Canada thistle occurs just outside the north property boundary that could facilitate spread of this species on the site. Other weedy species associated with disturbance include common dandelion (*Taraxacum officinalis*), lambs quarters (*Chenopodium album*), pepper-grass (*Lepidium perfoliatum*), tumbleweed (*Sisymbrium altissimum*), quackgrass and pennycress (*Thlaspi arvensis*).

Vegetation transect results are detailed in the attached COE Data Forms (**Appendix B**) and are summarized in **Tables 3** and **4** and in **Charts 1** to **4**. Vegetation transect results show no change in vegetation types for both transect # 1 and 2. Wetland areas for transect # 1 remained similar to the 2005 monitoring results. Transect # 2 during 2002 monitoring was mapped as exclusively upland vegetation; wetland vegetation was first noted in 2003. Transect # 2 remained similar to 2005 wetland composition during the 2006 monitoring. Percent vegetative cover observed in 2005 and 2006 decreased from levels observed in 2004 due to lower water levels and substantial grazing in community type 10.

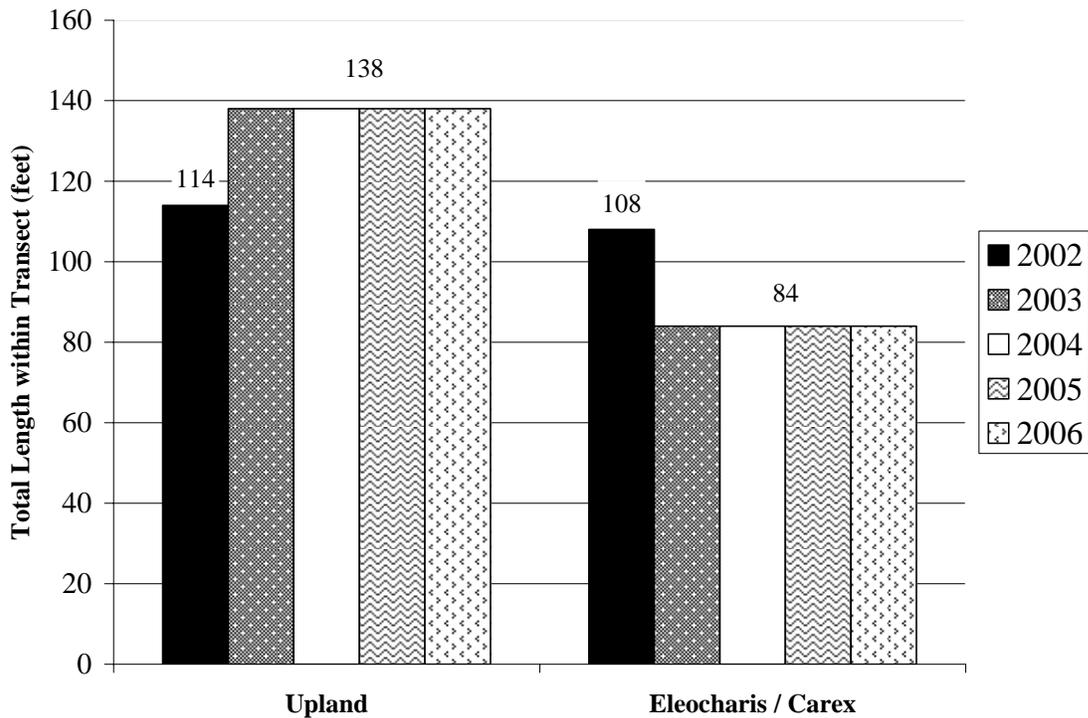
**Table 3: Transect 1 data summary.**

Monitoring Year	2002	2003	2004	2005	2006
Transect Length (feet)	222	222	222	222	222
# Vegetation Community Transitions along Transect	1	1	1	1	1
# Vegetation Communities along Transect	2	2	2	2	2
# Hydrophytic Vegetation Communities along Transect	1	1	1	1	1
Total Vegetative Species	14	15	15	17	17
Total Hydrophytic Species	9	11	10	11	11
Total Upland Species	4	3	3	6	6
Estimated % Total Vegetative Cover	85	95	67.5	60	60
% Transect Length Comprised of Hydrophytic Vegetation Communities	49	38	38	38	38
% Transect Length Comprised of Upland Vegetation Communities	51	62	62	62	62
% Transect Length Comprised of Unvegetated Open Water	0	0	0	0	0
% Transect Length Comprised of Bare Substrate	0	0	0	0	0

**Chart 1: *Transect 1 maps showing vegetation types from the start (0 feet) to the end of transect (222 feet) for each year monitored.***



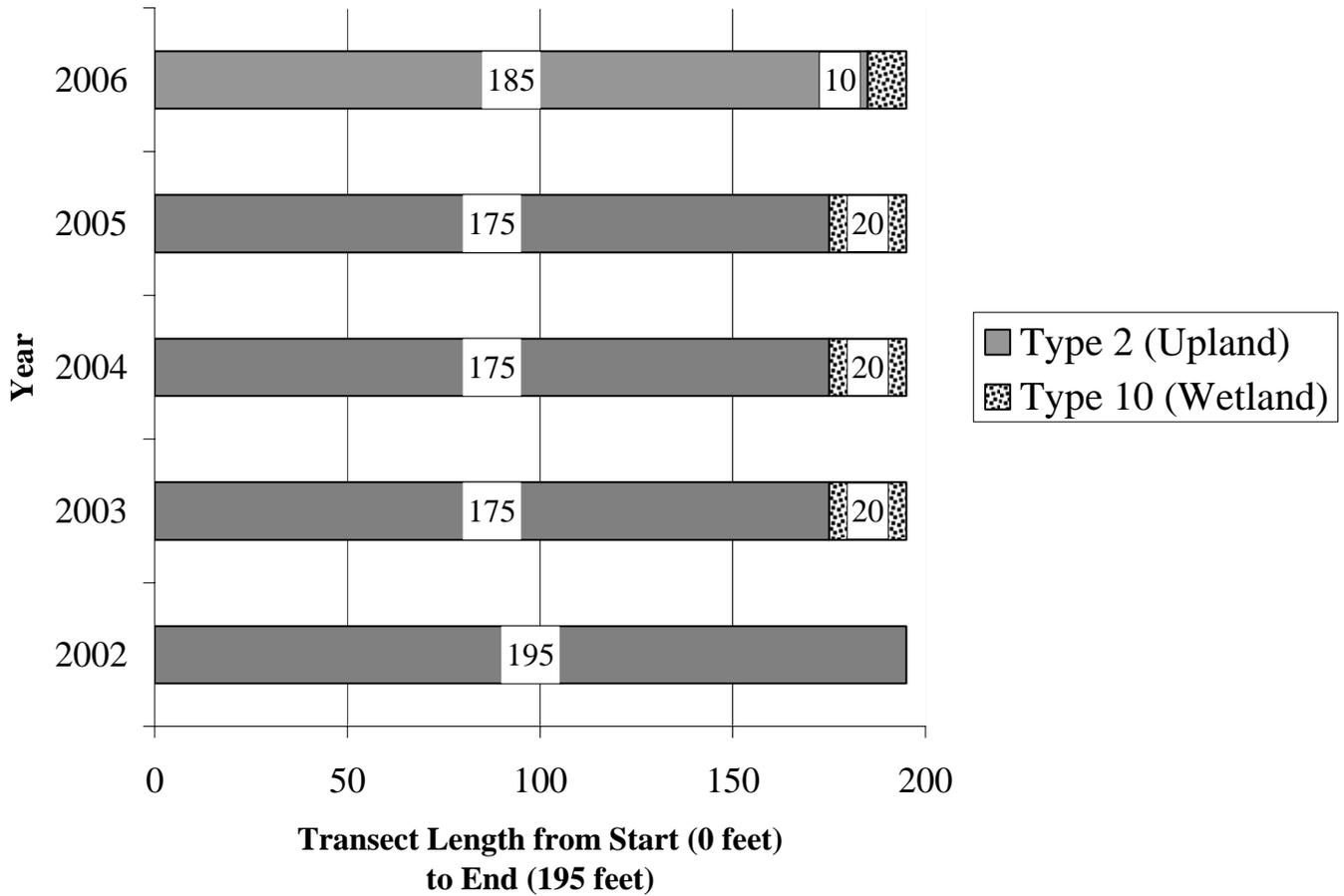
**Chart 2: *Length of vegetation communities within Transect 1 for each year monitored.***



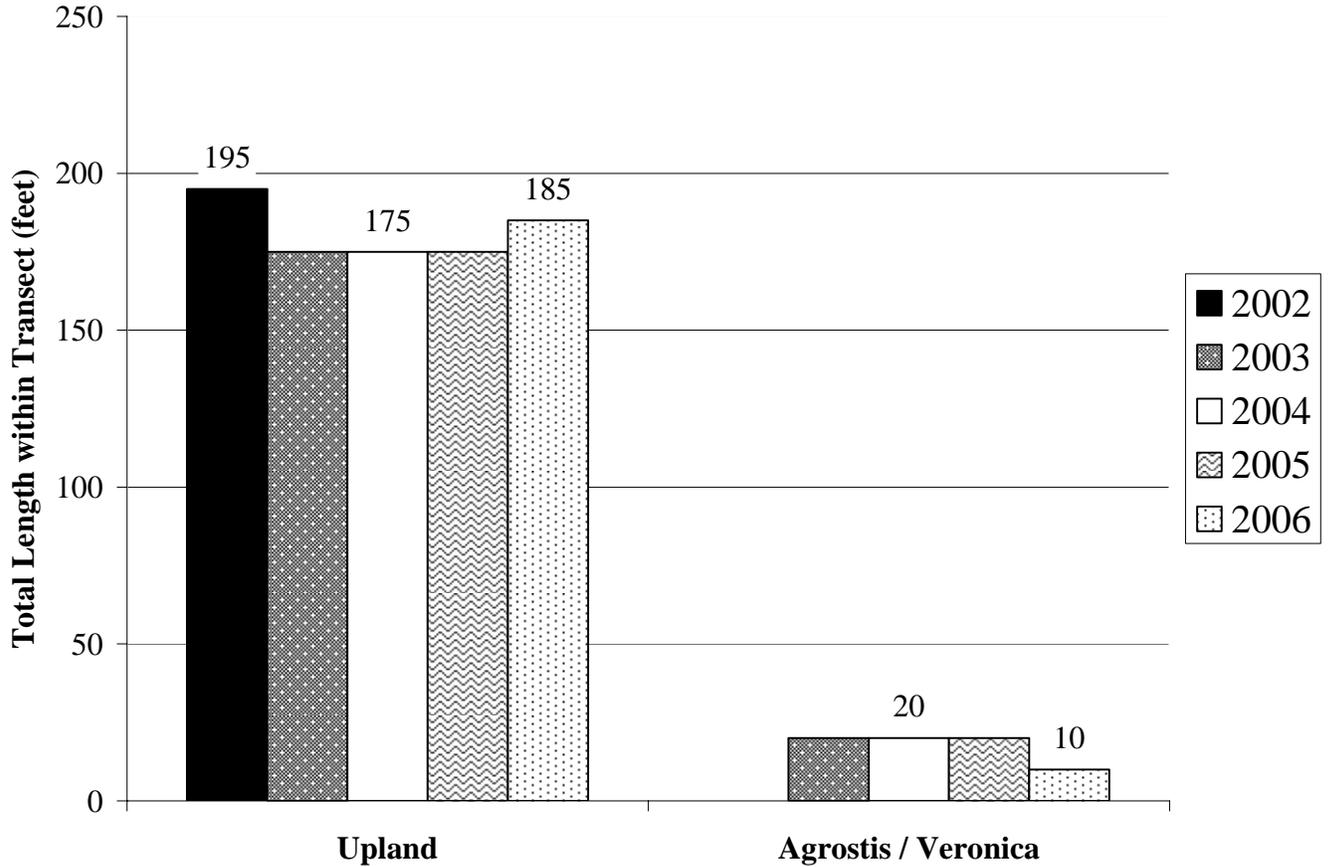
**Table 4: Transect 2 data summary.**

Monitoring Year	2002	2003	2004	2005	2006
Transect Length (feet)	195	195	195	195	195
# Vegetation Community Transitions along Transect	0	1	1	1	1
# Vegetation Communities along Transect	1	2	2	2	2
# Hydrophytic Vegetation Communities along Transect	0	1	1	1	1
Total Vegetative Species	15	13	13	9	14
Total Hydrophytic Species	6	6	7	3	6
Total Upland Species	6	7	5	6	8
Estimated % Total Vegetative Cover	85	95	85	50	50
% Transect Length Comprised of Hydrophytic Vegetation Communities	0	10	10	10	5
% Transect Length Comprised of Upland Vegetation Communities	100	90	90	90	95
% Transect Length Comprised of Unvegetated Open Water	0	0	0	0	0
% Transect Length Comprised of Bare Substrate	0	0	0	0	0

**Chart 3: Transect 2 maps showing vegetation types from the start (0 feet) to the end of transect (195 feet) for each year monitored.**



**Chart 4: Length of vegetation communities within Transect 2 for each year monitored.**



### 3.3 Soils

Soils are mapped in the Granite County Soil Survey as Nirling cobbly loam, Blossberg loam and Nythar-Flintcreek Complex. Blossberg loam and Nythar-Flintcreek Complex are both listed as hydric soils for Granite County (NRCS 2003). Wetland soils observed during monitoring and documented on the Routine Wetland Determination form were mostly sandy clay, clay loams, sandy clay loams and minor components of peat with very low chromas (1 or 2) within 6 inches of the surface. Mottles (redoximorphic features) were present in one profile sampled along transect # 2. Several soil profiles described on the Routine Wetland Determination forms were mapped as upland sampling points, having no soil moisture or distinct hydric characteristics within 18 inches of the surface.

### 3.4 Wetland Delineation

Delineated wetland boundaries are illustrated on **Figure 3** in **Appendix A**. Completed COE Forms are included in **Appendix B**. Soils, vegetation, and hydrology are discussed in preceding sections. Wetland conditions during the 2006 monitoring are identified in **Table 5**.

**Table 5: Acreages of habitats found within the monitored area of the Peterson Ranch Wetland Mitigation Site during 2002 to 2006.**

Condition	2002 (acre)	2003 (acre)	2004 (acre)	2005 (acre)	2006 (acre)
Gross Wetland Area	25.98	26.23	26.23	26.23	26.70
Open Water Area	(1.90)	(1.90)	(0.61)	(1.27) <sup>1</sup>	(1.08)
Upland “Islands”	(1.63)	(2.72)	(2.85)	(3.03)	(2.88)
<b>Net Wetland Area</b>	<b>22.45</b>	<b>21.61</b>	<b>22.77</b>	<b>21.93</b>	<b>22.74</b>

1 – Discrepancies in acreage calculations were identified and corrected in 2006.

Approximately 22.74 wetland acres and 1.08 open water acres are currently within the monitoring area (**Figure 3** in **Appendix A**), for a total of 23.82 acres of aquatic habitat. The pre-construction wetland delineation reported 90 acres of wetland and no open water acres throughout the entire 135-acre conservation easement. The mitigation site encompasses only 48 acres of this larger total. Turnstone Biological mapped 22.60 acres of wetlands within the current mitigation site boundary. A pre-project delineation map is provided on **Figure 4** (**Appendix A**). The net increase in aquatic habitat to date is  $23.82 - 22.60 = 1.22$  acre.

Pre-project and post-project delineation boundaries were observed to be fairly consistent. However, during the 2002-2006 monitoring some differences were observed between pre-project and post-project wetland boundaries. A few such areas of note occur northeast of OW/Pond 2, where mapped pre-project wetlands were apparently disturbed by construction and did not exhibit wetland characteristics during the 2002-2006 monitoring efforts. Given adequate hydrology, these areas may revert back to wetlands over time. The general timing of site visits and different evaluators also had a minor influence on wetland boundaries.

Minor changes in aquatic habitat were observed between 2005 and 2006 monitoring. An increase in wetland area was observed during 2006 near OW/pond 5 with expansion of C.T. 6 and 7 into previously mapped upland areas. An increase in wetland area was also due to the reduction of OW/pond 5 with the expansion of emergent vegetation into open water. During 2004 monitoring, OW/ponds 1 and 2 were mapped as wetland areas. During 2006 monitoring, community type 11, which had replaced the open water at these areas in 2004, remained similar in size to what was observed in 2005.

### 3.5 Wildlife

Wildlife species, or evidence of wildlife, observed on the site during the 2002, 2003, 2004, 2005 and 2006 monitoring efforts are listed in **Table 6**. Specific evidence observed in 2006, as well as activity codes pertaining to birds, is provided on the completed **Monitoring Form** (**Appendix B**).

This site provides habitat for a variety of wildlife species. One mammal, one amphibian, and ten bird species were noted at the mitigation site during the 2006 site visits (**Table 6**).

**Table 6: Fish and wildlife species observed at the Peterson Ranch Wetland Mitigation Site from 2002 to 2006.**

<b>FISH</b>	
None	
<b>AMPHIBIANS</b>	
Columbia spotted frog ( <i>Rana luteiventris</i> )	
<b>REPTILES</b>	
None	
<b>BIRDS</b>	
American Coot ( <i>Fulica americana</i> )	Great Blue Heron ( <i>Ardea herodias</i> )
American Crow ( <i>Corvus brachyrhynchos</i> )	<b>Lesser Scaup (<i>Aythya affinis</i>)</b>
American Robin ( <i>Turdus migratorius</i> )	<b>Killdeer (<i>Charadrius vociferous</i>)</b>
Bald Eagle ( <i>Haliaeetus leucocephalus</i> )	<b>Mallard (<i>Anas platyrhynchos</i>)</b>
Black-billed magpie ( <i>Pica pica</i> )	<b>Marsh Wren (<i>Cistothorus palustris</i>)</b>
<b>Brewer's Blackbird (<i>Euphagus cyanocephalus</i>)</b>	<b>Mountain bluebird (<i>Sialia currucoides</i>)</b>
Bobolink ( <i>Dolichonyx oryzivorus</i> )	Mourning Doves ( <i>Zenaidura macroura</i> )
Bohemian Waxwing ( <i>Bombycilla garrulus</i> )	Northern Flicker ( <i>Colaptes auratus</i> )
Brown-Headed Cowbird ( <i>Molothrus ater</i> )	<b>Red-Winged Blackbird (<i>Agelaius phoeniceus</i>)</b>
Cedar Waxwing ( <i>Bombycilla cedrorum</i> )	<b>Song Sparrow (<i>Melospiza melodia</i>)</b>
Cliff Swallow ( <i>Petrochelidon pyrrhonota</i> )	Spotted Sandpiper ( <i>Actitis macularia</i> )
Common Merganser ( <i>Mergus merganser</i> )	<b>Tree Swallow (<i>Iridoprocne bicolor</i>)</b>
Common Raven ( <i>Corvus corax</i> )	Vesper Sparrow ( <i>Poocetes gramineus</i> )
Common Snipe ( <i>Capella gallinago</i> )	Western Meadowlark ( <i>Sturnella neglecta</i> )
Eastern Kingbird ( <i>Tyrannus tyrannus</i> )	Willow Flycatcher ( <i>Empidonax traillii</i> )
Golden Eagle ( <i>Aquila chrysaetos</i> )	<b>Wilson's Phalarope (<i>Steganopus tricolor</i>)</b>
Gray Catbird ( <i>Dumetella carolinensis</i> )	Yellow-Headed Blackbird ( <i>Xanthocephalus xanthocephalus</i> )
<b>MAMMALS</b>	
<b>Coyote (<i>Canis latrans</i>)</b>	
<b>Deer (<i>Odocoileus spp.</i>)</b>	
Red Fox ( <i>Vulpes vulpes</i> )	

**Bolded** species were observed during 2006 monitoring. All other species were observed during one or more of the previous monitoring years, but not during 2006.

### 3.6 Macroinvertebrates

Complete results from the macroinvertebrate sampling (**Figure 2 in Appendix A**) are presented in **Appendix F**. Sampling points for the Peterson Ranch were located at OW/ponds # 4, 5 and previously mapped OW/pond # 1 and 2. Four locations were sampled during the 2006 monitoring. The following analysis was provided by Rhithron Associates (Bollman 2006).

***OW/Pool 1:** Bioassessment scores fell in 2006 at this site, but still indicated optimal biotic conditions. Taxa richness dropped from the previous year, but assemblage sensitivity remained high. Midges, especially the orthoclad Parakiefferiella sp. dominated the sampled animals. Habitats appear to have been diverse, with macrophyte surfaces, the benthic substrates, and open water*

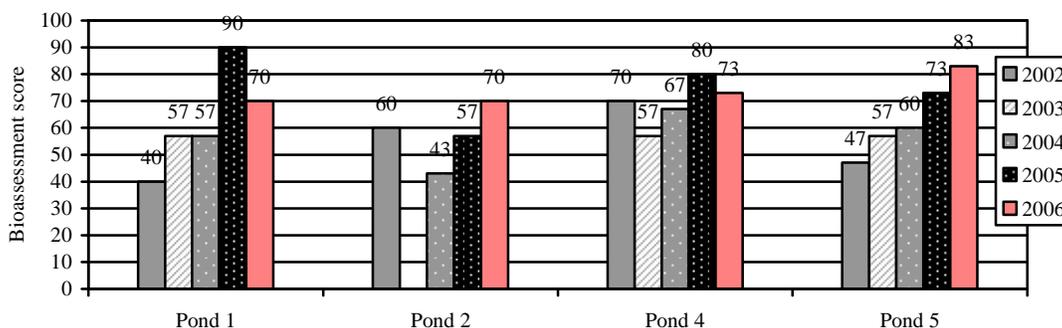
*all contributing to complexity. The biotic index value was well below the median value for studied sites, implying good water quality.*

**OW/Pool 2:** *Optimal conditions were also indicated at this site in 2006, corresponding to an increase in bioassessment scores from the previous year. Taxa richness and specific faunal components appear to have remained stable in the time period. Overall assemblage sensitivity, as measured by the biotic index value, increased. Biting gnats were more abundant in this year than in previous years, suggesting that cattle influenced the biota here. The functional composition of the invertebrate assemblage included all expected groups.*

**OW/Pool 4:** *Taxa richness remained high at this site in 2006, and the midge fauna became more diverse. These findings suggest that habitat complexity may have increased at this site since 2005. Optimal conditions are indicated by bioassessment scores in 2006. Cattle influence may be suggested by common occurrence of biting gnats (Ceratopogoninae) in the sample. All expected functional components were present. Metric indicators of water quality suggest clean water in this pond.*

**OW/Pool 5:** *Scores also implied optimal conditions at this site in 2006. Compared to the previous year, taxa richness and chironomid richness both increased here. Overall assemblage sensitivity improved dramatically, suggesting an amelioration of the water quality impairment noted in 2005. Evidence of hypoxic sediments was less apparent in 2006; this finding supports the hypothesis of improved water quality.*

**Chart 5: Bioassessment scores for the Peterson Ranch Wetland Mitigation Site.**



### 3.7 Functional Assessment

Completed 2006 Functional Assessment Forms are included in **Appendix B**. The Peterson Ranch was separated into three assessment areas (AAs) for purposes of functional assessment. These areas included the created wetland OW/ponds 1 and 2 and associated emergent wet meadow west of the irrigation ditch (AA 1), scrub-shrub emergent wetlands along the irrigation ditch (AA 2), and created wetland OW/ponds 3, 4, and 5 with associated emergent vegetation

east of the irrigation ditch (AA 3). A complete breakdown of ratings for each assessment area and pre-project assessment areas is presented in **Table 7**.

Ratings in 2006 were identical to those derived in 2005. The wetlands on the Peterson Ranch mitigation site are currently rated as Category II (AA 2 and 3) and III (AA 1) (moderate value). These ratings are primarily due to the moderate ratings for MNHP species habitat, general wildlife, flood attenuation and sediment/nutrient/toxicant removal variables. Other factors contributing to this score were low ratings for TE species, uniqueness and recreation/education ratings. These areas received a high rating for surface water storage due to the potential acre-feet of water contained within the wetlands during seasonal high flows. The variable for sediment/shoreline stabilization rated high due the increase in emergent type wetland species with deep binding roots along the outer fringes of most the open water. The variable for production export/food chain support also rated high due to the overall vegetated acres, outlet presence, and perennial water regime.

The AA's received a low to moderate flood attenuation rating due to the presence of an inflow channel into the wetland and restricted nature of the outlet. The AA's also received a low recreation/education rating since the site is moderately disturbed and is privately owned. During the 2005 (and 2006) monitoring, AA's 2 and 3 rating for the category MNHP species habitat increased due to the presences of bobolink (*Dolichonyx oryzivorus*) within the assessment areas. The bobolink is rated as S2 category by the MNHP. AA 2 and AA 3 also both received a higher rating for sediment/shoreline stability due to the presence of mature shrubs, and respectfully emergent wetland type with deep binding root systems.

Based on functional assessment results, approximately 164.80 functional units occur at the Peterson Ranch mitigation site (**Table 7**). Baseline functional assessment results are also provided for comparison (**Table 7**). However, it should be noted that direct comparison between the baseline and 2006 functional assessments are not possible, as they were completed using different versions of the MDT functional assessment method; assessments can still be compared qualitatively.

### **3.8 Photographs**

Representative photographs were taken from photo-points and transect ends (**Appendix C**).

### **3.9 Revegetation Efforts**

Upon completion of the project construction, revegetation efforts were conducted to enhance riparian and wetland habitat surrounding the created ponds. Riparian shrub cuttings collected from surrounding Flint Creek areas were sprigged along the margins of created ponds. Further enhancement included plantings of containerized stock of several native shrubs found within the area. These species included woods rose (*Rosa woodsii*), golden current (*Ribes aureum*), chokecherry (*Prunus virginiana*), silverberry (*Elaeagnus commutata*), and red-osier dogwood (*Cornus stolonifera*). The adjacent wetland slopes of the created wetland ponds were seeded

**Table 7: Summary of 1998 (baseline) and 2002 to 2006 wetland function/value ratings and functional points at the Peterson Ranch Wetland Mitigation Project.**

Function and Value Parameters From the 1999 MDT Montana Wetland Assessment Method	1998 Baseline <sup>1</sup>	2002 AA 1 <sup>1</sup>	2002 AA 2 <sup>1</sup>	2002 AA 3 <sup>1</sup>	2003 AA 1 <sup>1</sup>	2003 AA 2 <sup>1</sup>	2003 AA 3 <sup>1,2</sup>	2004 AA 1 <sup>1,2</sup>	2004 AA 2 <sup>1,2</sup>	2004 AA 3 <sup>1,2</sup>	2005 AA 1 <sup>1,2</sup>	2005 AA 2 <sup>1,2</sup>	2005 AA 3 <sup>1,2</sup>	2006 AA 1 <sup>1,2</sup>	2006 AA 2 <sup>1,2</sup>	2006 AA 3 <sup>1,2</sup>
Listed/Proposed T&E Species Habitat	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.5)	Low (0.5)	Low (0.3)	Low (0.5)	Low (0.5)
MTNHP Species Habitat	Low (0.1)	Low (0.0)	Low (0.1)	Low (0.0)	Low (0.0)	Low (0.1)	Low (0.0)	Low (0.0)	Low (0.1)	Low (0.0)	Low (0.0)	Mod (0.7)	Mod (0.7)	Low (0.0)	Mod (0.7)	Mod (0.7)
General Wildlife Habitat	Low (0.1)	Mod (0.5)	Mod (0.7)	Mod (0.7)	Mod (0.5)	Mod (0.7)	Mod (0.7)	Mod (0.5)	Mod (0.7)							
General Fish/Aquatic Habitat	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Flood Attenuation	NA	Mod (0.5)	Low (0.2)	Mod (0.5)	Mod (0.5)	Low (0.2)	Mod (0.5)	Mod (0.5)	Low (0.2)	Mod (0.5)	Mod (0.5)	Low (0.3)	Mod (0.5)	Mod (0.5)	Low (0.3)	Mod (0.5)
Short and Long Term Surface Water Storage	High (1.0)	High (0.8)	High (0.8)	High (0.8)	High (0.8)	High (0.8)	High (0.8)	High (0.8)	High (0.8)	High (0.8)	High (0.8)	High (0.8)	High (0.8)	High (0.8)	High (0.8)	High (0.8)
Sediment, Nutrient, Toxicant Removal	Mod (0.5)	Mod (0.7)	High (0.9)	Mod (0.7)	Mod (0.7)	High (0.9)	Mod (0.7)	Mod (0.7)	High (0.9)	Mod (0.7)	Mod (0.7)	High (1.0)	Mod (0.7)	Mod (0.7)	High (1.0)	Mod (0.7)
Sediment/Shoreline Stabilization	NA	Low (0.3)	High (1.0)	Mod (0.7)	Low (0.3)	High (1.0)	Mod (0.7)	Low (0.3)	High (1.0)	Mod (0.7)	Low (0.3)	High (1.0)	High (1.0)	Low (0.3)	High (1.0)	High (1.0)
Production Export/Food Chain Support	Mod (0.7)	High (0.8)	High (0.8)	High (0.8)	High (0.9)	High (0.8)	High (0.9)	High (0.9)	High (0.8)	High (0.9)	High (0.9)	High (0.8)	High (0.9)	High (0.9)	High (0.8)	High (0.9)
Groundwater Discharge/Recharge	UNK	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)
Uniqueness	Low (0.2)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)
Recreation/Education Potential	Low (0.1)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)
Actual Points / Possible Points	3.0 / 8	5.5 / 11	6.4 / 11	6.1 / 11	5.6 / 11	6.4 / 11	6.2 / 11	5.6 / 11	6.4 / 11	6.2 / 11	5.8 / 11	7.4 / 11	7.4 / 11	5.8 / 11	7.4 / 11	7.4 / 11
% off Possible Score Achieved	38%	50%	58%	55%	51%	58%	56%	51%	58%	56%	53%	67%	67%	53%	67%	67%
Overall Category	III (borderline IV)	III	III	III	III	III	III	III	III	III	III	II	II	III	II	II
<b>Total Acreage of Assessed Wetlands and Open Water within Easement by AA</b>	<b>22.60</b>	<b>7.00</b>	<b>3.00</b>	<b>13.80</b>	<b>7.35</b>	<b>3.00</b>	<b>13.16</b>	<b>7.35</b>	<b>3.00</b>	<b>13.03</b>	<b>7.17</b>	<b>3.0</b>	<b>11.76</b>	<b>7.17</b>	<b>3.0</b>	<b>13.65</b>
<b>Functional Units (acreage x actual points) by AA</b>	<b>67.80</b>	<b>38.50</b>	<b>19.20</b>	<b>84.18</b>	<b>41.16</b>	<b>19.20</b>	<b>81.59</b>	<b>41.16</b>	<b>19.20</b>	<b>80.78</b>	<b>41.59</b>	<b>22.20</b>	<b>87.02</b>	<b>41.59</b>	<b>22.20</b>	<b>101.01</b>
<b>Total Acreage of Assessed Wetlands and Open Water on Site (acre)</b>	<b>22.60</b>	24.35 total – 0.55 Pond 2 = <b>23.8</b>			<b>23.51</b>			<b>23.38</b>			<b>21.93</b>			<b>23.82</b>		
<b>Total Functional Units on Site</b>	<b>67.80</b>	<b>141.88</b>			<b>141.95</b>			<b>141.14</b>			<b>150.81</b>			<b>164.8</b>		
<b>Net Acreage Gain (assessed wetlands and open water only) (acre)</b>	<b>NA</b>	<b>1.20</b>			<b>0.91</b>			<b>0.78</b>			<b>-0.67</b>			<b>1.22</b>		
<b>Net Functional Unit Gain</b>	<b>NA</b>	<b>74.08</b>			<b>74.15</b>			<b>73.34</b>			<b>83.01</b>			<b>97</b>		

<sup>1</sup> The baseline assessment was performed using the 1996 MDT Assessment Method. The 2002 to 2006 assessments used the 1999 MDT Assessment Method. Several parameters were substantially revised in the 1999 MDT assessment method, therefore direct comparison of pre- and post-project functions is not possible, but some general trends can be noted.

<sup>2</sup> See completed 2006 MDT functional assessment forms **Appendix B** for further detail.

with a wet mix consisting of slender wheatgrass (*Agropyron trachycaulum*), western wheatgrass (*Agropyron smithii*), creeping wildrye (*Elymus triticoides*), American sloughgrass (*Beckmannia syzigachne*), western mannagrass (*Glyceria occidentalis*), Baltic rush (*Juncus balticus*), and bluejoint reedgrass (*Calamagrostis canadensis*). Drier upland slopes disturbed during construction efforts were seeded with a dry mix consisting of slender wheatgrass (*Agropyron trachycaulum*), western wheatgrass (*Agropyron smithii*), big basin wildrye (*Elymus cinereus*), green needlegrass (*Stipa viridula*), and big bluegrass (*Poa ampla*). Planting specifications are presented in **Appendix G**.

Woody species survival data were collected for the Peterson Ranch. Plantings were difficult to find during the 2004, 2005 and 2006 monitoring due to extensive herbaceous cover of upland grass species and heavy browse by livestock. The pond # 1 & 2 areas west of the irrigation ditch experienced the heaviest grazing this summer; potential for shrub development in these areas has been greatly reduced due to grazing. Most or all plantings observed in this area prior to 2004 have been removed by livestock. Willow species within this area also had a low survival rate due to either grazing effects or low water levels. OW/ponds # 3, 4 & 5 showed the best survival with higher rates. OW/pond # 3 had the majority of the willows that showed vigorous growth and spread. No silverberry, red osier dogwood, woods rose, and golden current shrubs were observed in 2006. Only nine chokecherry shrubs were observed in 2006. Survival data are presented in the **Monitoring Form (Appendix B)**.

### **3.10 Maintenance Needs/Recommendations**

Several noxious weeds are present including Canada thistle, hound's tongue, oxeye daisy, and spotted knapweed. These generally consist of scattered individuals with very low coverage. However, weed control and revegetation of disturbed sites would prevent further weed spread, and reduce the risk of new weeds invading. A large population of Canada thistle occurs just outside the north property boundary that could facilitate spread of this species on the site.

The general lack of water at the majority of this site continue to preclude wetland development in many areas. Continued livestock grazing within the area of Pond 1 and 2 is slowing wetland development.

### **3.11 Current Credit Summary**

At this time approximately 22.74 acres of wetland and 1.08 acres of open water occur on the mitigation site, for a total of 23.82 acres of aquatic habitat. Subtracting the original 22.6 acres of pre-project wetlands from this total yields a current net of approximately 1.22 wetland/open water acres. Additional acreage may form with additional time and more normal precipitation; however, as the originally designed water source (irrigation water) was unable to be implemented, additional wetland development is not likely to be substantive. The site has gained approximately 97 functional units to date.

#### 4.0 REFERENCES

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- USDA Natural Resources Conservation Service (NRCS). 1998. *Field Indicators of Hydric Soils in the United States*, Version 4. G. Hurt, P. Whited and R. Pringle (eds.). USDA, NRCS Fort Worth, TX.

## **Appendix A**

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### **FIGURES 2, 3, & 4**

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*MDT Wetland Mitigation Monitoring  
Peterson Ranch  
Hall, Montana*

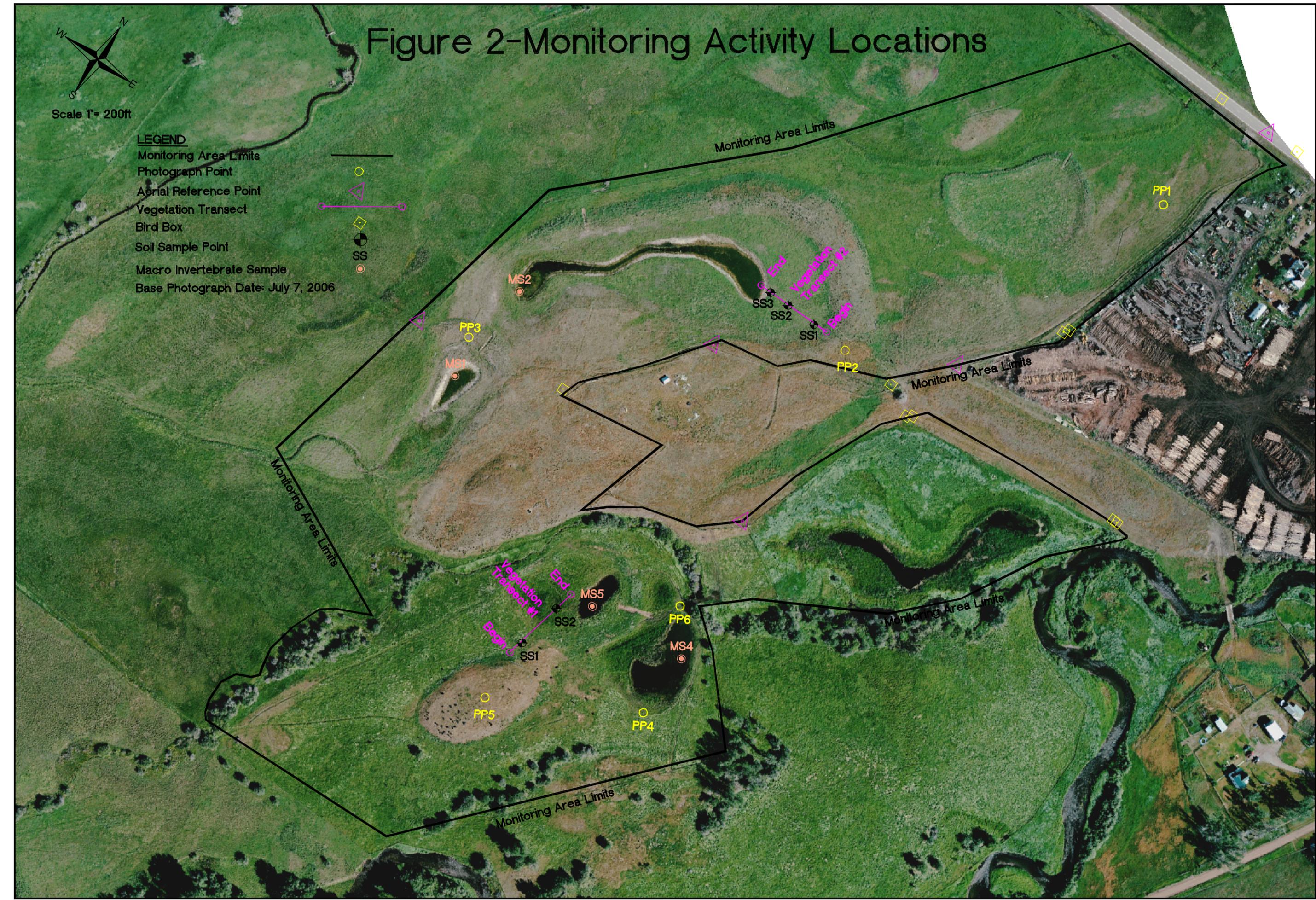
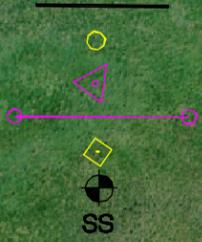
# Figure 2-Monitoring Activity Locations



Scale 1"= 200ft

## LEGEND

- Monitoring Area Limits
- Photograph Point
- Aerial Reference Point
- Vegetation Transect
- Bird Box
- Soil Sample Point
- Macro Invertebrate Sample
- Base Photograph Date: July 7, 2006



PROJECT NAME	MDT Peterson Wetland Mitigation		
DRAWING TITLE	Monitoring Activity Locations		
PROJECT NO:	E33054.118	DRAWN:	RAVLL
LOCATION:		PROJ MGR:	J.Berglund
SCALE:	1"=200'	CHECKED:	APPV:
FILE NAME:	L:\33054.118\ Peterson\dwg\Peterson2006.dwg		



# Figure 3-Mapped Site Features



Scale 1"= 200ft

### LEGEND

- Monitoring Area Limits
- Wetland Boundary
- Open Water Boundary
- Vegetation Community Boundary
- Base Photograph Date: July 7, 2006

Wetland Area  
 Gross Wetland 26.70 Acres  
 Open Water 3,4,5 -108 Acres  
 Upland Islands -2.88 Acres  
 Net Wetland Area 22.74 Acres

### Vegetation Types:

- ① Agrostis
- ② Agropyron
- ③ Salix
- ④ Eleocharis / Carex
- ⑤ Carex / Typha
- ⑥ Agrostis / Juncus
- ⑦ Carex / Alopecurus
- ⑧ Phleum / Agrostis
- ⑨ Typha/Eleocharis
- ⑩ Agrostis/Veronica
- ⑪ Veronica/Myriophyllum



PROJECT NAME: MDT Peterson Ranch Wetland Mitigation  
 DRAWING TITLE: Mapped Site Features

PROJ NO: B33054.118  
 LOCATION:  
 SCALE: 1"=200'  
 FILE NAME: L:\33054.118\ Peterson\dwg\ Peterson2006.dwg

DRAWN: RA/LL  
 PROJ MGR: JB  
 CHECKED:  
 APP'D:



LAND & WATER CONSULTING, INC. a/k/a LWC  
 P.O. BOX 6254  
 MISSOULA, MT 59807

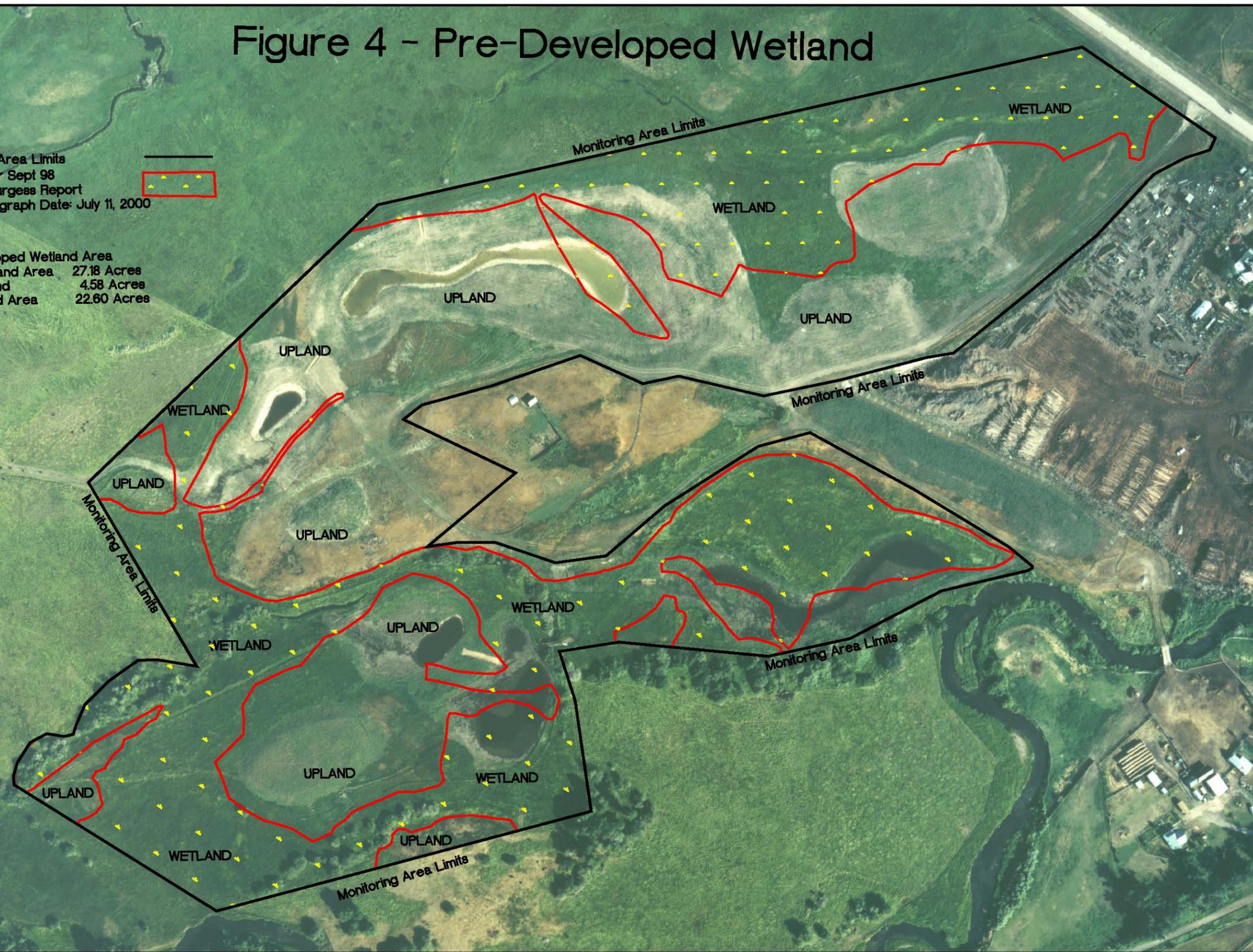
# Figure 4 - Pre-Developed Wetland



Scale 1"= 200ft

**LEGEND**  
 Monitoring Area Limits  
 Wetland per Sept 98  
 Carter - Burgess Report  
 Base Photograph Date: July 11, 2000

**Pre-Developed Wetland Area**  
 Gross Wetland Area 27.18 Acres  
 Upland Island 4.58 Acres  
 Net Wetland Area 22.60 Acres



PROJECT NAME <b>MDT Peterson Ranch Wetland Mitigation</b>	
DRAWING TITLE <b>Pre-Developed Wetland</b>	
PROJ NO: 330054.11B	DRAWN: RA
FILE NAME: TASK1\DBASE2004.dwg	CHECKED: GH
SCALE: 1"= 200ft	APPD: BD
LOCATION: Peterson Ranch	PROJ MGR: BD
SHEET NUMBER <b>F-4</b> OF 4	
REV - DATE: 6-24-05	

## **Appendix B**

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**2006 WETLAND MITIGATION SITE MONITORING FORMS**  
**2006 BIRD SURVEY FORM**  
**2006 COE WETLAND DELINEATION FORMS**  
**2006 FUNCTIONAL ASSESSMENT FORMS**

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*MDT Wetland Mitigation Monitoring*  
*Peterson Ranch*  
*Hall, Montana*

# LWC / MDT WETLAND MITIGATION SITE MONITORING FORM

Project Name: Peterson Ranch Project Number: 330054.00 0118 Assessment Date: 8/17/06  
 Location: E. of Hall MDT District: Upper Clark Fork Milepost:       
 Legal description: T 10 N R 13 W Section 35 Time of Day: Morning to Afternoon  
 Weather Conditions: Overcast & rainy Person(s) conducting the assessment: Greg Howard  
 Initial Evaluation Date: 7/31/02 Visit #: 12 Monitoring Year: 5  
 Size of evaluation area: 93 acres Land use surrounding wetland: Agriculture & forestry products

## HYDROLOGY

### Surface Water

Source: \_\_\_\_\_  
 Inundation: Present  Absent  Average depths: 1 ft Range of depths: 0-4 ft  
 Assessment area under inundation: 20-25 %  
 Depth at emergent vegetation-open water boundary: 1.0 ft  
 If assessment area is not inundated are the soils saturated w/in 12" of surface: Yes  No   
 Other evidence of hydrology on site (drift lines, erosion, stained vegetation etc.): Additional hydrology source from irrigation ditch to the E. of OW/pond # 3. Standing water backing up along ditch and draining into C.T. 9 and 7.

### Groundwater

Monitoring wells: Present \_\_\_\_\_ Absent   
 Record depth of water below ground surface

Well #	Depth	Well #	Depth	Well #	Depth

### Additional Activities Checklist:

- Map emergent vegetation-open water boundary on air photo
- 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:** Heavy disturbance near ponds 1 & 2 (Community Types 10 & 11) from livestock grazing. Higher water levels present in ponds 1 & 2, than in the previous monitoring year. Canada thistle (*Cirsium arvense*) located along N. boundary, not inside easement, but potential for seed dispersal into mitigation area. Standing water and flooding in area north of pond 5 within C.T. # 3 from partial blocked culvert. A new noxious weed identified on the site: oxeye daisy (*Chrysanthemum leucanthemum*)

## VEGETATION COMMUNITIES

Community No.: 1 Community Title (main species): Agrostis

Dominant Species	% Cover	Dominant Species	% Cover
<i>Agrostis alba</i>	50	<i>Typha latifolia</i>	T
<i>Carex nebrascensis</i>	10	<i>Scirpus acutus</i>	T
<i>Agropyron Trachycaulum</i>	P	<i>Hordeum jubatum</i>	P
<i>Potentilla anserine</i>	P	<i>Festuca pratensis</i>	10
<i>Trifolium pretense</i>	P	<i>Juncus balticus</i>	P

**COMMENTS/PROBLEMS:** Emergent vegetation type dominated by grasses and sedges.

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Community No.: 2 Community Title (main species): Agropyron

Dominant Species	% Cover	Dominant Species	% Cover
<i>Agropyron Trachycaulum</i>	50	<i>Malva neglecta</i>	P
<i>Agrostis alba</i>	20	<i>Thlaspi arvensis</i>	T
<i>Potentilla anserine</i>	P	<i>Achillea millefolium</i>	T
<i>Helianthus annuus</i>	T	<i>Alopecurus pratensis</i>	T
<i>Cirsium arvense</i>	T	<i>Taraxacum officinale</i>	P
<i>Chrysanthemum leucanthemum</i>	T		

**COMMENTS/PROBLEMS:** Dry slopes surrounding created ponds. Area dominated by upland grasses and some invasive species present. Areas heavily grazed during 2006, west side irrigation ditch. A new noxious weed, oxeye daisy (*Chrysanthemum leucanthemum*), identified within the community type along transect.

Community No.: 3 Community Title (main species): Salix

Dominant Species	% Cover	Dominant Species	% Cover
<i>Salix bebbiana</i>	50	<i>Geum macrophyllum</i>	T
<i>Crataegus douglasii</i>	50	<i>Cornus stolonifera</i>	P
<i>Ribes americanum</i>	P	<i>Salix geyeriana</i>	10
<i>Salix exigua</i>	10	<i>Agrostis alba</i>	10
<i>Carex utriculata</i>	20	<i>Populus trichocarpa</i>	10

**COMMENTS/PROBLEMS:** Scrub-shrub vegetation type located along existing side channel/irrigation ditch.

### Additional Activities Checklist:

Record and map vegetative communities on air photo

**VEGETATION COMMUNITIES (continued)**

Community No.: 4 Community Title (main species): Eleocharis/Carex

Dominant Species	% Cover	Dominant Species	% Cover
<i>Eleocharis Palustris</i>	40	<i>Agrostis alba</i>	20
<i>Carex nebrascensis</i>	P	<i>Juncus ensifolius</i>	P
<i>Typha latifolia</i>	20	<i>Potentilla anserina</i>	T
<i>Alopecurus pratensis</i>	10	<i>Beckmannia syzigachne</i>	P
<i>Polygonum amphibium</i>	T	<i>Glyceria striata</i>	T
<i>Juncus confuses</i>	P	<i>Juncus nodosus</i>	P

**COMMENTS/PROBLEMS:** Emergent vegetation type surrounding created OW/ponds # 4 & 5.

Community No.: 5 Community Title (main species): Carex/Typha

Dominant Species	% Cover	Dominant Species	% Cover
<i>Carex nebrascensis</i>	40		
<i>Typha latifolia</i>	20		
<i>Alopecurus pratensis</i>	30		

**COMMENTS/PROBLEMS:** Depressional wetlands found within areas of lower topography running across northwest corner of mitigation site. Hydrology source is groundwater & surface flow from irrigation water.

Community No.: 6 Community Title (main species): Agrostis/Juncus

Dominant Species	% Cover	Dominant Species	% Cover
<i>Agrostis alba</i>	30	<i>Alopecurus pratensis</i>	P
<i>Juncus Balticus</i>	40	<i>Carex nebrascensis</i>	P
<i>Phleum pretense</i>	10	<i>Rumex crispus</i>	T
<i>Trifolium pretense</i>	P		
<i>Agropyron repens</i>	P		

**COMMENTS/PROBLEMS:** Wetland meadow complex, located between drier upland slopes and emergent wetlands listed in Community Type 5. Vegetation fringe between upland and wetland areas, community type considered wetland.

**VEGETATION COMMUNITIES (continued)**

Community No.: 7 Community Title (main species): Carex/Alopecurus

Dominant Species	% Cover	Dominant Species	% Cover
<i>Carex utriculata</i>	50	<i>Juncus balticus</i>	P
<i>Alopecurus pratensis</i>	20	<i>Poa</i> spp.	T
<i>Veronica Americana</i>	P		

**COMMENTS/PROBLEMS:** Vegetation along irrigation ditch, emergent wetlands with no shrub coverage. Ditch and surrounding bottoms inundated, low flow present.

Community No.: 8 Community Title (main species): Phleum/Agrostis

Dominant Species	% Cover	Dominant Species	% Cover
<i>Phleum pretense</i>	P	<i>Typha latifolia</i>	10
<i>Agrostis alba</i>	30	<i>Scirpus acutus</i>	T
<i>Veronica Americana</i>	P	<i>Hordeum jubatum</i>	P
<i>Alopecurus pratensis</i>	30	<i>Glyceria striata</i>	P
<i>Juncus Balticus</i>	T	<i>Willow sprigs</i>	T
<i>Carex nebrascensis</i>	10	<i>Juncus mertensianus</i>	P
<i>Beckmannia syzigachne</i>	P	<i>Eleocharis palustris</i>	30

**COMMENTS/PROBLEMS:** Upper basin dominated by emergent wetlands with intermittent drainage into pond # 1. Wetland areas inundated. Hydrology source comes from irrigation ditch. Increase in emergent vegetation cover. Willow cuttings heavily browsed.

Community No.: 9 Community Title (main species): Typha / Eleocharis

Dominant Species	% Cover	Dominant Species	% Cover
<i>Typha latifolia</i>	70	<i>Potentilla anserina</i>	P
<i>Eleocharis palustris</i>	30	<i>Carex nebrascensis</i>	10
<i>Beckmannia syzigachne</i>	10	<i>Alopecurus pratensis</i>	P
<i>Agrostis alba</i>	P	<i>Glyceria striata</i>	P
<i>Veronica americana</i>	T	<i>Scirpus acutus</i>	P

**COMMENTS/PROBLEMS:** Emergent vegetation type located along the fringe of OW/pond # 3. Cattails expanding into OW/pond # 3 and along shoreline fringe.

Community No.: 10 Community Title (main species): Agrostis / Veronica

Dominant Species	% Cover	Dominant Species	% Cover
<i>Juncus mertensianus</i>	T	<i>Eleocharis palustris</i>	P
<i>Agrostis alba</i>	10	<i>Trifolium pratense</i>	T
<i>Veronica americana</i>	10	<i>Phleum pratense</i>	T
<i>Alopecurus pratensis</i>	10	<i>Epilobium ciliatum</i>	T
<i>Potentilla anserina</i>	P	<i>Hordeum jubatum</i>	T

**COMMENTS/PROBLEMS:** Emergent wetland type located along the fringe of pond # 2's standing water. Shallow open-water levels low, inundation ranging from 0.5 to 1.5 ft. Area heavily impacted from grazing. Decrease in overall vegetation coverage and development of wetland area.

**VEGETATION COMMUNITIES (continued)**

Community No.: 11 Community Title (main species): Veronica / Myriophyllum spicatum

Dominant Species	% Cover	Dominant Species	% Cover
<i>Veronica americana</i>	10	<i>Scirpus</i> spp.	P
<i>Typha latifolia</i>	10		
<i>Myriophyllum spicatum</i>	60		
<i>Eleocharis palustris</i>	P		

**COMMENTS/PROBLEMS:** Area heavily grazed along shoreline, vegetation cover mostly removed. Dirty water mostly dominated by Eurasian water-milfoil. Evidence of severe trampling and compaction along shoreline.

Community No.: Community Title (main species):

Dominant Species	% Cover	Dominant Species	% Cover

**COMMENTS/PROBLEMS:**

Community No.: Community Title (main species):

Dominant Species	% Cover	Dominant Species	% Cover

**COMMENTS/PROBLEMS:**

### Comprehensive Vegetation List

Species	Vegetation Community Number(s)	Species	Vegetation Community Number(s)
<i>Achillea millefolium</i>	2	<i>Juncus ensifolius</i>	4
<i>Agropyron repens</i>	2,6	<i>Juncus mertensianus</i>	10
<i>Agropyron smithii</i>	2	<i>Juncus nodosus</i>	4
<i>Agropyron trachycaulum</i>	2,6,10	<i>Kochia scoparia</i>	2
<i>Agrostis alba</i>	1,2,3,4,6,8,9,10	<i>Lepidium perfoliatum</i>	2
<i>Alopecurus pratensis</i>	2,4,5,7,8,9	<i>Lomatium spp.</i>	2
<i>Amaranthus retroflexus</i>	2	<i>Lychnis alba</i>	2
<i>Beckmannia syzigachne</i>	5,7,9	<i>Malva neglecta</i>	2
<i>Betula occidentalis</i>	3	<i>Medicago sativa</i>	2
<i>Bidens cernua</i>	4,6,8	<i>Mentha arvensis</i>	4,7
<i>Bromus inermis</i>	2	<i>Myriophyllum spicatum</i>	OW
<i>Bromus tectorum</i>	2	<i>Phalaris arundinaceae</i>	6,7,8
<i>Carduus nutans</i>	2	<i>Phleum pratense</i>	6,8,10
<i>Carex microptera</i>	6	<i>Plantago major</i>	2
<i>Carex nebrascensis</i>	1,4,5,8,9	<i>Poa ampla</i>	2
<i>Carex utriculata</i>	1,3,7	<i>Polygonum amphibium</i>	4
<i>Centaurea maculosa</i>	2	<i>Polygonum aviculare</i>	4
<i>Chenopodium album</i>	2	<i>Populus tremuloides</i>	3
<i>Chrysanthemum leucanthemum</i>	2	<i>Populus trichocarpa</i>	3
<i>Cirsium arvense</i>	2	<i>Potentilla anserina</i>	4,9,10
<i>Cornus stolonifera</i>	3	<i>Potentilla gracilis</i>	2
<i>Crataegus douglasii</i>	3	<i>Prunus virginiana</i>	2
<i>Cynoglossum officinale</i>	2	<i>Ribes aureum</i>	2
<i>Dactylis glomerata</i>	2	<i>Rosa woodsii</i>	2,3
<i>Descurainia sophia</i>	2	<i>Rumex crispus</i>	2
<i>Elaeagnus commutata</i>	2	<i>Salix bebbiana</i>	3
<i>Eleocharis palustris</i>	4,9	<i>Salix exigua</i>	3
<i>Elymus cinereus</i>	2	<i>Salix geyeriana</i>	3
<i>Elymus triticoides</i>	2	<i>Scirpus acutus</i>	1
<i>Epilobium ciliatum</i>	10	<i>Sisymbrium altissimum</i>	2
<i>Equisetum arvense</i>	2,4	<i>Sisyrinchium spp.</i>	2
<i>Festuca pratensis</i>	2	<i>Solidago missouriensis</i>	2
<i>Glyceria striata</i>	7,9	<i>Taraxacum officinale</i>	2,6
<i>Helianthus annuus</i>	2	<i>Thlaspi arvensis</i>	2
<i>Hordeum jubatum</i>	2	<i>Triglochin maritimum</i>	1,6,7
<i>Iris missouriensis</i>	4,7	<i>Trifolium pratense</i>	2
<i>Juncus balticus</i>	6,7	<i>Typha latifolia</i>	1,4,5,9,10
<i>Juncus confusus</i>	4	<i>Veronica americana</i>	1,4,7,10,11

**COMMENTS/PROBLEMS:** Two new species identified during 2006: blue-eyed grass (*Sisyrinchium spp.*) and oxeye daisy (*Chrysanthemum leucanthemum*).



**WILDLIFE / BIRDS**

(Attach Bird Survey Field Forms)

Were man made nesting structures installed? Yes x No      Type: Boxes How many? 10 Are the nesting structures being utilized? Yes x No      Do the nesting structures need repairs? Yes      No x

**MAMMALS AND HERPTILES**

Species	Number Observed	Indirect indication of use			
		Tracks	Scat	Burrows	Other
Deer	1	X			
Coyote			X		
Frogs	1				

**Additional Activities Checklist:**

X Macroinvertebrate sampling (if required)

**COMMENTS/PROBLEMS:** Four macro invertebrate samples were collected; OW/pond #'s 1, 2, 4 & 5.

## PHOTOGRAPHS

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

Checklist:

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

Location	Photo Frame #	Photograph Description	Compass Reading
1	1-3	Panoramic looking from south to north across the western half of the site.	180° – 0°
1	5	Looking northeast towards parcel boundary, lumber mill in background	90°
2	6	Looking southwest along vegetation transect no. 2.	225°
3	7 – 8	Looking north at the southern end of created wetland pond no.2.	0°
3	9 - 10	Looking west at emergent wetlands along fence line and beyond.	270°
3	11 - 12	Looking southeast at created wetland pond no. 1.	135°
4	13	Looking south across created wetland pond no 4.	180°
5	14	Looking north along vegetation transect no. 2 and created wetland no. 5.	0°
5	15	Looking north along vegetation transect no. 2 and created wetland no. 5.	0°
5	16	Looking northeast at created wetland no. 4	45°
5	17	Looking south at the top of upland spoil pile, view opposite of transect..	0°

### COMMENTS/PROBLEMS:

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## GPS SURVEYING

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

Checklist:

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

### COMMENTS/PROBLEMS:

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**WETLAND DELINEATION**

(Attach Corps of Engineers delineation forms)

At each site conduct the items on the checklist below:

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

**COMMENTS/PROBLEMS:**

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**FUNCTIONAL ASSESSMENT**

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

**COMMENTS/PROBLEMS:** Three distinct areas were evaluated separately; these assessment areas include ponds 1 & 2, scrub-shrub / emergent wetland types and OW/ponds 3, 4&5.

**MAINTENANCE**

Were man-made nesting structures installed at this site? YES  NO

If yes, do they need to be repaired? YES  NO

If yes, describe problems below and indicate if any actions were taken to remedy the problems.

Were man-made structures build or installed to impound water or control water flow into or out of the wetland? YES  NO

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

If no, describe the problems below.

**COMMENTS/PROBLEMS:**

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**MDT WETLAND MONITORING – VEGETATION TRANSECT (continued)**

Site: Ponds no. 4 Date: 8/17/06 Examiner: Greg Howard Transect # 1

Approx. transect length: 222 ft. Compass Direction from Start (Upland): North (0°)

<b>Vegetation type 1:</b>		Agropyron (Community No. 2)
Length of transect in this type:	138 ft.	feet
Species:		Cover:
Agropyron trachycaulum		10
Bromus inermis		P
Poa pratensis		20
Trifolium pratense		T
Agrostis alba		P
Agropyron repens		10
Taraxacum officinale		P
Juncus balticus		P
Total Vegetative Cover:		50%

<b>Vegetation type 2:</b>		Eleocharis/Carex (Community No. 4)
Length of transect in this type:	84 ft.	feet
Species:		Cover:
Carex nebrascensis		10
Eleocharis palustris		30
Potentilla anserina		T
Alopecurus pratensis		20
Polygonum amphibium		T
Agrostis alba		10
Glyceria striata		P
Beckmannia syzigachne		P
Typha latifolia		10
Juncus ensifolius		P
Total Vegetative Cover:		70%

<b>Vegetation type 3:</b>		
Length of transect in this type:		feet
Species:		Cover:
Total Vegetative Cover:		

<b>Vegetation type 4:</b>		
Length of transect in this type:		feet
Species:		Cover:
Total Vegetative Cover:		

**MDT WETLAND MONITORING – VEGETATION TRANSECT**

Site: Pond no. 2 Date: 8/17/06 Examiner: Greg Howard Transect # 2

Approx. transect length: 195 ft. Compass Direction from Start (Upland): 270

<b>Vegetation type 1:</b>		Agropyron (Community No. 2)
Length of transect in this type:	185 ft.	feet
Species:		Cover:
Agropyron trachycaulum		20
Agropyron repens		10
Agrostis alba		40
Potentilla anserina		P
Trifolium pratense		10
Chrysanthemum leucanthemum		T
Cirsium arvense		T
Phleum pratense		P
Poa pratensis		P
Medicago sativa		P
Total Vegetative Cover:		85%

<b>Vegetation type 2:</b>		Agrostis / Veronica (Community No. 10)
Length of transect in this type:	10 ft.	feet
Species:		Cover:
Agrostis alba		P
Agropyron trachycaulum		10
Hordeum jubatum		T
Veronica americana		T
Alopecurus pratensis		T
Beckmannia syzigachne		T
Total Vegetative Cover:		15%

<b>Vegetation type 3:</b>		
Length of transect in this type:		feet
Species:		Cover:
Total Vegetative Cover:		

<b>Vegetation type 4:</b>		
Length of transect in this type:		feet
Species:		Cover:
Total Vegetative Cover:		

MDT WETLAND MONITORING – VEGETATION TRANSECT (back of form)

**Cover Estimate**

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

**Indicator Class:**

+ = Obligate  
- = Facultative/Wet  
0 = Facultative

**Source:**

P = Planted  
V = Volunteer

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

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

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

Notes:








### SOILS

Map Unit Name	Blossberg loam, 0 to 4 percent slopes	Drainage Class:	<u>Poorly drained</u>
(Series and Phase):	_____	Field Observations	_____
Taxonomy (Subgroup):	_____	Confirm Mapped Type?	_____ Yes <u>x</u> No

Profile Description:					
Depth inches	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0 - 8+	A	10 YR 2/1	--	--	Sandy clay, fine to medium gravels, large cobbles

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

Low-chroma color is present, but not considered wetland soils.

### WETLAND DETERMINATION

Hydrophytic Vegetation Present? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Wetland Hydrology Present? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Hydric Soils Present? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Is this Sampling Point Within a Wetland? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
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Remarks:  
 Sampling point is considered within upland.

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

Project/Site: <u>Peterson Ranch</u> Applicant/Owner: <u>MDT</u> Investigator: <u>Greg Howard</u>	Date: <u>8/17/06</u> County: <u>Granite</u> State: <u>MT</u>
Do Normal Circumstances exist on the site: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Is the site significantly disturbed (Atypical Situation)? <input type="checkbox"/> Yes <input type="checkbox"/> No Is the area a potential Problem Area?: <input type="checkbox"/> Yes <input type="checkbox"/> No (If needed, explain on reverse.)	Community ID: _____ Transect ID: <u>1- OW/pool # 4</u> Plot ID: <u>2</u>

**VEGETATION**

	Dominant Plant Species	Stratum	Indicator
1	<u>Carex nebrascensis</u>	<u>H</u>	<u>OBL</u>
2	<u>Eleocharis palustris</u>	<u>H</u>	<u>OBL</u>
3	<u>Typha latifolia</u>	<u>H</u>	<u>OBL</u>
4	<u>Potentilla anserina</u>	<u>H</u>	<u>OBL</u>
5	<u>Alopecurus pratensis</u>	<u>H</u>	<u>FACW</u>
6	<u>Juncus ensifolius</u>	<u>H</u>	<u>FACW</u>
7	<u>Agrostis alba</u>	<u>H</u>	<u>FAC+</u>
8	<u>Beckmannia syzigachne</u>	<u>H</u>	<u>OBL</u>
9	_____	_____	_____
10	_____	_____	_____
11	_____	_____	_____
12	_____	_____	_____
13	_____	_____	_____
14	_____	_____	_____
15	_____	_____	_____
16	_____	_____	_____

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-).                    8/8 = 100%

Area dominated by hydrophytic vegetation.

**HYDROLOGY**

<input type="checkbox"/> Recorded Data (Describe in Remarks): <input type="checkbox"/> Stream, Lake, or Tide Gauge <input type="checkbox"/> Aerial Photographs <input type="checkbox"/> Other <input checked="" type="checkbox"/> No Recorded Data Available	Wetland Hydrology Indicators: Primary Indicators: <input type="checkbox"/> Inundated <input checked="" type="checkbox"/> Saturated in Upper 12 Inches <input type="checkbox"/> Water Marks <input type="checkbox"/> Drift Lines <input type="checkbox"/> Sediment Deposits <input type="checkbox"/> Drainage Patterns in Wetlands Secondary Indicators (2 or more required): <input type="checkbox"/> Oxidized Root Channels in Upper 12 Inches <input type="checkbox"/> Water-Stained Leaves <input type="checkbox"/> Local Soil Survey Data <input type="checkbox"/> FAC-Neutral Test <input type="checkbox"/> Other (Explain in Remarks)
Field Observations:  Depth of Surface Water: <u>      -      </u> (in.)  Depth to Free Water in Pit: <u>      -      </u> (in.)  Depth to Saturated Soil: <u>      0      </u> (in.)	
Remarks: Hydrologic indicator present with saturated soils to ground surface.	

### SOILS

Map Unit Name		Blossberg loam, 0 to 4 percent slopes		Drainage Class: <u>    </u> Poorly drained	
(Series and Phase):		_____		Field Observations	
Taxonomy (Subgroup):		_____		Confirm Mapped Type? <u>  x  </u> Yes <u>    </u> No	
<b>Profile Description:</b>					
Depth inches	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0 – 6	A1	10 YR 2/1	-	-	Clay loam
6 – 12+	A2	10 YR 2/1	2.5 YR 3/6-	Few / Faint-	Clay
<b>Hydric Soil Indicators:</b>					
_____ Histosol		_____ Concretions			
_____ Histic Epipedon		_____ High Organic Content in surface Layer in Sandy Soils			
_____ Sulfidic Odor		_____ Organic Streaking in Sandy Soils			
_____ Aquic Moisture Regime		<u>  x  </u> Listed on Local Hydric Soils List			
_____ Reducing Conditions		_____ Listed on National Hydric Soils List			
<u>  X  </u> Gleyed or Low-Chroma Colors		_____ Other (Explain in Remarks)			
Hydric soil indicators present with low-chroma colors and mottles. Mapped soils listed as hydric in Granite County Soil survey.					

### WETLAND DETERMINATION

Hydrophytic Vegetation Present? <u>  X  </u> Yes <u>    </u> No	Is this Sampling Point Within a Wetland? <u>  X  </u> Yes <u>    </u> No
Wetland Hydrology Present? <u>  X  </u> Yes <u>    </u> No	
Hydric Soils Present? <u>  X  </u> Yes <u>    </u> No	
Remarks: Sampling point considered within a wetland.	

Approved by HQUSACE 2/92



**SOILS**

Map Unit Name	Nythar-Flintcreek Complex, 0 to 4 percent slopes	Drainage Class:	Very poorly drained
(Series and Phase):	_____	Field Observations	_____
Taxonomy (Subgroup):	_____	Confirm Mapped Type?	_____ Yes <u>  x  </u> No

Profile Description:					
Depth inches	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0 – 2.5	O	10 YR 3/2	-	-	Roots & organic w/loam
2.5 – 10+	A	10 YR 3/1	-	-	Clay

Large cobbles 4-6 inches in wide.

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

Low chroma-colors present, no other evidence of hydric soils. Soils for this area listed as hydric, but characteristics in sampling pit do not reflect mapped type. Likely, alteration due to construction efforts.

**WETLAND DETERMINATION**

Hydrophytic Vegetation Present? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Wetland Hydrology Present? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Hydric Soils Present? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Is this Sampling Point Within a Wetland? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
--	--

Remarks:  
 Sampling point considered within an upland area.

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

Project/Site: <u>Peterson Ranch</u> Applicant/Owner: <u>MDT</u> Investigator: <u>Greg Howard</u>	Date: <u>8/17/06</u> County: <u>Granite</u> State: <u>MT</u>
Do Normal Circumstances exist on the site: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Is the site significantly disturbed (Atypical Situation)? <input type="checkbox"/> Yes <input type="checkbox"/> No Is the area a potential Problem Area?: <input type="checkbox"/> Yes <input type="checkbox"/> No (If needed, explain on reverse.)	Community ID: _____ Transect ID: <u>2 - Pool # 2</u> Plot ID: <u>2</u>

**VEGETATION**

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1	<u>Agropyron trachycaulum</u>	<u>H</u>	<u>FAC</u>	9			
2	<u>Agrostis alba</u>	<u>H</u>	<u>FAC+</u>	10			
3	<u>Hordeum jubatum</u>	<u>H</u>	<u>FAC+</u>	11			
4	<u>Veronica americana</u>	<u>H</u>	<u>OBL</u>	12			
5	<u>Alopecurus pratensis</u>	<u>H</u>	<u>FACW</u>	13			
6	<u>Beckmannia syzigachne</u>	<u>H</u>	<u>OBL</u>	14			
7				15			
8				16			

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-).      6/6 = 100%

Area dominated by marginal wetland vegetation. Site heavily impacted from livestock grazing.

**HYDROLOGY**

<u> </u> Recorded Data (Describe in Remarks): <u> </u> Stream, Lake, or Tide Gauge <u> </u> Aerial Photographs <u> </u> Other <input checked="" type="checkbox"/> No Recorded Data Available	Wetland Hydrology Indicators: <b>Primary Indicators:</b> <input type="checkbox"/> Inundated <input checked="" type="checkbox"/> Saturated in Upper 12 Inches <input type="checkbox"/> Water Marks <input type="checkbox"/> Drift Lines <input type="checkbox"/> Sediment Deposits <input type="checkbox"/> Drainage Patterns in Wetlands <b>Secondary Indicators (2 or more required):</b> <input type="checkbox"/> Oxidized Root Channels in Upper 12 Inches <input type="checkbox"/> Water-Stained Leaves <input type="checkbox"/> Local Soil Survey Data <input type="checkbox"/> FAC-Neutral Test <input type="checkbox"/> Other (Explain in Remarks)
Field Observations:  Depth of Surface Water:      _____ (in.)  Depth to Free Water in Pit:    _____ (in.)  Depth to Saturated Soil: <u>5</u> (in.)	
Hydrology indicator present with saturated soils to ground surface.	

### SOILS

Map Unit Name	Nythar-Flintcreek Complex, 0 to 4 percent slopes	Drainage Class:	Very poorly drained		
(Series and Phase):	_____	Field Observations	_____		
Taxonomy (Subgroup):	_____	Confirm Mapped Type?	_____ Yes <input checked="" type="checkbox"/> No		
<b>Profile Description:</b>					
Depth inches	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0 – 6	A	10 YR 3/2	-	-	Clay loam
6 – 12+	B	10 YR 4/2	-	-	Sandy clay
<b>Hydric Soil Indicators:</b>					
<input type="checkbox"/>	Histosol	<input type="checkbox"/>	Concretions		
<input type="checkbox"/>	Histic Epipedon	<input type="checkbox"/>	High Organic Content in surface Layer in Sandy Soils		
<input type="checkbox"/>	Sulfidic Odor	<input type="checkbox"/>	Organic Streaking in Sandy Soils		
<input type="checkbox"/>	Aquic Moisture Regime	<input checked="" type="checkbox"/>	Listed on Local Hydric Soils List		
<input type="checkbox"/>	Reducing Conditions	<input type="checkbox"/>	Listed on National Hydric Soils List		
<input checked="" type="checkbox"/>	Gleyed or Low-Chroma Colors	<input type="checkbox"/>	Other (Explain in Remarks)		
Some evidence of hydric soil conditions with low-chroma colors. Soils listed as hydric on the local NRCS Soil survey.					

### WETLAND DETERMINATION

Hydrophytic Vegetation Present? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Is this Sampling Point Within a Wetland? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Wetland Hydrology Present? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Hydric Soils Present? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
<b>Remarks:</b> Sampling point considered within a wetland area. The sampling area is located near the fringe of shallow standing water and shoreline. Observations made during 2006 monitoring, show area heavily impacted from livestock grazing.	

Approved by HQUSACE 2/92



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

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

- Primary or Critical habitat (list species)  D  S \_\_\_\_\_
- Secondary habitat (list species)  D  S \_\_\_\_\_
- Incidental habitat (list species)  D  S Bald Eagle
- 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 & Rating	---	---	---	---	---	.3 (L)	---

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

**14B. HABITAT FOR PLANTS AND ANIMALS RATED AS S1, S2, OR S3 BY THE MONTANA NATURAL HERITAGE PROGRAM.**

Do not include species listed in 14A(i).

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

- Primary or Critical habitat (list species)  D  S \_\_\_\_\_
- Secondary habitat (list species)  D  S \_\_\_\_\_
- Incidental habitat (list species)  D  S \_\_\_\_\_
- No usable habitat  D  S \_\_\_\_\_

ii. Rating: Based on the strongest habitat chosen in 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 & Rating	---	---	---	---	---	---	0 (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 the AA attribute to determine the exceptional (E), high (H), moderate (M), or low (L) rating. Structural diversity is from 13. For class cover to be considered evenly distributed, vegetated classes must be within 20% of each other in terms of their percent composition in the AA (see 10). Duration of Surface Water: P/P = permanent/perennial; S/I = seasonal/intermittent; T/E = temporary/ephemeral; A = absent.

Structural Diversity (from 13)	<input type="checkbox"/> High								<input checked="" type="checkbox"/> Moderate								<input type="checkbox"/> Low			
	<input type="checkbox"/> Even				<input type="checkbox"/> Uneven				<input type="checkbox"/> Even				<input checked="" type="checkbox"/> Uneven				<input type="checkbox"/> Even			
Class Cover Distribution (all vegetated classes)	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
Duration of Surface Water in ≥ 10% of AA																				
Low disturbance at AA (see 12)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Moderate disturbance at AA (see 12)	--	--	--	--	--	--	--	--	--	--	--	--	H	--	--	--	--	--	--	--
High disturbance at AA (see 12)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

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

Evidence of Wildlife Use from 14C(i)	Wildlife Habitat Features Rating from 14C(ii)			
	<input type="checkbox"/> Exceptional	<input checked="" type="checkbox"/> High	<input type="checkbox"/> Moderate	<input type="checkbox"/> Low
Substantial	--	--	--	--
Moderate	--	.7 (M)	--	--
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 or 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 determine the quality rating of exceptional (E), high (H), moderate (M), or low (L).

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

**ii. Modified Habitat Quality:** Is fish use of the AA precluded or significantly reduced by a culvert, dike, other man-made structure or activity or is the waterbody included on the 'MDEQ list of waterbodies in need of TMDL development' with 'Probable Impaired Uses' listed as cold or warm water fishery or aquatic life support?

Y  N If yes, reduce the rating from 14D(i) by one level and check the modified habitat quality rating:  E  H  M  L

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

Types of Fish Known or Suspected within AA	Modified Habitat Quality from 14D(ii)			
	<input type="checkbox"/> Exceptional	<input type="checkbox"/> High	<input type="checkbox"/> Moderate	<input type="checkbox"/> Low
Native game fish	--	--	--	--
Introduced game fish	--	--	--	--
Non-game fish	--	--	--	--
No fish	--	--	--	--

Comments: \_\_\_\_\_

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

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

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

Estimated wetland area in AA subject to periodic flooding	<input type="checkbox"/> ≥ 10 acres			<input checked="" type="checkbox"/> <10, >2 acres			<input type="checkbox"/> ≤2 acres		
	75%	25-75%	<25%	75%	25-75%	<25%	75%	25-75%	<25%
% of flooded wetland classified as forested, scrub/shrub, or both									
AA contains no outlet or restricted outlet	--	--	--	--	--	.5 (M)	--	--	--
AA contains unrestricted outlet	--	--	--	--	--	--	--	--	--

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

Y  N Comments: Low percent of scrub-shrub class. AA does not contain a restricted outlet.

**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, then 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.

P/P = permanent/perennial; S/I = seasonal/intermittent; T/E = temporary/ephemeral.

Estimated maximum acre feet of water contained in wetlands within the AA that are subject to periodic flooding or ponding.	<input type="checkbox"/> >5 acre feet			<input checked="" type="checkbox"/> <5, >1 acre feet			<input type="checkbox"/> ≤1 acre foot		
	P/P	S/I	T/E	P/P	S/I	T/E	P/P	S/I	T/E
Duration of surface water at wetlands within the AA									
Wetlands in AA flood or pond ≥ 5 out of 10 years	--	--	--	.8 (H)	--	--	--	--	--
Wetlands in AA flood or pond < 5 out of 10 years	--	--	--	--	--	--	--	--	--

Comments: Ponds with a high capacity to contain flood waters during seasonal flooding of Flint Creek.

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

Applies to wetlands with the 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.			
	<input type="checkbox"/> ≥ 70%		<input checked="" type="checkbox"/> < 70%		<input type="checkbox"/> ≥ 70%		<input type="checkbox"/> < 70%	
% cover of wetland vegetation in AA	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Evidence of flooding or ponding in AA								
AA contains no or restricted outlet	--	--	.7 (M)	--	--	--	--	--
AA contains unrestricted outlet	--	--	--	--	--	--	--	--

Comments: Low percent of vegetative cover around ponds.

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

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

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

% Cover of wetland streambank or shoreline by species with deep, binding rootmasses.	Duration of Surface Water Adjacent to Rooted Vegetation		
	<input checked="" type="checkbox"/> Permanent / Perennial	<input type="checkbox"/> Seasonal / Intermittent	<input type="checkbox"/> Temporary / Ephemeral
≥ 65 %	--	--	--
35-64 %	--	--	--
< 35 %	.3 (L)	--	--

**Comments:** Low vegetative cover along shoreline.

**14I. PRODUCTION EXPORT / FOOD CHAIN SUPPORT**

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

A = acreage of vegetated component in the AA. B = structural diversity rating from #13. C = Yes (Y) or No (N) as to whether or not the AA contains a surface or subsurface outlet. P/P = permanent/perennial; S/I = seasonal/intermittent; T/E/A= temporary/ephemeral/absent.

A	<input checked="" type="checkbox"/> Vegetated component >5 acres						<input type="checkbox"/> Vegetated component 1-5 acres						<input type="checkbox"/> Vegetated component <1 acre					
B	<input type="checkbox"/> High		<input checked="" type="checkbox"/> Moderate		<input type="checkbox"/> Low		<input type="checkbox"/> High		<input type="checkbox"/> Moderate		<input type="checkbox"/> Low		<input type="checkbox"/> High		<input type="checkbox"/> Moderate		<input type="checkbox"/> Low	
C	<input type="checkbox"/> Y	<input type="checkbox"/> N	<input checked="" type="checkbox"/> Y	<input type="checkbox"/> N	<input type="checkbox"/> Y	<input type="checkbox"/> N	<input type="checkbox"/> Y	<input type="checkbox"/> N	<input type="checkbox"/> Y	<input type="checkbox"/> N	<input type="checkbox"/> Y	<input type="checkbox"/> N	<input type="checkbox"/> Y	<input type="checkbox"/> N	<input type="checkbox"/> Y	<input type="checkbox"/> N	<input type="checkbox"/> Y	<input type="checkbox"/> N
P/P	--	--	.9H	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
S/I	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
T/E/A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

**Comments:** \_\_\_\_\_

**14J. GROUNDWATER DISCHARGE / RECHARGE (DR)** (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 slope.
- 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 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:** High groundwater table; irrigation influenced and subsurface flow through alluvial materials.

**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.		
	<input type="checkbox"/> rare	<input type="checkbox"/> common	<input type="checkbox"/> abundant	<input type="checkbox"/> rare	<input type="checkbox"/> common	<input type="checkbox"/> abundant	<input type="checkbox"/> rare	<input checked="" type="checkbox"/> common	<input type="checkbox"/> abundant
Estimated Relative Abundance from 11									
<b>Low</b> disturbance at AA (12i)	--	--	--	--	--	--	--	--	--
<b>Moderate</b> disturbance at AA (12i)	--	--	--	--	--	--	--	.3L	--
<b>High</b> disturbance at AA (12i)	--	--	--	--	--	--	--	--	--

**Comments:** \_\_\_\_\_

**14L. RECREATION / EDUCATION POTENTIAL**

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

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

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

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

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

Ownership	Disturbance at AA from 12(i)		
	<input type="checkbox"/> Low	<input checked="" type="checkbox"/> Moderate	<input type="checkbox"/> High
Public ownership	--	--	--
Private ownership	--	.3(L)	--

**Comments:** \_\_\_\_\_

**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	low	0.30	1	
B. MT Natural Heritage Program Species Habitat	low	0.00	1	
C. General Wildlife Habitat	moderate	0.70	1	
D. General Fish/Aquatic Habitat	N/A		--	
E. Flood Attenuation	moderate	0.50	1	
F. Short and Long Term Surface Water Storage	high	0.80	1	
G. Sediment/Nutrient/Toxicant Removal	moderate	0.70	1	
H. Sediment/Shoreline Stabilization	low	0.30	1	
I. Production Export/Food Chain Support	high	0.90	1	
J. Groundwater Discharge/Recharge	high	1.00	1	
K. Uniqueness	low	0.30	1	
L. Recreation/Education Potential	low	0.30	1	
<b>Total:</b>		<b><u>5.80</u></b>	<b><u>11.00</u></b>	_____
<b>Percent of Total Possible Points:</b>			<b><u>53%</u></b> (Actual / Possible) x 100 [rd to nearest whole #]	

<p><b>Category I Wetland:</b> (Must satisfy <b>one</b> of the following criteria. If not satisfied, proceed to Category II.)</p> <p><input type="checkbox"/> Score of 1 functional point for Listed/Proposed Threatened or Endangered Species; <b>or</b></p> <p><input type="checkbox"/> Score of 1 functional point for Uniqueness; <b>or</b></p> <p><input type="checkbox"/> Score of 1 functional point for Flood Attenuation <b>and</b> answer to Question 14E(ii) is "yes"; <b>or</b></p> <p><input type="checkbox"/> Percent of total Possible Points is &gt; 80%.</p>
<p><b>Category II Wetland:</b> (Criteria for Category I not satisfied <b>and</b> meets any <b>one</b> of the following Category II criteria. If not satisfied, proceed to Category IV.)</p> <p><input type="checkbox"/> Score of 1 functional point for Species Rated S1, S2, or S3 by the MT Natural Heritage Program; <b>or</b></p> <p><input type="checkbox"/> Score of .9 or 1 functional point for General Wildlife Habitat; <b>or</b></p> <p><input type="checkbox"/> Score of .9 or 1 functional point for General Fish/Aquatic Habitat; <b>or</b></p> <p><input type="checkbox"/> "High" to "Exceptional" ratings for <b>both</b> General Wildlife Habitat <b>and</b> General Fish / Aquatic Habitat; <b>or</b></p> <p><input type="checkbox"/> Score of .9 functional point for Uniqueness; <b>or</b></p> <p><input type="checkbox"/> Percent of total possible points is &gt; 65%.</p>
<p><input checked="" type="checkbox"/> <b>Category III Wetland:</b> (Criteria for Categories I, II, or IV not satisfied.)</p>
<p><b>Category IV Wetland:</b> (Criteria for Categories I or II are not satisfied <b>and</b> <u>all</u> of the following criteria are met; If not satisfied, return to Category III.)</p> <p><input type="checkbox"/> "Low" rating for Uniqueness; <b>and</b></p> <p><input type="checkbox"/> "Low" rating for Production Export / Food Chain Support; <b>and</b></p> <p><input type="checkbox"/> Percent of total possible points is &lt; 30%.</p>

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

**I**     
 **II**     
 **III**     
 **IV**



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

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

- Primary or Critical habitat (list species)  D  S \_\_\_\_\_
- Secondary habitat (list species)  D  S \_\_\_\_\_
- Incidental habitat (list species)  D  S Bald Eagle
- 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 & Rating	---	---	---	---	.5 (L)	---	---

If documented, list the source (e.g., observations, records, etc.): Bald Eagle observed on site during 2004 spring monitoring.

**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 Bobolink
- Incidental habitat (list species)  D  S Olive-sided flycatcher
- No usable habitat  D  S \_\_\_\_\_

ii. 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 & Rating	---	---	.7 (M)	---	---	---	---

If documented, list the source (e.g., observations, records, etc.): Bobolink identified during spring birding trip.

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

Structural Diversity (from 13)	<input type="checkbox"/> High								<input checked="" type="checkbox"/> Moderate								<input type="checkbox"/> Low			
	<input type="checkbox"/> Even				<input type="checkbox"/> Uneven				<input type="checkbox"/> Even				<input checked="" type="checkbox"/> Uneven				<input type="checkbox"/> Even			
Class Cover Distribution (all vegetated classes)	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
Duration of Surface Water in ≥ 10% of AA																				
Low disturbance at AA (see 12)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Moderate disturbance at AA (see 12)	--	--	--	--	--	--	--	--	--	--	--	--	H	--	--	--	--	--	--	--
High disturbance at AA (see 12)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

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

Evidence of Wildlife Use from 14C(i)	Wildlife Habitat Features Rating from 14C(ii)			
	<input type="checkbox"/> Exceptional	<input checked="" type="checkbox"/> High	<input type="checkbox"/> Moderate	<input type="checkbox"/> Low
Substantial	--	--	--	--
Moderate	--	.7 (M)	--	--
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 or 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 determine the quality rating of exceptional (E), high (H), moderate (M), or low (L).

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

**ii. Modified Habitat Quality:** Is fish use of the AA precluded or significantly reduced by a culvert, dike, other man-made structure or activity or is the waterbody included on the 'MDEQ list of waterbodies in need of TMDL development' with 'Probable Impaired Uses' listed as cold or warm water fishery or aquatic life support?

Y      N     If yes, reduce the rating from 14D(i) by one level and check the modified habitat quality rating:      E      H      M      L

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

Types of Fish Known or Suspected within AA	Modified Habitat Quality from 14D(ii)			
	<input type="checkbox"/> Exceptional	<input type="checkbox"/> High	<input type="checkbox"/> Moderate	<input type="checkbox"/> Low
Native game fish	--	--	--	--
Introduced game fish	--	--	--	--
Non-game fish	--	--	--	--
No fish	--	--	--	--

Comments: \_\_\_\_\_

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

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

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

Estimated wetland area in AA subject to periodic flooding	<input type="checkbox"/> ≥ 10 acres			<input type="checkbox"/> <10, >2 acres			<input checked="" type="checkbox"/> ≤2 acres		
	75%	25-75%	<25%	75%	25-75%	<25%	75%	25-75%	<25%
% of flooded wetland classified as forested, scrub/shrub, or both									
AA contains no outlet or restricted outlet	--	--	--	--	--	--	--	.3 (L)	--
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: Channel is restricted due to several beaver dams and accumulated debris.

**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, then 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.

P/P = permanent/perennial; S/I = seasonal/intermittent; T/E = temporary/ephemeral.

Estimated maximum acre feet of water contained in wetlands within the AA that are subject to periodic flooding or ponding.	<input type="checkbox"/> >5 acre feet			<input checked="" type="checkbox"/> <5, >1 acre feet			<input type="checkbox"/> ≤1 acre foot		
	P/P	S/I	T/E	P/P	S/I	T/E	P/P	S/I	T/E
Duration of surface water at wetlands within the AA									
Wetlands in AA flood or pond ≥ 5 out of 10 years	--	--	--	.8 (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 the 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.			
	<input checked="" type="checkbox"/> ≥ 70%		<input type="checkbox"/> < 70%		<input type="checkbox"/> ≥ 70%		<input type="checkbox"/> < 70%	
% cover of wetland vegetation in AA	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Evidence of flooding or ponding in AA								
AA contains no or restricted outlet	1 (H)	--	--	--	--	--	--	--
AA contains unrestricted outlet	--	--	--	--	--	--	--	--

Comments: High percentage of vegetative cover from mature willow community.

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

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

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

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

**Comments:** Mature willows with deep binding root system along irrigation ditch.

**14I. PRODUCTION EXPORT / FOOD CHAIN SUPPORT**

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

A = acreage of vegetated component in the AA. B = structural diversity rating from #13. C = Yes (Y) or No (N) as to whether or not the AA contains a surface or subsurface outlet. P/P = permanent/perennial; S/I = seasonal/intermittent; T/E/A= temporary/ephemeral/absent.

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

**Comments:** \_\_\_\_\_

**14J. GROUNDWATER DISCHARGE / RECHARGE (DR)** (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 slope.
- 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 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:** High groundwater table; irrigation influenced and subsurface flow through alluvial materials.

**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.		
	<input type="checkbox"/> rare	<input type="checkbox"/> common	<input type="checkbox"/> abundant	<input type="checkbox"/> rare	<input type="checkbox"/> common	<input type="checkbox"/> abundant	<input type="checkbox"/> rare	<input checked="" type="checkbox"/> common	<input type="checkbox"/> abundant
Estimated Relative Abundance from 11									
<b>Low</b> disturbance at AA (12i)	--	--	--	--	--	--	--	--	--
<b>Moderate</b> disturbance at AA (12i)	--	--	--	--	--	--	--	.3L	--
<b>High</b> disturbance at AA (12i)	--	--	--	--	--	--	--	--	--

**Comments:** \_\_\_\_\_

**14L. RECREATION / EDUCATION POTENTIAL**

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

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

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

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

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

Ownership	Disturbance at AA from 12(i)		
	<input type="checkbox"/> Low	<input checked="" type="checkbox"/> Moderate	<input type="checkbox"/> High
Public ownership	--	--	--
Private ownership	--	.3(L)	--

**Comments:** \_\_\_\_\_

## 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	low	0.50	1	
B. MT Natural Heritage Program Species Habitat	moderate	0.70	1	
C. General Wildlife Habitat	moderate	0.70	1	
D. General Fish/Aquatic Habitat	N/A		--	
E. Flood Attenuation	low	0.30	1	
F. Short and Long Term Surface Water Storage	high	0.80	1	
G. Sediment/Nutrient/Toxicant Removal	high	1.00	1	
H. Sediment/Shoreline Stabilization	high	1.00	1	
I. Production Export/Food Chain Support	high	0.80	1	
J. Groundwater Discharge/Recharge	high	1.00	1	
K. Uniqueness	low	0.30	1	
L. Recreation/Education Potential	low	0.30	1	
<b>Total:</b>		<b><u>7.40</u></b>	<b><u>11.00</u></b>	_____
<b>Percent of Total Possible Points:</b>		<b><u>67%</u></b> (Actual / Possible) x 100 [rd to nearest whole #]		

<p><b>Category I Wetland:</b> (Must satisfy <b>one</b> of the following criteria. If not satisfied, proceed to Category II.)</p> <p><input type="checkbox"/> Score of 1 functional point for Listed/Proposed Threatened or Endangered Species; <b>or</b></p> <p><input type="checkbox"/> Score of 1 functional point for Uniqueness; <b>or</b></p> <p><input type="checkbox"/> Score of 1 functional point for Flood Attenuation <b>and</b> answer to Question 14E(ii) is "yes"; <b>or</b></p> <p><input type="checkbox"/> Percent of total Possible Points is &gt; 80%.</p>
<p><b>Category II Wetland:</b> (Criteria for Category I not satisfied <b>and</b> meets any <b>one</b> of the following Category II criteria. If not satisfied, proceed to Category IV.)</p> <p><input type="checkbox"/> Score of 1 functional point for Species Rated S1, S2, or S3 by the MT Natural Heritage Program; <b>or</b></p> <p><input type="checkbox"/> Score of .9 or 1 functional point for General Wildlife Habitat; <b>or</b></p> <p><input type="checkbox"/> Score of .9 or 1 functional point for General Fish/Aquatic Habitat; <b>or</b></p> <p><input type="checkbox"/> "High" to "Exceptional" ratings for <b>both</b> General Wildlife Habitat <b>and</b> General Fish / Aquatic Habitat; <b>or</b></p> <p><input type="checkbox"/> Score of .9 functional point for Uniqueness; <b>or</b></p> <p><input checked="" type="checkbox"/> Percent of total possible points is &gt; 65%.</p>
<p><input type="checkbox"/> <b>Category III Wetland:</b> (Criteria for Categories I, II, or IV not satisfied.)</p>
<p><b>Category IV Wetland:</b> (Criteria for Categories I or II are not satisfied <b>and</b> <u>all</u> of the following criteria are met; If not satisfied, return to Category III.)</p> <p><input type="checkbox"/> "Low" rating for Uniqueness; <b>and</b></p> <p><input type="checkbox"/> "Low" rating for Production Export / Food Chain Support; <b>and</b></p> <p><input type="checkbox"/> Percent of total possible points is &lt; 30%.</p>

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

**I**                     
 **II**                     
 **III**                     
 **IV**



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

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

- Primary or Critical habitat (list species)  D  S \_\_\_\_\_
- Secondary habitat (list species)  D  S \_\_\_\_\_
- Incidental habitat (list species)  D  S Bald Eagle
- 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 & Rating	---	---	---	---	.5 (L)	---	---

If documented, list the source (e.g., observations, records, etc.): Bald Eagle observed on site during 2004 spring monitoring.

**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 Bobolink
- Incidental habitat (list species)  D  S \_\_\_\_\_
- No usable habitat  D  S \_\_\_\_\_

ii. 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 & Rating	---	---	.7 (M)	---	---	---	---

If documented, list the source (e.g., observations, records, etc.): Bobolink identified during 2005 spring birding visit.

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

Structural Diversity (from 13)	<input type="checkbox"/> High								<input checked="" type="checkbox"/> Moderate								<input type="checkbox"/> Low			
	<input type="checkbox"/> Even				<input type="checkbox"/> Uneven				<input type="checkbox"/> Even				<input checked="" type="checkbox"/> Uneven				<input type="checkbox"/> Even			
Class Cover Distribution (all vegetated classes)	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
Duration of Surface Water in ≥ 10% of AA																				
Low disturbance at AA (see 12)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Moderate disturbance at AA (see 12)	--	--	--	--	--	--	--	--	--	--	--	--	H	--	--	--	--	--	--	--
High disturbance at AA (see 12)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

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

Evidence of Wildlife Use from 14C(i)	Wildlife Habitat Features Rating from 14C(ii)			
	<input type="checkbox"/> Exceptional	<input checked="" type="checkbox"/> High	<input type="checkbox"/> Moderate	<input type="checkbox"/> Low
Substantial	--	--	--	--
Moderate	--	.7 (M)	--	--
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 or 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 determine the quality rating of exceptional (E), high (H), moderate (M), or low (L).

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

**ii. Modified Habitat Quality:** Is fish use of the AA precluded or significantly reduced by a culvert, dike, other man-made structure or activity or is the waterbody included on the 'MDEQ list of waterbodies in need of TMDL development' with 'Probable Impaired Uses' listed as cold or warm water fishery or aquatic life support?

Y  N If yes, reduce the rating from 14D(i) by one level and check the modified habitat quality rating:  E  H  M  L

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

Types of Fish Known or Suspected within AA	Modified Habitat Quality from 14D(ii)			
	<input type="checkbox"/> Exceptional	<input type="checkbox"/> High	<input type="checkbox"/> Moderate	<input type="checkbox"/> Low
Native game fish	--	--	--	--
Introduced game fish	--	--	--	--
Non-game fish	--	--	--	--
No fish	--	--	--	--

Comments: \_\_\_\_\_

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

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

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

Estimated wetland area in AA subject to periodic flooding	<input type="checkbox"/> ≥ 10 acres			<input checked="" type="checkbox"/> <10, >2 acres			<input type="checkbox"/> ≤2 acres		
	75%	25-75%	<25%	75%	25-75%	<25%	75%	25-75%	<25%
% of flooded wetland classified as forested, scrub/shrub, or both									
AA contains no outlet or restricted outlet	--	--	--	--	--	.5 (M)	--	--	--
AA contains unrestricted outlet	--	--	--	--	--	--	--	--	--

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

Y  N Comments: Irrigation ditch with outlet into Flint Creek and lack of scrub-shrub/forested vegetation communities.

**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, then 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.

P/P = permanent/perennial; S/I = seasonal/intermittent; T/E = temporary/ephemeral.

Estimated maximum acre feet of water contained in wetlands within the AA that are subject to periodic flooding or ponding.	<input type="checkbox"/> >5 acre feet			<input checked="" type="checkbox"/> <5, >1 acre feet			<input type="checkbox"/> ≤1 acre foot		
	P/P	S/I	T/E	P/P	S/I	T/E	P/P	S/I	T/E
Duration of surface water at wetlands within the AA									
Wetlands in AA flood or pond ≥ 5 out of 10 years	--	--	--	.8 (H)	--	--	--	--	--
Wetlands in AA flood or pond < 5 out of 10 years	--	--	--	--	--	--	--	--	--

Comments: Moderate capacity to contain waters within the wetland areas.

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

Applies to wetlands with the 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.			
	<input type="checkbox"/> ≥ 70%		<input checked="" type="checkbox"/> < 70%		<input type="checkbox"/> ≥ 70%		<input type="checkbox"/> < 70%	
% cover of wetland vegetation in AA	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Evidence of flooding or ponding in AA								
AA contains no or restricted outlet	--	--	.7 (M)	--	--	--	--	--
AA contains unrestricted outlet	--	--	--	--	--	--	--	--

Comments: Moderate percentage of vegetative cover.

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

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

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

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

**Comments:** Area dominated by emergent vegetation.

**14I. PRODUCTION EXPORT / FOOD CHAIN SUPPORT**

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

A = acreage of vegetated component in the AA. B = structural diversity rating from #13. C = Yes (Y) or No (N) as to whether or not the AA contains a surface or subsurface outlet. P/P = permanent/perennial; S/I = seasonal/intermittent; T/E/A= temporary/ephemeral/absent.

A	<input checked="" type="checkbox"/> Vegetated component >5 acres						<input type="checkbox"/> Vegetated component 1-5 acres						<input type="checkbox"/> Vegetated component <1 acre					
B	<input type="checkbox"/> High		<input checked="" type="checkbox"/> Moderate		<input type="checkbox"/> Low		<input type="checkbox"/> High		<input type="checkbox"/> Moderate		<input type="checkbox"/> Low		<input type="checkbox"/> High		<input type="checkbox"/> Moderate		<input type="checkbox"/> Low	
C	<input type="checkbox"/> Y	<input type="checkbox"/> N	<input checked="" type="checkbox"/> Y	<input type="checkbox"/> N	<input type="checkbox"/> Y	<input type="checkbox"/> N	<input type="checkbox"/> Y	<input type="checkbox"/> N	<input type="checkbox"/> Y	<input type="checkbox"/> N	<input type="checkbox"/> Y	<input type="checkbox"/> N	<input type="checkbox"/> Y	<input type="checkbox"/> N	<input type="checkbox"/> Y	<input type="checkbox"/> N	<input type="checkbox"/> Y	<input type="checkbox"/> N
P/P	--	--	.9H	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
S/I	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
T/E/A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

**Comments:** \_\_\_\_\_

**14J. GROUNDWATER DISCHARGE / RECHARGE (DR)** (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 slope.
- 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 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:** Groundwater subsurface flow. Highly permeable alluvial substrate.

**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.		
	<input type="checkbox"/> rare	<input type="checkbox"/> common	<input type="checkbox"/> abundant	<input type="checkbox"/> rare	<input type="checkbox"/> common	<input type="checkbox"/> abundant	<input type="checkbox"/> rare	<input checked="" type="checkbox"/> common	<input type="checkbox"/> abundant
Estimated Relative Abundance from 11									
Low disturbance at AA (12i)	--	--	--	--	--	--	--	--	--
Moderate disturbance at AA (12i)	--	--	--	--	--	--	--	.3L	--
High disturbance at AA (12i)	--	--	--	--	--	--	--	--	--

**Comments:** \_\_\_\_\_

**14L. RECREATION / EDUCATION POTENTIAL**

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

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

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

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

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

Ownership	Disturbance at AA from 12(i)		
	<input type="checkbox"/> Low	<input checked="" type="checkbox"/> Moderate	<input type="checkbox"/> High
Public ownership	--	--	--
Private ownership	--	.3(L)	--

**Comments:** \_\_\_\_\_

**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	low	0.50	1	
B. MT Natural Heritage Program Species Habitat	moderate	0.70	1	
C. General Wildlife Habitat	moderate	0.70	1	
D. General Fish/Aquatic Habitat	N/A		--	
E. Flood Attenuation	moderate	0.50	1	
F. Short and Long Term Surface Water Storage	high	0.80	1	
G. Sediment/Nutrient/Toxicant Removal	moderate	0.70	1	
H. Sediment/Shoreline Stabilization	high	1.00	1	
I. Production Export/Food Chain Support	high	0.90	1	
J. Groundwater Discharge/Recharge	high	1.00	1	
K. Uniqueness	low	0.30	1	
L. Recreation/Education Potential	low	0.30	1	
<b>Total:</b>		<u><b>7.40</b></u>	<u><b>11.00</b></u>	_____
<b>Percent of Total Possible Points:</b>			<u><b>67%</b></u> (Actual / Possible) x 100 [rd to nearest whole #]	

<p><b>Category I Wetland:</b> (Must satisfy <b>one</b> of the following criteria. If not satisfied, proceed to Category II.)</p> <p><input type="checkbox"/> Score of 1 functional point for Listed/Proposed Threatened or Endangered Species; <b>or</b></p> <p><input type="checkbox"/> Score of 1 functional point for Uniqueness; <b>or</b></p> <p><input type="checkbox"/> Score of 1 functional point for Flood Attenuation <b>and</b> answer to Question 14E(ii) is "yes"; <b>or</b></p> <p><input type="checkbox"/> Percent of total Possible Points is &gt; 80%.</p>
<p><b>Category II Wetland:</b> (Criteria for Category I not satisfied <b>and</b> meets any <b>one</b> of the following Category II criteria. If not satisfied, proceed to Category IV.)</p> <p><input type="checkbox"/> Score of 1 functional point for Species Rated S1, S2, or S3 by the MT Natural Heritage Program; <b>or</b></p> <p><input type="checkbox"/> Score of .9 or 1 functional point for General Wildlife Habitat; <b>or</b></p> <p><input type="checkbox"/> Score of .9 or 1 functional point for General Fish/Aquatic Habitat; <b>or</b></p> <p><input type="checkbox"/> "High" to "Exceptional" ratings for <b>both</b> General Wildlife Habitat <b>and</b> General Fish / Aquatic Habitat; <b>or</b></p> <p><input type="checkbox"/> Score of .9 functional point for Uniqueness; <b>or</b></p> <p><input checked="" type="checkbox"/> Percent of total possible points is &gt; 65%.</p>
<p><input type="checkbox"/> <b>Category III Wetland:</b> (Criteria for Categories I, II, or IV not satisfied.)</p>
<p><b>Category IV Wetland:</b> (Criteria for Categories I or II are not satisfied <b>and</b> <u>all</u> of the following criteria are met; If not satisfied, return to Category III.)</p> <p><input type="checkbox"/> "Low" rating for Uniqueness; <b>and</b></p> <p><input type="checkbox"/> "Low" rating for Production Export / Food Chain Support; <b>and</b></p> <p><input type="checkbox"/> Percent of total possible points is &lt; 30%.</p>

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

**I**
         
  **II**
         
  **III**
         
  **IV**

## **Appendix C**

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### **2006 REPRESENTATIVE PHOTOGRAPHS**

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*MDT Wetland Mitigation Monitoring  
Peterson Ranch  
Hall, Montana*

## 2006 PETERSON RANCH WETLAND MITIGATION SITE



Photo Point No. 1: View looking west across mitigation site. Upland vegetation in foreground.



Photo Point No. 2: View looking west along vegetation transect No. 2. Upland community type in foreground, created wetland / pond No. 2 in background.



Photo Point No. 3: View looking north at southern end of created wetland pond No.2.



Photo Point No. 5: View looking north toward pond No. 5. Emergent vegetation developing around pond fringe.



Photo Point No. 6: View looking north at inundated areas. Newly added emergent wetland area during 2006 monitoring.

**2006 PETERSON RANCH WETLAND MITIGATION SITE**



Photo Point No. 4: View looking northwest across pond No. 4. Emergent wetlands developing around pond fringe.



Photo Point No. 5: View looking north toward pond No. 5. Emergent vegetation increasing around pond fringe.

## **Appendix D**

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### **ORIGINAL SITE PLAN**

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*MDT Wetland Mitigation Monitoring  
Peterson Ranch  
Hall, Montana*

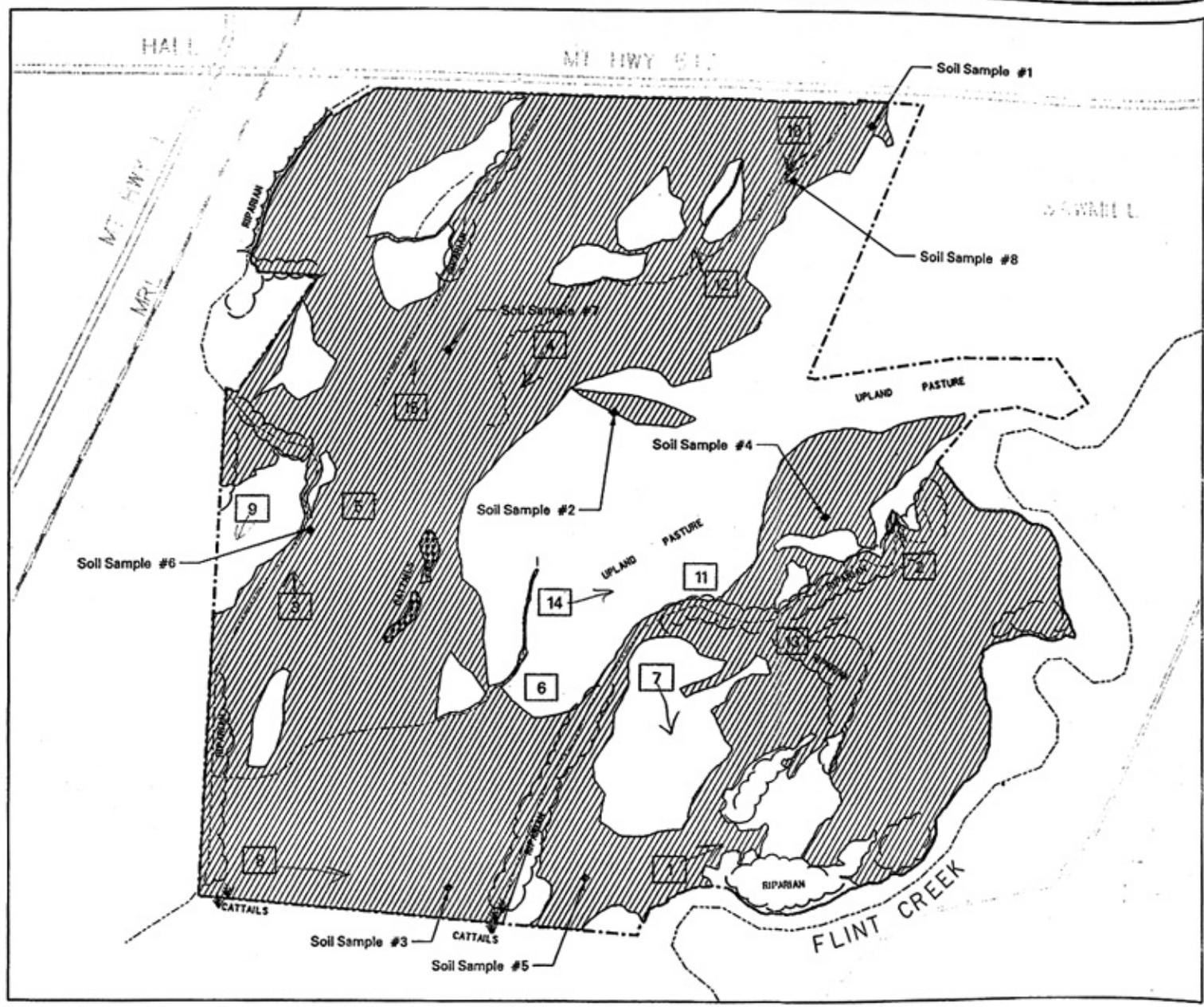


### LEGEND

-  PROPOSED EASEMENT
-  EXISTING WETLAND BOUNDARY
-  CREEK / IRRIGATION DITCH
-  HIGHWAY
-  ROAD
-  SOIL SAMPLE
-  PHOTO LOCATION

MAXVILLE-DRUMMOND  
**PETERSON RANCH**  
**WETLAND MITIGATION**  
 EXISTING WETLANDS

MAP SOURCE:  
 GPS FIELD SURVEY DATA OBTAINED 7/10/08,  
 AND USGS TIGERLINE DATA OBTAINED FROM  
 THE MONTANA MRS WEB SITE.



# MONTANA DEPARTMENT OF TRANSPORTATION

STATE	PROJECT NUMBER	SHEET NO.
MONTANA	STPX 20 (19)	1

LAND & WATER D-2

## FEDERAL AID PROJECT NO. STPX 20 (19) PETERSON WETLAND MITIGATION PLAN GRANITE COUNTY

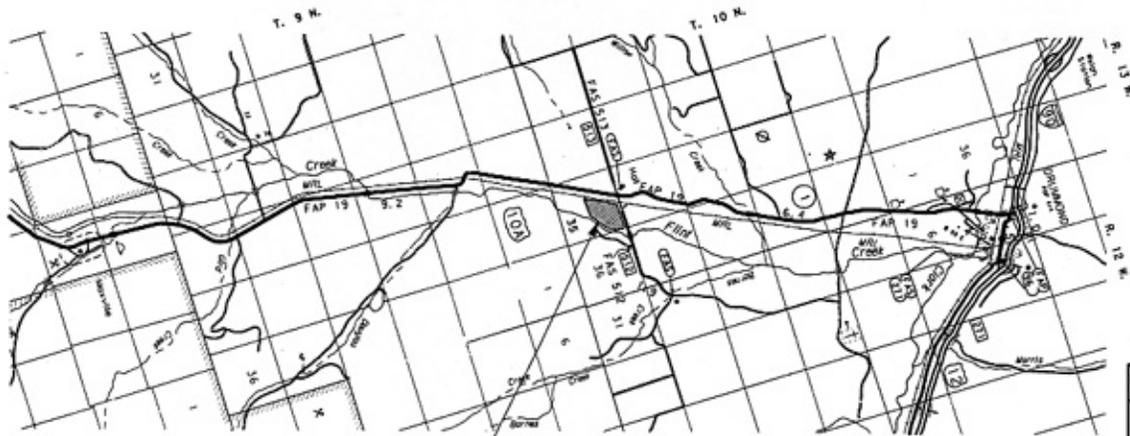
RECEIVED  
MAY 17 2001  
ENVIRONMENTAL



THIS PROJECT

SCALES AS NOTED ON PLANS  
REDUCED PRINTS APPROXIMATELY 1/2 ORIGINAL SCALE

RECEIVED  
JUN 10 2002  
ENVIRONMENTAL



THIS CONTRACT

PLANS PREPARED BY

**Carter-Burgess**  
103 W. FRONT ST. SUITE 103  
MISSOULA, MONTANA 59802  
(406) 725-5471

**WGM Group, Inc.**  
3021 PALMER  
P.O. BOX 18627  
MISSOULA, MONTANA 59808-0227  
(406) 728-6011

RELATED PROJECTS

MAXVILLE-DRUMMOND  
STPP 98-226148

ASSOCIATED PROJECT  
AGREEMENT NUMBERS

R/W & SC	P.L.

**WGM Group, Inc.**

by *Jeremiah Keewo*

DATE *5/16/01*



MONTANA  
DEPARTMENT OF TRANSPORTATION

RECEIVED:  
by *Carl A. Pal* *May 17, 2001*  
PRECONSTRUCTION ENGINEER DATE

U.S. DEPARTMENT OF TRANSPORTATION  
FEDERAL HIGHWAY ADMINISTRATION

APPROVED:

DIVISION ADMINISTRATOR DATE

WGM Group, Inc.

DESIGNED BY: [blank]  
DRAWN BY: [blank]  
CHECKED BY: [blank]  
DATE: [blank]

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# NOTES

STATE	PROJECT NUMBER	SHEET NO.
MONTANA	STPX 20 (19)	2



## PROTECTION OF EXISTING WETLANDS

ENCLOSE DESIGNATED CONSTRUCTION AREAS WITH TEMPORARY FENCING. CONSTRUCTION VEHICLES ARE NOT PERMITTED OUTSIDE OF THE CONSTRUCTION AREAS, EXCEPT ON DESIGNATED CONSTRUCTION ACCESS ROADS. MAINTAIN ALL FENCING UNTIL THE COMPLETION OF CONSTRUCTION.

## CONSTRUCTION ACCESS AND STAGING

AN EXISTING APPROACH ON HIGHWAY 512 MAY BE USED TO ACCESS THE MAIN IRRIGATION DITCH ON THE WEST SIDE OF THE PROPERTY. A TEMPORARY APPROACH MAY BE CONSTRUCTED TO GAIN ACCESS TO THE SITE FROM HIGHWAY 512 AT THE NORTHEAST CORNER OF THE PROPERTY, ADJACENT TO THE SAWMILL. THE CONTRACTOR IS RESPONSIBLE FOR REMOVING THE APPROACH FOLLOWING COMPLETION OF CONSTRUCTION.

STORE ALL EQUIPMENT AND MATERIALS WITHIN THE DESIGNATED STAGING AREA PROVIDED SOUTH OF THE CORRAL. CONSTRUCTION ACCESS TO THE STAGING AREA IS SHOWN ON THE PLANS. THE CONTRACTOR IS RESPONSIBLE FOR REVEGETATING ALL DISTURBED ACCESS AND STAGING AREAS.

## WETLAND TOPSOIL

EXCAVATE WETLAND TOPSOIL FROM WITHIN CONSTRUCTION LIMIT AREAS AND STOCKPILE TOPSOIL IN THE AREAS DESIGNATED ON THE PLANS. PLACE TOPSOIL TO A MINIMUM DEPTH OF 100mm ON BERMS AND SPDS, PILES, AND AT VARIABLE DEPTHS RANGING FROM 100mm TO 400mm WITHIN "SHALLOW WATER AREAS" TO CREATE AN UNEVEN NATURAL BOTTOM. DO NOT PLACE TOPSOIL IN "DEEP WATER AREAS". FINISHED GRADE ELEVATIONS DO NOT INCLUDE TOPSOIL.

## GRADING

PERFORM ALL EXCAVATION AND EMBANKMENT BY THE METHODS DESCRIBED IN SECTION 203 OF THE STANDARD SPECIFICATIONS. ALL EXCAVATION, INCLUDING MUCK EXCAVATION, AND DITCH EXCAVATION WILL BE PAID FOR AS "UNCLASSIFIED EXCAVATION". EXCAVATION OF SATURATED AND UNSTABLE MATERIAL IS ANTICIPATED IN SOME AREAS, HOWEVER, NO PAYMENT WILL BE MADE FOR "MUCK EXCAVATION". TOPSOIL EXCAVATION IS DEDUCTED FROM THE GRADING QUANTITY.

## SEEDING

SEED AREAS SHOWN ON THE PLANS AND OTHER AREAS DISTURBED DURING CONSTRUCTION. SEEDING AREA NO. 1 IS A NATIVE SEED MIX TO BE USED IN ALL NON-WETLAND (CRY) AREAS. SEEDING AREA NO. 2 IS A TRANSITIONAL SEED MIX TO BE USED IN WET AND SEMI-WET AREAS. SEE SPECIAL PROVISIONS.

## PLANTING

COLLECT AND PLANT LIVE CUTTINGS FROM SUITABLE WILLOW SPECIES RESIDENT WITHIN THE FLINT CREEK FLOODPLAIN. OBTAIN BAREROOT STOCK FROM A QUALIFIED NURSERY. SUPPLIER OR INSTALLATION CONTRACTOR IS TO HAVE NOT LESS THAN THREE (3) YEARS OF EXPERIENCE IN SUCCESSFULLY COLLECTING AND PLANTING WETLAND PLANT MATERIAL. SEE SPECIAL PROVISIONS.

PLANT WILLOW CUTTINGS AND BAREROOT STOCK AS DIRECTED BY THE ENGINEER IN THE APPROXIMATE LOCATIONS SHOWN ON THE PLANTING PLAN.

## FENCING

PERMETER FENCING IS STANDARD NOT BARBED 5-WIRE FENCE WITH WOODEN POSTS (TYPE F5W). PLACE PERMETER FENCING ON THE EASEMENT BOUNDARY DEFINED BY THE CERTIFICATE OF SURVEY (C.O.S. 581). INTERIOR FENCING IS STANDARD NOT BARBED 4-WIRE FENCE WITH WOODEN POSTS (TYPE F4W). FINAL PLACEMENT OF INTERIOR FENCING IS SUBJECT TO REVIEW BY THE LANDOWNER.

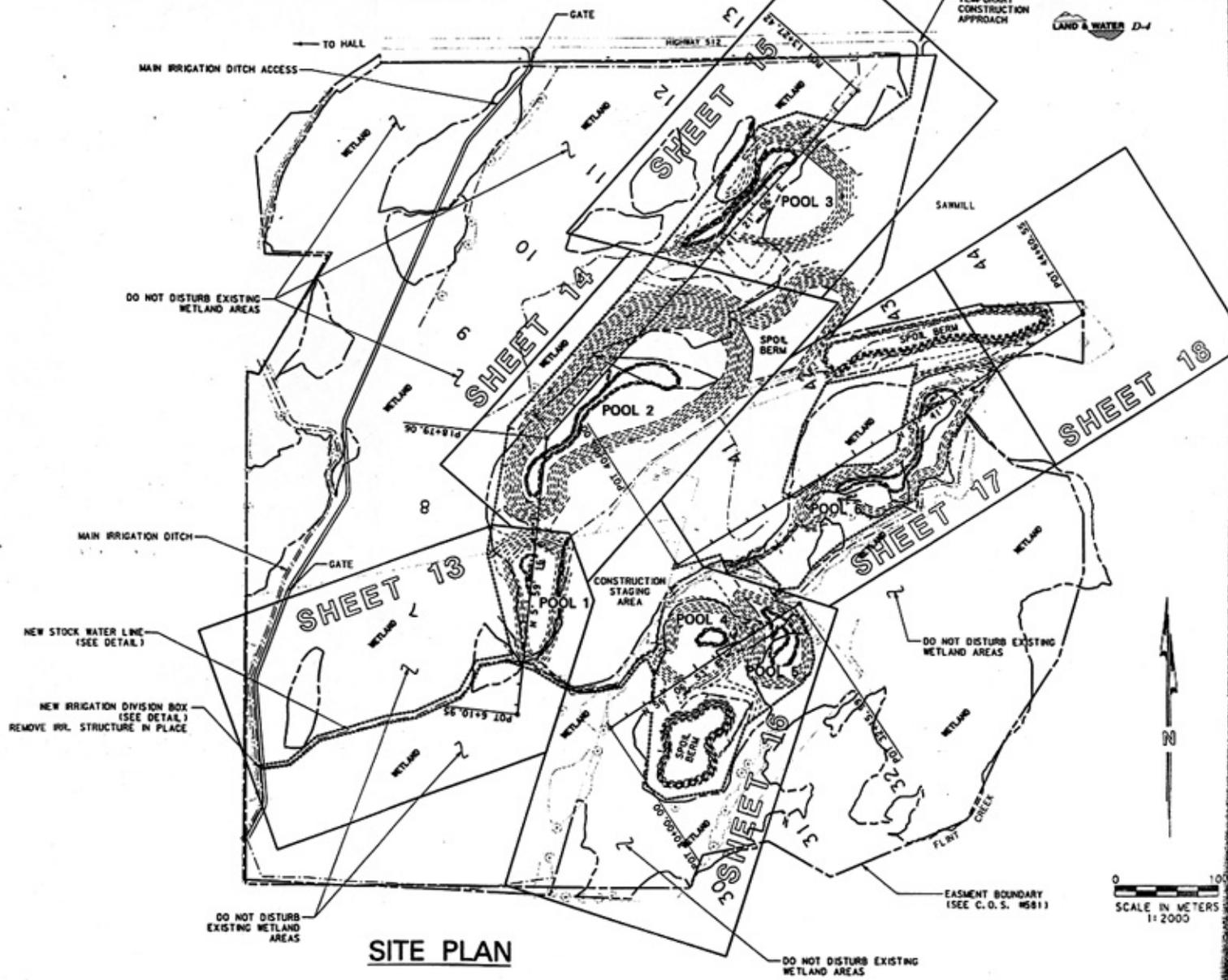
# DETAIL

STATE	PROJECT NUMBER	SHEET
MONTANA	STPX 20 (18)	11

LAND & WATER D-4

## LEGEND

-  EASEMENT BOUNDARY
-  EXISTING TREES AND SHRUBS
-  EXISTING TREE
-  EXISTING FENCE
-  EXISTING IRRIGATION DITCH
-  EXISTING 0.25m CONTOUR
-  EXISTING 1.0m CONTOUR
-  CONTROL LINE
-  TEMPORARY CONSTRUCTION FENCING
-  PROPOSED BERM
-  PROPOSED BANK PROTECTION
-  PROPOSED 0.25m CONTOUR
-  PROPOSED 1.0m CONTOUR
-  REMOVE FENCE
-  PROPOSED FENCE



# SITE PLAN

MONTANA DEPARTMENT OF TRANSPORTATION

WGM Group, Inc.

DATE	SCALE	BY
05/16/2001	1:2000	WGM
05/16/2001		WGM
05/16/2001		WGM
05/16/2001		WGM



## **Appendix E**

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### **BIRD SURVEY PROTOCOL GPS PROTOCOL**

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*MDT Wetland Mitigation Monitoring  
Peterson Ranch  
Hall, 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**

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### **2006 MACROINVERTEBRATE SAMPLING PROTOCOL AND DATA**

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*MDT Wetland Mitigation Monitoring  
Peterson Ranch  
Hall, Montana*

# AQUATIC INVERTEBRATE SAMPLING PROTOCOL

## Equipment List

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

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

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

## Site Selection

Select the sampling site with these considerations in mind:

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

## Sampling

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

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

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

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

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

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

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

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

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

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

Photograph the sampled site.

### **Sample Handling/Shipping**

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

# **MDT Mitigated Wetland Monitoring Project: Aquatic Invertebrate Monitoring Summary 2001 – 2006**

Prepared for PBS&J, Inc.

Prepared by W.Bollman, Rhithron Associates, Inc.

## **INTRODUCTION**

Among other monitoring activities, aquatic invertebrate assemblages were collected at a number of mitigated wetlands throughout Montana. This report summarizes data generated from six years of collection. Over all years of sampling, a total of 182 invertebrate samples were collected. Table 2 summarizes sites and sampling years.

## **METHODS**

### **Sample processing**

Aquatic invertebrate samples were collected at mitigated wetland sites in the summer months of 2001, 2002, 2003, 2004, 2005 and 2006 by personnel of PBS&J, Inc. Sampling procedures utilized were based on the protocols developed by the Montana Department of Environmental Quality (MT DEQ). Sampling consisted of D-frame net sweeps through emergent vegetation (when present), the water column, and over the water surface, and included disturbing and scraping substrates at each sampled site. These sample components were composited and preserved in ethanol at each wetland site. Samples were delivered to Rhithron Associates, Inc. for processing, taxonomic determinations, and data analysis.

At Rhithron's laboratory, Caton subsamplers and stereomicroscopes with 10X magnification were used to randomly select a minimum of 100 organisms from each sample. In some instances, the entire sample contained fewer than 100 organisms; in these cases, all organisms from the sample were taken. Animals were identified to lowest practical taxonomic levels using relevant published resources. Quality control (QC) procedures were applied to sample sorting, taxonomic determinations and enumeration, and data entry. QC statistics are presented in Table 3. The identified samples have been archived at Rhithron's laboratory.

### **Assessment**

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

Scoring criteria for metrics were developed by generally following the tactic used by Stribling et al. Boxplots were generated using a statistical software package (Statistica™), and distributions, median values, ranges, and quartiles for each metric were examined. All sites in all years of sampling were used. Camp Creek, which was sampled in 2002, 2003, 2004, 2005 and 2006, and Kleinschmidt Creek, sampled in 2003, 2004, 2005 and 2006, were assessed using the tested metric battery developed for montane streams of Western Montana (Bollman 1998). Invertebrate assemblages at these sites differed from those of the other sites, and suggested montane or foothill stream conditions rather than wetland conditions. For the wetland sites, "optimal" scores were generally those that fell above the 75<sup>th</sup> percentile (for those metrics that decrease in value in response to stress) or below the 25<sup>th</sup> percentile (for metrics that respond to stress by an increase in value) of all scores. Additional scoring ranges were established by bisecting the range below the 75<sup>th</sup> percentile for decreasing scores (or above the 25<sup>th</sup> percentile for increasing scores) into "sub-optimal" and "poor" assessment categories. A score of 5, 3, or 1 was assigned to optimal, sub-optimal, and poor metric performance, respectively. In this way, metric values were translated into normalized metric scores, and scores for all metrics were summed to produce a total bioassessment score. Total bioassessment scores were classified according to a similar process, using the ranges and distributions of total scores for all sites studied in all years.

The purpose of constructing an index from biological attributes or metrics is to provide a means of integrating information to facilitate the determination of whether management action is needed. The nature of the action needed is not determined solely by the index score, however, but by consideration of an

analysis of the component metrics, the taxonomic composition of the assemblages, and other issues. The diagnostic functions of the metrics and taxonomic data need more study since our understanding of the interrelationships of natural environmental factors and anthropogenic disturbances is tentative. Thus, the further interpretive remarks accompanying the raw taxonomic and metric data in this summary are offered cautiously. Year-to-year comparisons depend on an assumption that specific sites were revisited in each year, and that equivalent sampling methods were utilized at each site revisit.

### **Bioassessment metrics**

An index based on the performance of 12 metrics was constructed, as described above. Table 2 lists those metrics, describes their calculation and the expected response of each to increased degradation or impairment of the wetland.

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

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

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

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

Metric scoring criteria were re-examined each year as new data was added. For 2005, all 151 records were utilized. Ranges of individual metrics, as well as median metric values remained remarkably consistent over all 5 years of analysis. Since metric value distributions changed insignificantly with the addition of the 2006 data, no changes were made to scoring criteria this year. Summary metric values and scores for the 2006 samples are given in Tables 3a-3d.

### **Quality control**

Quality control procedures for initial sample processing and subsampling involved checking sorting efficiency. These checks were conducted on 100% of the samples by independent technicians who microscopically re-examined 20% of sorted substrate from each sample. All organisms that were missed were counted and this number was added to the total number obtained in the original sort. Sorting efficiency was evaluated by applying the following calculation:

$$SE = \frac{n_1}{n_2} \times 100$$

Where: SE is the sorting efficiency, expressed as a percentage,  $n_1$  is the total number of specimens in the first sort, and  $n_2$  is the total number of specimens in the first and second sorts combined.

Quality control procedures for taxonomic determinations involved checking accuracy, precision and enumeration. Four samples were randomly selected and all organisms re-identified by independent taxonomists. A Bray-Curtis similarity statistic (Bray and Curtis 1957) was generated to evaluate identifications.

**Table 1.** Montana Department of Transportation Mitigated Wetlands Monitoring Project sites, 2001 – 2006.

Site identifier	2001	2002	2003	2004	2005	2006
Beaverhead 1	+	+	+	+	+	+
Beaverhead 2	+	+				
Beaverhead 3	+	+		+	+	+
Beaverhead 4	+	+	+			
Beaverhead 5	+	+	+	+	+	+
Beaverhead 6	+	+	+	+	+	+
Big Sandy 1	+					
Big Sandy 2	+					
Big Sandy 3	+					
Big Sandy 4	+					
Johnson-Valier	+					
VIDA	+					
Cow Coulee	+	+	+			
Fourchette – Puffin	+	+	+	+		
Fourchette – Flashlight	+	+	+	+		
Fourchette – Penguin	+	+	+	+		
Fourchette – Albatross	+	+	+	+		
Big Spring	+	+	+	+	+	
Vince Ames	+					
Ryegate	+					
Lavinia	+					
Stillwater	+	+	+	+	+	
Roundup	+	+	+	+	+	+
Wigeon	+	+	+	+	+	+
Ridgeway	+	+	+	+	+	+
Musgrave – Rest. 1	+	+	+	+	+	+
Musgrave – Rest. 2	+	+	+	+	+	+
Musgrave – Enh. 1	+	+	+	+	+	+
Musgrave – Enh. 2	+					+
Hoskins Landing		+	+	+	+	
Hoskins Landing						
Peterson - 1		+	+	+	+	+
Peterson – 2		+		+	+	+
Peterson – 4		+	+	+	+	+
Peterson – 5		+	+	+	+	+
Jack Johnson - main		+	+			
Jack Johnson - SW		+	+			
Creston		+	+	+	+	
Lawrence Park		+				
Perry Ranch		+			+	
SF Smith River		+	+	+	+	+
Camp Creek		+	+	+	+	+
Camp Creek						+
Kleinschmidt		+	+	+	+	+
Kleinschmidt – stream			+	+	+	+
Ringling - Galt			+			
Circle				+		
Cloud Ranch Pond				+	+	
Cloud Ranch Stream				+		
American Colloid				+	+	+
Jack Creek				+	+	
Jack Creek						
Norem				+	+	+
Rock Creek Ranch					+	+
Wagner Marsh					+	+
Alkali Lake 1						+
Alkali Lake 2						+

**Table 2.** Aquatic invertebrate metrics employed in the MTDT mitigated wetland monitoring study, 2001-2005.

<b>Metric</b>	<b>Metric calculation</b>	<b>Expected response to degradation or impairment</b>
Total taxa	Count of unique taxa identified to lowest recommended taxonomic level	Decrease
POET	Count of unique Plecoptera, Trichoptera, Ephemeroptera, and Odonata taxa identified to lowest recommended taxonomic level	Decrease
Chironomidae taxa	Count of unique midge taxa identified to lowest recommended taxonomic level	Decrease
Crustacea taxa + Mollusca taxa	Count of unique Crustacea taxa and Mollusca taxa identified to lowest recommended taxonomic level	Decrease
% Chironomidae	Percent abundance of midges in the subsample	Increase
Orthoclaadiinae/Chironomidae	Number of individual midges in the sub-family Orthoclaadiinae / 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 by that taxon's modified Hilsenhoff Biotic Index (tolerance) value. These numbers are summed over all taxa in the subsample.	Increase
%Dominant taxon	Percent abundance of the most abundant taxon in the subsample	Increase
%Collector-Gatherers	Percent abundance of organisms in the collector-gatherer functional group	Decrease
%Filterers	Percent abundance of organisms in the filterer functional group	Increase

## RESULTS

(Note: Individual site discussions were removed from this report by PBS&J and are included in the macroinvertebrate sections of individual monitoring reports. Summary tables (4a – 4d) are provided on the following pages.)

### Quality Assurance

Table 3 gives the results of quality assurance procedures for sample sorting and taxonomic determinations and enumeration.

**Table 3.** Results of quality control procedures for subsampling and taxonomy.

Sample ID	Site name	SE	Bray-Curtis similarity
MDT06PBSJ001	MUSGRAVE LAKE ES-1	91.67%	
MDT06PBSJ002	MUSGRAVE LAKE ES-2	94.44%	
MDT06PBSJ003	MUSGRAVE LAKE RS-1	87.30%	
MDT06PBSJ004	MUSGRAVE LAKE RS-2	100.00%	
MDT06PBSJ005	ROCK CREEK RANCH	96.49%	95.25%
MDT06PBSJ006	Alkali Lake Sample 1	100.00%	
MDT06PBSJ007	Alkali Lake Sample 2	100.00%	
MDT06PBSJ008	Peterson Ranch Pond # 4	100.00%	
MDT06PBSJ009	Peterson Ranch Pond # 1	97.35%	
MDT06PBSJ010	Peterson Ranch Pond # 5	91.67%	
MDT06PBSJ011	South Fork Smith River	100.00%	
MDT06PBSJ012	Beaverhead 1	100.00%	
MDT06PBSJ013	Beaverhead 3	95.65%	
MDT06PBSJ014	Beaverhead 5	100.00%	
MDT06PBSJ015	Beaverhead 6	94.12%	98.38%
MDT06PBSJ016	Peterson Ranch Pond # 2	91.67%	99.66%
MDT06PBSJ017	American Colloid	100.00%	
MDT06PBSJ018	Norem	100.00%	
MDT06PBSJ019	Cloud Ranch	85.56%	98.89%
MDT06PBSJ020	Jack Creek Pond	100.00%	
MDT06PBSJ021	Jack Creek Stream	100.00%	
MDT06PBSJ022	Camp Creek 1	99.10%	
MDT06PBSJ023	Camp Creek 2	100.00%	
MDT06PBSJ024	Kleinschmidt Pond	100.00%	
MDT06PBSJ025	Kleinschmidt Stream	96.49%	
MDT06PBSJ026	Hoskins Landing 1	97.35%	
MDT06PBSJ027	Hoskins Landing 2	96.49%	
MDT06PBSJ028	Wagner Marsh	100.00%	
MDT06PBSJ029	Wigeon Reservoir	100.00%	
MDT06PBSJ030	Ridgeway	98.21%	
MDT06PBSJ031	Roundup	100.00%	

**Table 4a.** Metric values and scores for Montana Department of Transportation mitigated wetland sites. 2006.

	BEAVERHEAD #1	BEAVERHEAD #3	BEAVERHEAD #5	BEAVERHEAD #6	ROUNDUP	WIDGEON	RIDGEWAY	MUSGRAVE RS-1
Total taxa	12	11	4	15	11	11	21	23
POET	1	0	1	3	2	1	3	4
Chironomidae taxa	5	3	1	7	4	3	10	7
Crustacea + Mollusca	1	4	2	3	2	2	5	7
% Chironomidae	52.38%	25.22%	0.69%	63.06%	18.87%	6.42%	37.25%	9.62%
Orthoclaadiinae/Chir	0.181818	0.965517	0	0.142857	0.2	0.285714	0.289474	0.7
% Amphipoda	0.00%	0.00%	0.00%	0.90%	0.00%	6.42%	11.76%	1.92%
% Crustacea + % Mollusca	9.52%	69.57%	98.62%	3.60%	73.58%	79.82%	45.10%	51.92%
HBI	7.857143	7.773913	7.97931	7.243243	8.09434	8.100917	7.127451	7.403846
% Dominant taxon	33.33%	39.13%	97.93%	27.93%	72.64%	73.39%	28.43%	23.08%
% Collector-Gatherers	61.90%	68.70%	100.00%	84.68%	87.74%	6.42%	49.02%	47.12%
% Filterers	0.00%	2.61%	0.00%	1.80%	0.00%	0.00%	0.00%	4.81%
Total taxa	1	1	1	3	1	1	5	5
POET	1	1	1	3	1	1	3	5
Chironomidae taxa	3	3	1	5	3	3	5	5
Crustacea + Mollusca	1	3	1	1	1	1	3	5
% Chironomidae	1	3	5	1	3	5	3	5
Orthoclaadiinae/Chir	1	5	1	1	3	3	3	5
% Amphipoda	5	5	5	5	5	3	3	5
% Crustacea + % Mollusca	5	1	1	5	1	1	3	3
HBI	1	1	1	3	1	1	3	3
% Dominant taxon	5	3	1	5	1	1	5	5
% Collector-Gatherers	3	3	5	5	5	1	3	3
% Filterers	3	3	3	3	3	3	3	3
<b>Total score</b>	30	32	26	40	28	24	42	52
<b>Percent of maximum score</b>	0.5	0.533333	0.433333	0.666667	0.466667	0.4	0.7	0.866667
<b>Impairment classification</b>	poor	poor	poor	sub-optimal	poor	poor	optimal	optimal

**Table 4b.** Metric values and scores for Montana Department of Transportation mitigated wetland sites. 2006.

	MUSGRAVE RS- 2	MUSGRAVE ES- 1	MUSGRAVE ES- 2	HOSKINS LANDING 1	HOSKINS LANDING 2	PETERSON RANCH 1	PETERSON RANCH 2	PETERSON RANCH 4	PETERSON RANCH 5
<b>Total taxa</b>	10	21	10	22	29	19	17	28	26
POET	1	2	1	5	4	2	2	3	4
Chironomidae taxa	2	7	4	6	6	7	4	13	9
Crustacea + Mollusca	3	6	0	5	9	5	6	5	6
% Chironomidae	3.96%	10.89%	10.00%	18.18%	11.71%	64.08%	7.48%	27.52%	14.29%
Orthoclaadiinae/Chir	0	0.181818	0.125	0.055556	0.307692	0.757576	0.75	0.6	0.75
% Amphipoda	0.00%	2.97%	0.00%	5.05%	1.80%	1.94%	22.43%	2.75%	15.18%
% Crustacea + % Mollusca	8.91%	75.25%	0.00%	20.20%	23.42%	8.74%	42.06%	19.27%	40.18%
HBI	6.326733	6.940594	6	7.111111	7.585586	6.631068	6.719626	7.293578	7.321429
% Dominant taxon	70.30%	38.61%	83.75%	25.25%	42.34%	47.57%	28.04%	20.18%	16.07%
% Collector-Gatherers	15.84%	8.91%	3.75%	64.65%	62.16%	72.82%	31.78%	34.86%	50.89%
% Filterers	0.00%	0.00%	0.00%	6.06%	5.41%	3.88%	3.74%	8.26%	0.89%
<b>Total taxa</b>	1	5	1	5	5	3	3	5	5
POET	1	1	1	5	5	1	1	3	5
Chironomidae taxa	1	5	3	3	3	5	3	5	5
Crustacea + Mollusca	1	5	1	3	5	3	5	3	5
% Chironomidae	5	5	5	3	5	1	5	3	5
Orthoclaadiinae/Chir	1	1	1	1	3	5	5	5	5
% Amphipoda	5	5	5	3	5	5	3	5	3
% Crustacea + % Mollusca	5	1	5	5	5	5	3	5	3
HBI	5	3	5	3	3	5	5	3	3
% Dominant taxon	1	3	1	5	3	3	5	5	5
% Collector-Gatherers	1	1	1	3	3	3	1	1	3
% Filterers	3	3	3	1	3	3	3	1	3
<b>Total score</b>	30	38	32	40	48	42	42	44	50
<b>Percent of maximum score</b>	0.5	0.633333	0.533333	0.666667	0.8	0.7	0.7	0.733333	0.833333
<b>Impairment classification</b>	<b>poor</b>	<b>sub-optimal</b>	<b>poor</b>	<b>sub-optimal</b>	<b>optimal</b>	<b>optimal</b>	<b>optimal</b>	<b>optimal</b>	<b>optimal</b>

**Table 4c.** Metric values and scores for Montana Department of Transportation mitigated wetland sites. 2006

	<b>SOUTH FORK SMITH RIVER</b>	<b>CAMP CREEK 1*</b>	<b>CAMP CREEK 2*</b>	<b>KLEINSCH MIDT POND</b>	<b>KLEINSCH MIDT STREAM*</b>	<b>CLOUD RANCH</b>	<b>COLLOID</b>	<b>JACK CREEK POND</b>	<b>JACK CREEK STREAM</b>
Total taxa	14	31	29	20	22	13	7	7	5
POET	4	8	8	5	1	1	2	0	0
Chironomidae taxa	3	10	8	6	8	6	4	4	0
Crustacea + Mollusca	4	1	3	2	5	3	0	2	2
% Chironomidae	18.02%	45.87%	16.07%	8.04%	77.68%	23.81%	84.21%	75.00%	0.00%
Orthoclaadiinae/Chir	0.05	0.26	0.277778	0.222222	0.448276	0.65	0.25	0.555556	0
% Amphipoda	18.02%	0.00%	0.00%	25.00%	0.00%	4.76%	0.00%	0.00%	5.00%
% Crustacea + % Mollusca	58.56%	0.92%	3.57%	25.89%	5.36%	11.90%	0.00%	16.67%	7.50%
HBI	7.540541	4.504587	4.294643	7.241071	5.928571	7.535714	6.315789	8.833333	7.325
% Dominant taxon	25.23%	24.77%	37.50%	25.00%	33.93%	36.90%	52.63%	33.33%	60.00%
% Collector-Gatherers	41.44%	48.62%	31.25%	62.50%	46.43%	64.29%	21.05%	58.33%	67.50%
% Filterers	15.32%	6.42%	7.14%	3.57%	38.39%	2.38%	0.00%	0.00%	0.00%
Total taxa	1	5	5	3	5	1	1	1	1
POET	5	5	5	5	1	1	1	1	1
Chironomidae taxa	3	5	5	3	5	3	3	3	1
Crustacea + Mollusca	3	1	1	1	3	1	1	1	1
% Chironomidae	3	1	5	5	1	3	1	1	5
Orthoclaadiinae/Chir	1	3	3	3	3	5	3	5	1
% Amphipoda	3	5	5	1	5	3	5	5	3
% Crustacea + % Mollusca	3	5	5	5	5	5	5	5	5
HBI	3	5	5	3	5	3	5	1	3
% Dominant taxon	5	5	3	5	5	3	1	5	1
% Collector-Gatherers	1	3	1	3	3	3	1	3	3
% Filterers	1	1	1	3	1	3	3	3	3
<b>Total score</b>	32	44	44	40	42	34	30	34	28
<b>Percent of maximum score</b>	0.533333	0.733333	0.733333	0.666667	0.7	0.566667	0.5	0.566667	0.466667
<b>Impairment classification</b>	<b>poor</b>	<b>optimal</b>	<b>optimal</b>	<b>sub-optimal</b>	<b>optimal</b>	<b>sub-optimal</b>	<b>poor</b>	<b>sub-optimal</b>	<b>poor</b>

\*Sites indicated by asterisks were dominated by lotic fauna, and were evaluated with the MDEQ index for streams in the text and charts. Scores and impairment classifications in this table (italicized) are included only for completeness and are not reliable indications of conditions at these sites. See text.

**Table 4d.** Metric values and scores for Montana Department of Transportation mitigated wetland sites. 2006.

	NOREM	ROCK CREEK RANCH	WAGNER MARSH	ALKALI LAKE 1	ALKALI LAKE 2
Total taxa	6	15	11	6	5
POET	1	0	0	0	0
Chironomidae taxa	2	4	4	3	0
Crustacea + Mollusca	1	4	3	1	1
% Chironomidae	82.93%	8.40%	13.51%	42.86%	0.00%
Orthoclaadiinae/Chir	0	0.2	0.6	0.666667	0
% Amphipoda	0.00%	0.00%	0.00%	0.00%	0.00%
% Crustacea + % Mollusca	7.32%	65.55%	23.42%	7.14%	9.52%
HBI	7.317073	7.638655	7.036036	7.785714	7.904762
% Dominant taxon	65.85%	47.06%	45.95%	42.86%	52.38%
% Collector-Gatherers	68.29%	56.30%	47.75%	28.57%	9.52%
% Filterers	17.07%	0.00%	0.90%	0.00%	0.00%
Total taxa	1	3	1	1	1
POET	1	1	1	1	1
Chironomidae taxa	1	3	3	3	1
Crustacea + Mollusca	1	3	1	1	1
% Chironomidae	1	5	5	1	5
Orthoclaadiinae/Chir	1	3	5	5	1
% Amphipoda	5	5	5	5	5
% Crustacea + % Mollusca	5	1	5	5	5
HBI	3	1	3	1	1
% Dominant taxon	1	3	3	3	1
% Collector-Gatherers	3	3	3	1	1
% Filterers	1	3	3	3	3
<b>Total score</b>	24	34	38	30	26
<b>Percent of maximum score</b>	0.4	0.566667	0.633333	0.5	0.433333
<b>Impairment classification</b>	<b>poor</b>	<b>sub-optimal</b>	<b>sub-optimal</b>	<b>poor</b>	<b>poor</b>

### **Literature cited**

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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.

# Taxa Listing

Project ID: MDT06PBSJ  
RAI No.: MDT06PBSJ009

RAI No.: MDT06PBSJ009

Sta. Name: Peterson Ranch Pond # 1

Client ID:

Date Coll.: 8/17/2006

No. Jars: 1

STORET ID:

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
<b>Non-Insect</b>							
Acari	1	0.97%	Yes	Unknown		5	PR
Copepoda	2	1.94%	Yes	Unknown		8	CG
Ostracoda	2	1.94%	Yes	Unknown		8	CG
Enchytraeidae							
Enchytraeidae	4	3.88%	Yes	Unknown		4	CG
Lymnaeidae							
<i>Stagnicola</i> sp.	2	1.94%	Yes	Unknown		6	SC
Naididae							
Naididae	2	1.94%	Yes	Unknown		8	CG
Physidae							
Physidae	1	0.97%	Yes	Unknown		8	SC
Talitridae							
<i>Hyalella</i> sp.	2	1.94%	Yes	Unknown		8	CG
<b>Odonata</b>							
Coenagrionidae							
<i>Enallagma</i> sp.	17	16.50%	Yes	Larva		7	PR
<b>Ephemeroptera</b>							
Baetidae							
<i>Callibaetis</i> sp.	1	0.97%	Yes	Larva		9	CG
<b>Coleoptera</b>							
Halplidae							
<i>Halplus</i> sp.	1	0.97%	No	Larva		5	PH
<i>Halplus</i> sp.	1	0.97%	Yes	Adult		5	PH
<b>Diptera</b>							
Ceratopogonidae							
Ceratopogoninae	1	0.97%	Yes	Larva		6	PR
<b>Chironomidae</b>							
Chironomidae							
<i>Acricotopus</i> sp.	1	0.97%	Yes	Larva		10	CG
Chironomidae	8	7.77%	No	Pupa		10	CG
<i>Dicrotendipes</i> sp.	1	0.97%	Yes	Larva		8	CG
<i>Parakiefferiella</i> sp.	49	47.57%	Yes	Larva		6	CG
<i>Paratanytarsus</i> sp.	3	2.91%	Yes	Larva		6	CG
Tanytarsini	1	0.97%	No	Larva	Damaged	6	CF
<i>Tanytarsus</i> sp.	3	2.91%	Yes	Larva		6	CF
	<b>Sample Count</b>	<b>103</b>					

# Metrics Report

Project ID: MDT06PBSJ  
 RAI No.: MDT06PBSJ009  
 Sta. Name: Peterson Ranch Pond # 1  
 Client ID:  
 STORET ID:  
 Coll. Date: 8/17/2006

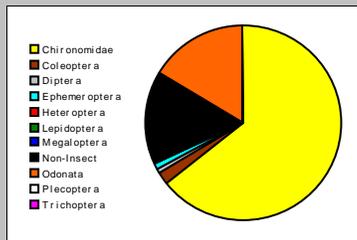
## Abundance Measures

Sample Count: 103  
 Sample Abundance: 1,030.00 10.00% of sample used

Coll. Procedure:  
 Sample Notes:

## Taxonomic Composition

Category	R	A	PRA
Non-Insect	8	16	15.53%
Odonata	1	17	16.50%
Ephemeroptera	1	1	0.97%
Plecoptera			
Heteroptera			
Megaloptera			
Trichoptera			
Lepidoptera			
Coleoptera	1	2	1.94%
Diptera	1	1	0.97%
Chironomidae	5	66	64.08%

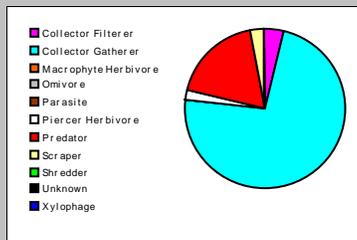


## Dominant Taxa

Category	A	PRA
Parakiefferiella	49	47.57%
Enallagma	17	16.50%
Chironomidae	8	7.77%
Enchytraeidae	4	3.88%
Tanytarsus	3	2.91%
Paratanytarsus	3	2.91%
Staquicola	2	1.94%
Ostracoda	2	1.94%
Naididae	2	1.94%
Hyalella	2	1.94%
Haliplus	2	1.94%
Copepoda	2	1.94%
Physidae	1	0.97%
Dicrotendipes	1	0.97%
Acari	1	0.97%

## Functional Composition

Category	R	A	PRA
Predator	3	19	18.45%
Parasite			
Collector Gatherer	10	75	72.82%
Collector Filterer	1	4	3.88%
Macrophyte Herbivore			
Piercer Herbivore	1	2	1.94%
Xylophage			
Scraper	2	3	2.91%
Shredder			
Omnivore			
Unknown			

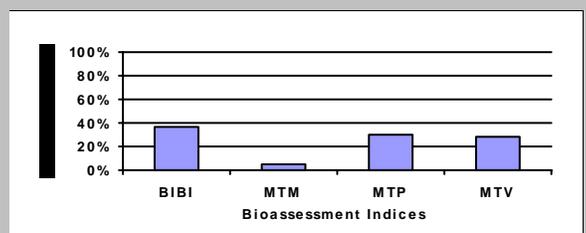


## Metric Values and Scores

Metric	Value	BIBI	MTP	MTV	MTM
<i>Composition</i>					
Taxa Richness	17	1	1		0
Non-Insect Percent	15.53%				
E Richness	1	1		0	
P Richness	0	1		0	
T Richness	0	1		0	
EPT Richness	1		0		0
EPT Percent	0.97%		0		0
Oligochaeta+Hirudinea Percent	5.83%				
Baetidae/Ephemeroptera	1.00%				
Hydropsychidae/Trichoptera	0.00%				
<i>Dominance</i>					
Dominant Taxon Percent	47.57%		1		0
Dominant Taxa (2) Percent	64.08%				
Dominant Taxa (3) Percent	71.84%	3			
Dominant Taxa (10) Percent	89.32%				
<i>Diversity</i>					
Shannon H (loge)	1.759				
Shannon H (log2)	2.538		2		
Margalef D	3.530				
Simpson D	0.311				
Evenness	0.092				
<i>Function</i>					
Predator Richness	3		1		
Predator Percent	18.45%	3			
Filterer Richness	1				
Filterer Percent	3.88%			3	
Collector Percent	76.70%		2		1
Scraper+Shredder Percent	2.91%		0		0
Scraper/Filterer	0.750				
Scraper/Scraper+Filterer	0.429				
<i>Habit</i>					
Burrower Richness	2				
Burrower Percent	1.94%				
Swimmer Richness	2				
Swimmer Percent	2.91%				
Clinger Richness	1	1			
Clinger Percent	2.91%				
<i>Characteristics</i>					
Cold Stenotherm Richness	0				
Cold Stenotherm Percent	0.00%				
Hemoglobin Bearer Richness	1				
Hemoglobin Bearer Percent	0.97%				
Air Breather Richness	0				
Air Breather Percent	0.00%				
<i>Voltinism</i>					
Univoltine Richness	7				
Semivoltine Richness	1	1			
Multivoltine Percent	69.90%		1		
<i>Tolerance</i>					
Sediment Tolerant Richness	1				
Sediment Tolerant Percent	1.94%				
Sediment Sensitive Richness	0				
Sediment Sensitive Percent	0.00%				
Metals Tolerance Index	2.895				
Pollution Sensitive Richness	0				
Pollution Tolerant Percent	6.80%	1		0	
Hilsenhoff Biotic Index	6.631		1		0
Intolerant Percent	0.00%				
Supertolerant Percent	19.42%				
CTQa	100.500				

## Bioassessment Indices

BiIndex	Description	Score	Pct	Rating
BIBI	B-IBI (Karr et al.)	18	36.00%	
MTP	Montana DEQ Plains (Bukantis 1998)	9	30.00%	Moderate
MTV	Montana Revised Valleys/Foothills (Bollman 1998)	5	27.78%	Moderate
MTM	Montana DEQ Mountains (Bukantis 1998)	1	4.76%	Severe



# Taxa Listing

Project ID: MDT06PBSJ  
RAI No.: MDT06PBSJ016

RAI No.: MDT06PBSJ016

Sta. Name: Peterson Ranch Pond # 2

Client ID:

Date Coll.: 8/17/2006

No. Jars: 1

STORET ID:

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
<b>Non-Insect</b>							
Cladocera	3	2.80%	Yes	Unknown		8	CF
Ostracoda	1	0.93%	Yes	Unknown		8	CG
Gammaridae							
<i>Gammarus</i> sp.	6	5.61%	Yes	Unknown		4	SH
Lymnaeidae							
<i>Stagnicola</i> sp.	14	13.08%	Yes	Unknown		6	SC
Naididae							
Naididae	7	6.54%	Yes	Unknown		8	CG
Planorbidae							
<i>Gyraulus</i> sp.	3	2.80%	Yes	Unknown		8	SC
Talitridae							
<i>Hyalella</i> sp.	18	16.82%	Yes	Unknown		8	CG
<b>Odonata</b>							
Coenagrionidae							
<i>Enallagma</i> sp.	12	11.21%	Yes	Larva		7	PR
<b>Ephemeroptera</b>							
Baetidae							
<i>Callibaetis</i> sp.	1	0.93%	Yes	Larva		9	CG
<b>Coleoptera</b>							
Dytiscidae							
Dytiscidae	1	0.93%	Yes	Larva		5	PR
Halplidae							
<i>Haliplus</i> sp.	1	0.93%	Yes	Larva		5	PH
<b>Diptera</b>							
Ceratopogonidae							
Ceratopogoninae	30	28.04%	Yes	Larva		6	PR
Tipulidae							
<i>Tipula</i> sp.	2	1.87%	Yes	Larva		4	SH
<b>Chironomidae</b>							
Chironomidae							
<i>Acricotopus</i> sp.	3	2.80%	Yes	Larva		10	CG
Chironomidae	1	0.93%	No	Pupa		10	CG
Orthoclaadiinae	3	2.80%	No	Larva	Early Instar	6	CG
Tanytarsini	1	0.93%	Yes	Larva	Early Instar	6	CF
	<b>Sample Count</b>	<b>107</b>					

# Metrics Report

Project ID: MDT06PBSJ  
 RAI No.: MDT06PBSJ016  
 Sta. Name: Peterson Ranch Pond # 2  
 Client ID:  
 STORET ID:  
 Coll. Date: 8/17/2006

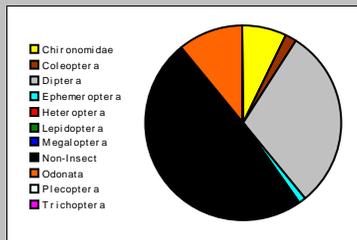
## Abundance Measures

Sample Count: 107  
 Sample Abundance: 3,210.00 3.33% of sample used

Coll. Procedure:  
 Sample Notes:

## Taxonomic Composition

Category	R	A	PRA
Non-Insect	7	52	48.60%
Odonata	1	12	11.21%
Ephemeroptera	1	1	0.93%
Plecoptera			
Heteroptera			
Megaloptera			
Trichoptera			
Lepidoptera			
Coleoptera	2	2	1.87%
Diptera	2	32	29.91%
Chironomidae	2	8	7.48%

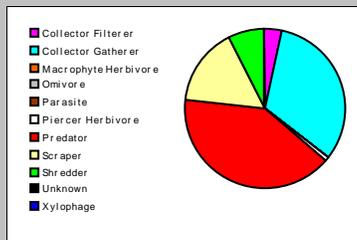


## Dominant Taxa

Category	A	PRA
Ceratopogoninae	30	28.04%
Hyalella	18	16.82%
Stanicola	14	13.08%
Enallagma	12	11.21%
Naididae	7	6.54%
Gammarus	6	5.61%
Orthocladinae	3	2.80%
Gyraulid	3	2.80%
Cladocera	3	2.80%
Acricotopus	3	2.80%
Tipula	2	1.87%
Ostracoda	1	0.93%
Halipus	1	0.93%
Dytiscidae	1	0.93%
Chironomidae	1	0.93%

## Functional Composition

Category	R	A	PRA
Predator	3	43	40.19%
Parasite			
Collector Gatherer	5	34	31.78%
Collector Filterer	2	4	3.74%
Macrophyte Herbivore			
Piercer Herbivore	1	1	0.93%
Xylophage			
Scraper	2	17	15.89%
Shredder	2	8	7.48%
Omnivore			
Unknown			

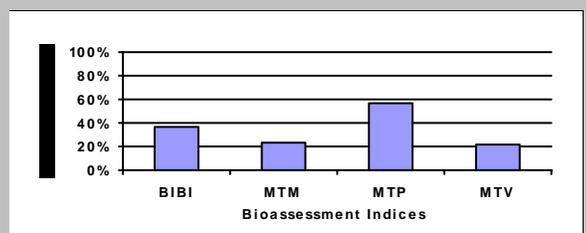


## Metric Values and Scores

Metric	Value	BIBI	MTP	MTV	MTM
<i>Composition</i>					
Taxa Richness	15	1	1		0
Non-Insect Percent	48.60%				
E Richness	1	1		0	
P Richness	0	1		0	
T Richness	0	1		0	
EPT Richness	1		0		0
EPT Percent	0.93%		0		0
Oligochaeta+Hirudinea Percent	6.54%				
Baetidae/Ephemeroptera	1.00%				
Hydropsychidae/Trichoptera	0.00%				
<i>Dominance</i>					
Dominant Taxon Percent	28.04%		3		2
Dominant Taxa (2) Percent	44.86%				
Dominant Taxa (3) Percent	57.94%	3			
Dominant Taxa (10) Percent	92.52%				
<i>Diversity</i>					
Shannon H (loge)	2.145				
Shannon H (log2)	3.094		3		
Margalef D	3.021				
Simpson D	0.151				
Evenness	0.096				
<i>Function</i>					
Predator Richness	3		1		
Predator Percent	40.19%	5			
Filterer Richness	2				
Filterer Percent	3.74%			3	
Collector Percent	35.51%		3		3
Scraper+Shredder Percent	23.36%		2		0
Scraper/Filterer	4.250				
Scraper/Scraper+Filterer	0.810				
<i>Habit</i>					
Burrower Richness	2				
Burrower Percent	29.91%				
Swimmer Richness	2				
Swimmer Percent	1.87%				
Clinger Richness	0	1			
Clinger Percent	0.00%				
<i>Characteristics</i>					
Cold Stenotherm Richness	0				
Cold Stenotherm Percent	0.00%				
Hemoglobin Bearer Richness	1				
Hemoglobin Bearer Percent	2.80%				
Air Breather Richness	2				
Air Breather Percent	2.80%				
<i>Voltinism</i>					
Univoltine Richness	8				
Semivoltine Richness	2	1			
Multivoltine Percent	12.15%		3		
<i>Tolerance</i>					
Sediment Tolerant Richness	3				
Sediment Tolerant Percent	17.76%				
Sediment Sensitive Richness	0				
Sediment Sensitive Percent	0.00%				
Metals Tolerance Index	3.383				
Pollution Sensitive Richness	0	1			0
Pollution Tolerant Percent	24.30%	3			1
Hilsenhoff Biotic Index	6.720		1		0
Intolerant Percent	0.00%				
Supertolerant Percent	34.58%				
CTQa	88.200				

## Bioassessment Indices

BioIndex	Description	Score	Pct	Rating
BIBI	B-IBI (Karr et al.)	18	36.00%	
MTP	Montana DEQ Plains (Bukantis 1998)	17	56.67%	Slight
MTV	Montana Revised Valleys/Foothills (Bollman 1998)	4	22.22%	Moderate
MTM	Montana DEQ Mountains (Bukantis 1998)	5	23.81%	Moderate



# Taxa Listing

Project ID: MDT06PBSJ  
RAI No.: MDT06PBSJ008

RAI No.: MDT06PBSJ008

Sta. Name: Peterson Ranch Pond # 4

Client ID:

Date Coll.: 8/17/2006

No. Jars: 1

STORET ID:

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
<b>Non-Insect</b>							
Acari	1	0.92%	Yes	Unknown		5	PR
Cladocera	7	6.42%	Yes	Unknown		8	CF
Copepoda	1	0.92%	Yes	Unknown		8	CG
Naididae							
Naididae	10	9.17%	Yes	Unknown		8	CG
Physidae							
Physidae	2	1.83%	Yes	Unknown		8	SC
Planorbidae							
<i>Gyraulus</i> sp.	8	7.34%	Yes	Unknown		8	SC
Talitridae							
<i>Hyalella</i> sp.	3	2.75%	Yes	Unknown		8	CG
<b>Odonata</b>							
Coenagrionidae							
<i>Enallagma</i> sp.	22	20.18%	Yes	Larva		7	PR
<b>Ephemeroptera</b>							
Baetidae							
<i>Callibaetis</i> sp.	2	1.83%	Yes	Larva		9	CG
Caenidae							
<i>Caenis</i> sp.	6	5.50%	Yes	Larva		7	CG
<b>Heteroptera</b>							
Nepidae							
<i>Ranatra</i> sp.	1	0.92%	Yes	Adult		11	PR
Notonectidae							
<i>Notonecta</i> sp.	1	0.92%	Yes	Adult		5	PR
<b>Coleoptera</b>							
Dytiscidae							
Dytiscidae	1	0.92%	Yes	Larva		5	PR
Halplidae							
<i>Halplus</i> sp.	1	0.92%	Yes	Larva		5	PH
<b>Diptera</b>							
Ceratopogonidae							
Ceratopogoninae	12	11.01%	Yes	Larva		6	PR
Ceratopogoninae	1	0.92%	No	Pupa		6	PR

# Taxa Listing

Project ID: MDT06PBSJ  
RAI No.: MDT06PBSJ008

RAI No.: MDT06PBSJ008

Sta. Name: Peterson Ranch Pond # 4

Client ID:

Date Coll.: 8/17/2006

No. Jars: 1

STORET ID:

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
<b>Chironomidae</b>							
Chironomidae							
<i>Acricotopus</i> sp.	5	4.59%	Yes	Larva		10	CG
Chironomidae	1	0.92%	No	Pupa		10	CG
<i>Cricotopus (Cricotopus)</i> sp.	6	5.50%	Yes	Larva		7	SH
<i>Dicrotendipes</i> sp.	1	0.92%	Yes	Larva		8	CG
<i>Endochironomus</i> sp.	4	3.67%	Yes	Larva		10	SH
<i>Metriocnemus</i> sp.	1	0.92%	Yes	Larva		6	OM
Orthoclaadiinae	4	3.67%	No	Larva	Early Instar	6	CG
<i>Parakiefferiella</i> sp.	1	0.92%	Yes	Larva		6	CG
<i>Paratanytarsus</i> sp.	1	0.92%	Yes	Larva		6	CG
<i>Procladius</i> sp.	1	0.92%	Yes	Larva		9	PR
<i>Psectrocladius</i> sp.	1	0.92%	Yes	Larva		8	CG
<i>Pseudochironomus</i> sp.	2	1.83%	Yes	Larva		5	CG
<i>Tanytarsus</i> sp.	2	1.83%	Yes	Larva		6	CF
<b>Sample Count</b>	<b>109</b>						

# Metrics Report

Project ID: MDT06PBSJ  
 RAI No.: MDT06PBSJ008  
 Sta. Name: Peterson Ranch Pond # 4  
 Client ID:  
 STORET ID:  
 Coll. Date: 8/17/2006

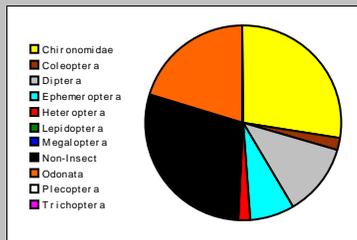
## Abundance Measures

Sample Count: 109  
 Sample Abundance: 1,635.00 6.67% of sample used

Coll. Procedure:  
 Sample Notes:

## Taxonomic Composition

Category	R	A	PRA
Non-Insect	7	32	29.36%
Odonata	1	22	20.18%
Ephemeroptera	2	8	7.34%
Plecoptera			
Heteroptera	2	2	1.83%
Megaloptera			
Trichoptera			
Lepidoptera			
Coleoptera	2	2	1.83%
Diptera	1	13	11.93%
Chironomidae	11	30	27.52%

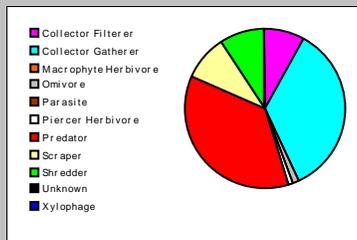


## Dominant Taxa

Category	A	PRA
Enallagma	22	20.18%
Ceratopogoninae	13	11.93%
Naididae	10	9.17%
Gyraulid	8	7.34%
Cladocera	7	6.42%
Cricotopus (Cricotopus)	6	5.50%
Caenis	6	5.50%
Acricotopus	5	4.59%
Orthocladinae	4	3.67%
Endochironomus	4	3.67%
Hyalella	3	2.75%
Tanytarsus	2	1.83%
Pseudochironomus	2	1.83%
Physidae	2	1.83%
Callibaetis	2	1.83%

## Functional Composition

Category	R	A	PRA
Predator	7	40	36.70%
Parasite			
Collector Gatherer	11	38	34.86%
Collector Filterer	2	9	8.26%
Macrophyte Herbivore			
Piercer Herbivore	1	1	0.92%
Xylophage			
Scraper	2	10	9.17%
Shredder	2	10	9.17%
Omnivore	1	1	0.92%
Unknown			

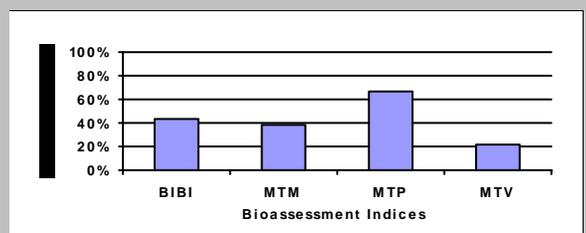


## Metric Values and Scores

Metric	Value	BIBI	MTP	MTV	MTM
<i>Composition</i>					
Taxa Richness	26	3	3		2
Non-Insect Percent	29.36%				
E Richness	2	1		1	
P Richness	0	1		0	
T Richness	0	1		0	
EPT Richness	2		0		0
EPT Percent	7.34%		0		0
Oligochaeta+Hirudinea Percent	9.17%				
Baetidae/Ephemeroptera	0.250				
Hydropsychidae/Trichoptera	0.000				
<i>Dominance</i>					
Dominant Taxon Percent	20.18%		3		3
Dominant Taxa (2) Percent	32.11%				
Dominant Taxa (3) Percent	41.28%	5			
Dominant Taxa (10) Percent	77.98%				
<i>Diversity</i>					
Shannon H (loge)	2.741				
Shannon H (log2)	3.955		3		
Margalef D	5.394				
Simpson D	0.085				
Evenness	0.060				
<i>Function</i>					
Predator Richness	7		3		
Predator Percent	36.70%	5			
Filterer Richness	2				
Filterer Percent	8.26%			2	
Collector Percent	43.12%		3		3
Scraper+Shredder Percent	18.35%		2		0
Scraper/Filterer	1.111				
Scraper/Scraper+Filterer	0.526				
<i>Habit</i>					
Burrower Richness	4				
Burrower Percent	15.60%				
Swimmer Richness	3				
Swimmer Percent	3.67%				
Clinger Richness	2	1			
Clinger Percent	7.34%				
<i>Characteristics</i>					
Cold Stenotherm Richness	0				
Cold Stenotherm Percent	0.00%				
Hemoglobin Bearer Richness	6				
Hemoglobin Bearer Percent	15.60%				
Air Breather Richness	2				
Air Breather Percent	1.83%				
<i>Voltinism</i>					
Univoltine Richness	8				
Semivoltine Richness	2	1			
Multivoltine Percent	37.61%		3		
<i>Tolerance</i>					
Sediment Tolerant Richness	1				
Sediment Tolerant Percent	7.34%				
Sediment Sensitive Richness	0				
Sediment Sensitive Percent	0.00%				
Metals Tolerance Index	3.650				
Pollution Sensitive Richness	0				
Pollution Tolerant Percent	24.77%	1	3		0
Hilsenhoff Biotic Index	7.324		0		0
Intolerant Percent	0.00%				
Supertolerant Percent	42.20%				
CTQa	99.474				

## Bioassessment Indices

BiIndex	Description	Score	Pct	Rating
BIBI	B-IBI (Karr et al.)	22	44.00%	
MTP	Montana DEQ Plains (Bukantis 1998)	20	66.67%	Slight
MTV	Montana Revised Valleys/Foothills (Bollman 1998)	4	22.22%	Moderate
MTM	Montana DEQ Mountains (Bukantis 1998)	8	38.10%	Moderate



# Taxa Listing

Project ID: MDT06PBSJ  
RAI No.: MDT06PBSJ010

RAI No.: MDT06PBSJ010

Sta. Name: Peterson Ranch Pond # 5

Client ID:

Date Coll.: 8/17/2006

No. Jars: 1

STORET ID:

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
<b>Non-Insect</b>							
Acari	7	6.25%	Yes	Unknown		5	PR
Ostracoda	13	11.61%	Yes	Unknown		8	CG
Asellidae							
<i>Caecidotea</i> sp.	1	0.89%	Yes	Unknown		8	CG
Erpobdellidae							
<i>Mooreobdella</i> sp.	1	0.89%	Yes	Unknown		8	PR
Lymnaeidae							
<i>Stagnicola</i> sp.	2	1.79%	Yes	Unknown		6	SC
Naididae							
Naididae	12	10.71%	Yes	Unknown		8	CG
Pisidiidae							
Pisidiidae	2	1.79%	Yes	Unknown		8	CG
Planorbidae							
<i>Gyraulus</i> sp.	10	8.93%	Yes	Unknown		8	SC
Talitridae							
<i>Hyalella</i> sp.	17	15.18%	Yes	Unknown		8	CG
<b>Odonata</b>							
Aeshnidae							
Aeshnidae	1	0.89%	Yes	Larva	Damaged	5	PR
Coenagrionidae							
<i>Enallagma</i> sp.	18	16.07%	Yes	Larva		7	PR
Libellulidae							
<i>Sympetrum</i> sp.	1	0.89%	Yes	Larva		9	PR
<b>Ephemeroptera</b>							
Caenidae							
<i>Caenis</i> sp.	3	2.68%	Yes	Larva		7	CG
<b>Heteroptera</b>							
Notonectidae							
<i>Notonecta</i> sp.	1	0.89%	Yes	Adult		5	PR
<b>Coleoptera</b>							
Halplidae							
<i>Halplus</i> sp.	1	0.89%	No	Larva		5	PH
<i>Halplus</i> sp.	1	0.89%	Yes	Adult		5	PH
<i>Pelodytes</i> sp.	1	0.89%	Yes	Adult		5	SH
<b>Diptera</b>							
Ceratopogonidae							
Ceratopogoninae	4	3.57%	Yes	Larva		6	PR

# Taxa Listing

Project ID: MDT06PBSJ  
RAI No.: MDT06PBSJ010

RAI No.: MDT06PBSJ010

Sta. Name: Peterson Ranch Pond # 5

Client ID:

Date Coll.: 8/17/2006

No. Jars: 1

STORET ID:

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
<b>Chironomidae</b>							
Chironomidae							
<i>Acricotopus</i> sp.	3	2.68%	Yes	Larva		10	CG
<i>Cricotopus (Cricotopus)</i> sp.	5	4.46%	Yes	Larva		7	SH
<i>Dicrotendipes</i> sp.	2	1.79%	Yes	Larva		8	CG
<i>Micropsectra</i> sp.	1	0.89%	Yes	Larva		4	CG
<i>Orthocladius</i> sp.	1	0.89%	Yes	Larva		6	CG
<i>Parakiefferiella</i> sp.	1	0.89%	Yes	Larva		6	CG
<i>Phaenopsectra</i> sp.	1	0.89%	Yes	Larva		7	SC
<i>Psectrocladius</i> sp.	1	0.89%	Yes	Larva		8	CG
<i>Tanytarsus</i> sp.	1	0.89%	Yes	Larva		6	CF
<b>Sample Count</b>	<b>112</b>						

# Metrics Report

Project ID: MDT06PBSJ  
 RAI No.: MDT06PBSJ010  
 Sta. Name: Peterson Ranch Pond # 5  
 Client ID:  
 STORET ID:  
 Coll. Date: 8/17/2006

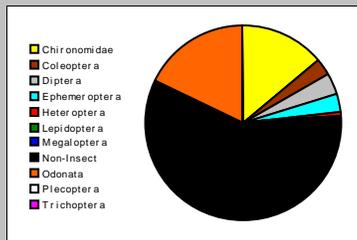
## Abundance Measures

Sample Count: 112  
 Sample Abundance: 3,360.00 3.33% of sample used

Coll. Procedure:  
 Sample Notes:

## Taxonomic Composition

Category	R	A	PRA
Non-Insect	9	65	58.04%
Odonata	3	20	17.86%
Ephemeroptera	1	3	2.68%
Plecoptera			
Heteroptera	1	1	0.89%
Megaloptera			
Trichoptera			
Lepidoptera			
Coleoptera	2	3	2.68%
Diptera	1	4	3.57%
Chironomidae	9	16	14.29%

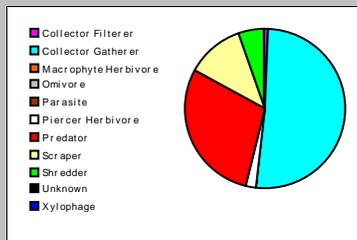


## Dominant Taxa

Category	A	PRA
Enallagma	18	16.07%
Hyaella	17	15.18%
Ostracoda	13	11.61%
Naididae	12	10.71%
Gyraulus	10	8.93%
Acari	7	6.25%
Cricotopus (Cricotopus)	5	4.46%
Ceratopogoninae	4	3.57%
Caenis	3	2.68%
Acricotopus	3	2.68%
Stannicola	2	1.79%
Pisidiidae	2	1.79%
Halipus	2	1.79%
Dicrotendipes	2	1.79%
Aeshnidae	1	0.89%

## Functional Composition

Category	R	A	PRA
Predator	7	33	29.46%
Parasite			
Collector Gatherer	12	57	50.89%
Collector Filterer	1	1	0.89%
Macrophyte Herbivore			
Piercer Herbivore	1	2	1.79%
Xylophage			
Scraper	3	13	11.61%
Shredder	2	6	5.36%
Omnivore			
Unknown			

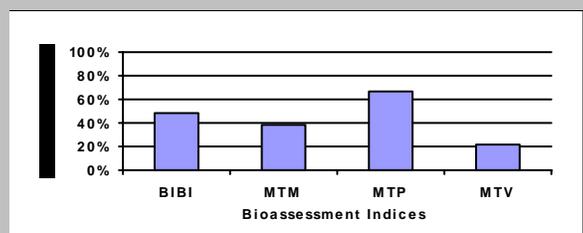


## Metric Values and Scores

Metric	Value	BIBI	MTP	MTV	MTM
<i>Composition</i>					
Taxa Richness	26	3	3		2
Non-Insect Percent	58.04%				
E Richness	1	1		0	
P Richness	0	1		0	
T Richness	0	1		0	
EPT Richness	1		0		0
EPT Percent	2.68%		0		0
Oligochaeta+Hirudinea Percent	11.61%				
Baetidae/Ephemeroptera	0.00%				
Hydropsychidae/Trichoptera	0.00%				
<i>Dominance</i>					
Dominant Taxon Percent	16.07%		3		3
Dominant Taxa (2) Percent	31.25%				
Dominant Taxa (3) Percent	42.86%	5			
Dominant Taxa (10) Percent	82.14%				
<i>Diversity</i>					
Shannon H (loge)	2.688				
Shannon H (log2)	3.879		3		
Margalef D	5.308				
Simpson D	0.086				
Evenness	0.062				
<i>Function</i>					
Predator Richness	7		3		
Predator Percent	29.46%	5			
Filterer Richness	1				
Filterer Percent	0.89%			3	
Collector Percent	51.79%		3		3
Scraper+Shredder Percent	16.96%		2		0
Scraper/Filterer	13.00%				
Scraper/Scraper+Filterer	0.92%				
<i>Habit</i>					
Burrower Richness	2				
Burrower Percent	5.36%				
Swimmer Richness	3				
Swimmer Percent	3.57%				
Clinger Richness	3	1			
Clinger Percent	6.25%				
<i>Characteristics</i>					
Cold Stenotherm Richness	0				
Cold Stenotherm Percent	0.00%				
Hemoglobin Bearer Richness	4				
Hemoglobin Bearer Percent	12.50%				
Air Breather Richness	0				
Air Breather Percent	0.00%				
<i>Voltinism</i>					
Univoltine Richness	11				
Semivoltine Richness	4	3			
Multivoltine Percent	32.14%			3	
<i>Tolerance</i>					
Sediment Tolerant Richness	2				
Sediment Tolerant Percent	10.71%				
Sediment Sensitive Richness	0				
Sediment Sensitive Percent	0.00%				
Metals Tolerance Index	3.590				
Pollution Sensitive Richness	0				
Pollution Tolerant Percent	21.43%		3		1
Hilsenhoff Biotic Index	7.304			0	
Intolerant Percent	0.00%				
Supertolerant Percent	56.25%				
CTQa	100.125				

## Bioassessment Indices

BioIndex	Description	Score	Pct	Rating
BIBI	B-IBI (Karr et al.)	24	48.00%	
MTP	Montana DEQ Plains (Bukantis 1998)	20	66.67%	Slight
MTV	Montana Revised Valleys/Foothills (Bollman 1998)	4	22.22%	Moderate
MTM	Montana DEQ Mountains (Bukantis 1998)	8	38.10%	Moderate



## **Appendix G**

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### **REVEGETATION**

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*MDT Wetland Mitigation Monitoring  
Peterson Ranch  
Hall, Montana*

24. SEEDING



A. Description

This work consists of revegetating areas shown on the plans and other areas disturbed during construction. Seeding Area No. 1 is a native seed mix to be used in all non-wetland (dry) areas. Seeding Area No. 2 is a transitional seed mix to be used in wet and semi-wet areas. All work is to be conducted in accordance with Section 610 of the Standard Specifications.

B. Construction Requirements

1. Schedule. Drill seed only between October 1 and May 15. Broadcast seeding is acceptable between April 1 and May 15. Double seeding rate for broadcast seeding.

C. Materials

1. Seeding Area No. 1

<u>Species</u>	<u>Kgs(lbs) per Hectare (Acre)</u>
Revenue slender wheatgrass	1.0 (1.0)
Rosana western wheatgrass	6.5 (6.0)
Lodorm green needlegrass	3.5 (3.0)
Sherman big bluegrass	2.0 (2.0)
Magnar Great Basin wildrye	4.5 (4.0)

2. Seeding Area No. 2

<u>Species</u>	<u>Kgs(lbs) per Hectare (Acre)</u>
Revenue slender wheatgrass	1.0 (1.0)
Rosana western wheatgrass	7.5 (7.0)

January 1999

Shoshone creeping wildrye	4.5 (4.0)
Western mannagrass	1.0 (1.0)
American sloughgrass	1.0 (1.0)
Blatic rush	0.1 (0.1)
Bluejoint reedgrass	0.1 (0.1)

25. PLANTING

A. Description

This work includes collecting, preparing, and planting live cuttings from suitable willow species resident within the Flint Creek floodplain.

B. Construction Requirements

1. Schedule

Collect and plant cuttings when the ground is ice-free and while the whole plants are dormant. This will typically be in late fall after leaf-drop (October-November), or early spring before bud-break (March-May).

2. Quality Assurance

Supplier or installation contractor is to have not less than three years of experience in successfully collecting and installing wetland plant material.

3. Selection

Select cuttings from the list of suitable species provided below. Identification of willow species is to be made by a qualified agronomist or biologist supervising the project. Select young, green wood (1-3 years). Do not use suckers (<1 year). Choose branches that are 13-25 millimeters (0.5-1.0 inches) in diameter and 900-1800 millimeters (3-6 feet) in length. Select branches that will not overly affect the health and appearance of the parent plant when removed. Do not remove more than 25% of the branches from any given individual.

4. Preparation

Trim all side branches of the cutting to a single stem. Cut the tip where the cutting becomes less than 13 millimeters (0.5 inches). Cut the bottom of the cutting at a 45 degree angle to assist in planting and identification of the bottom end. Label each cutting with color-coded flagging or paint to identify species. Soak cuttings in water for at least 24 hours prior to planting.

5. Storage

Cuttings may be stored up to two weeks wrapped in burlap and bailing twine and soaked in water. Store vertically and soak the lower 450-600 millimeters (18-24 inches) of the stems. Do not submerge the entire cutting. If it is necessary to store cuttings for longer periods, store vertically in a dry, well ventilated, dark, and cool (35-50 deg. F) without freezing. Keep cuttings in moist (not soaked), fungus-free sawdust. At no time should the cuttings be spread out on the ground or exposed to sun and/or wind.

6. Planting

Plant cuttings in small colonies of 8-10 plants each in the locations shown on the plans. Space colonies at 8-10 meters (26-33 feet) apart. Space individual cuttings at 300-900 millimeters (1-3 feet) apart.

SPECIAL PROVISIONS

Project No. 1280

Insert cuttings in the ground so that the bottom is between 50 and 150 millimeters (2-6 inches) below the water table throughout the growing season. Insert cuttings by hand or with a rubber mallet where possible. If the soil is rocky or gravelly, use a rod or rebar stake to create a hole. The use of a shovel or other large tools should be avoided. If shoveling is necessary, the soil should be well tamped to insure good contact between the cutting and the soil.

Cleanly clip the top of the cutting so that at least 3/4 of the length of the stem is below ground, and 3-4 healthy buds are above ground. A minimum of 200 millimeters (8 inches) should remain above ground. Clip any portion of the top end that is deformed by installation with a rubber mallet.

C. Materials

The following species are suitable for cuttings and can be found within the project site. Obtain cuttings on-site or from other off-site locations within the Flint Creek floodplain. Obtain permission from landowners prior to collecting cuttings on private property.

Suitable Cutting Species

Peach-Leaved Willow	<i>Salix amygdaloides</i>
Sandbar Willow	<i>Salix exigua</i>
Bebb's Willow	<i>Salix bebbiana</i>
Drummond Willow	<i>Salix drummondiana</i>
Yellow Willow	<i>Salix lutea</i>

Other willow species native to the Flint Creek floodplain may be substituted upon approval.

D. Method of Measurement

Willow cuttings will be measured as each, including collection, storage, planting, and installation in place.

E. Basis of Payment

Payment for the completed and accepted quantities will be made under the following:

<u>Pay Item</u>	<u>Pay Unit</u>
Bareroot Stock	Each
Willow Cuttings	Each

Such price and payment constitutes full compensation for all labor, equipment, tools, materials and incidentals necessary to complete the item.