MONTANA DEPARTMENT OF TRANSPORTATION
WETLAND MITIGATION MONITORING REPORT: YEAR 2007

Peterson Ranch
Hall, Montana

Prepared for:

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

Prepared by:

POST, BUCKLEY, SCHUH, & JERNIGAN
801 North Last Chance Gulch, Suite 101
Helena, MT 59601-3360

December 2007

PBS&J Project No: B43088.00 – 0110

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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 sixth 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 though the highly permeable alluvium substrate located within the floodplain of the Flint Creek Valley.

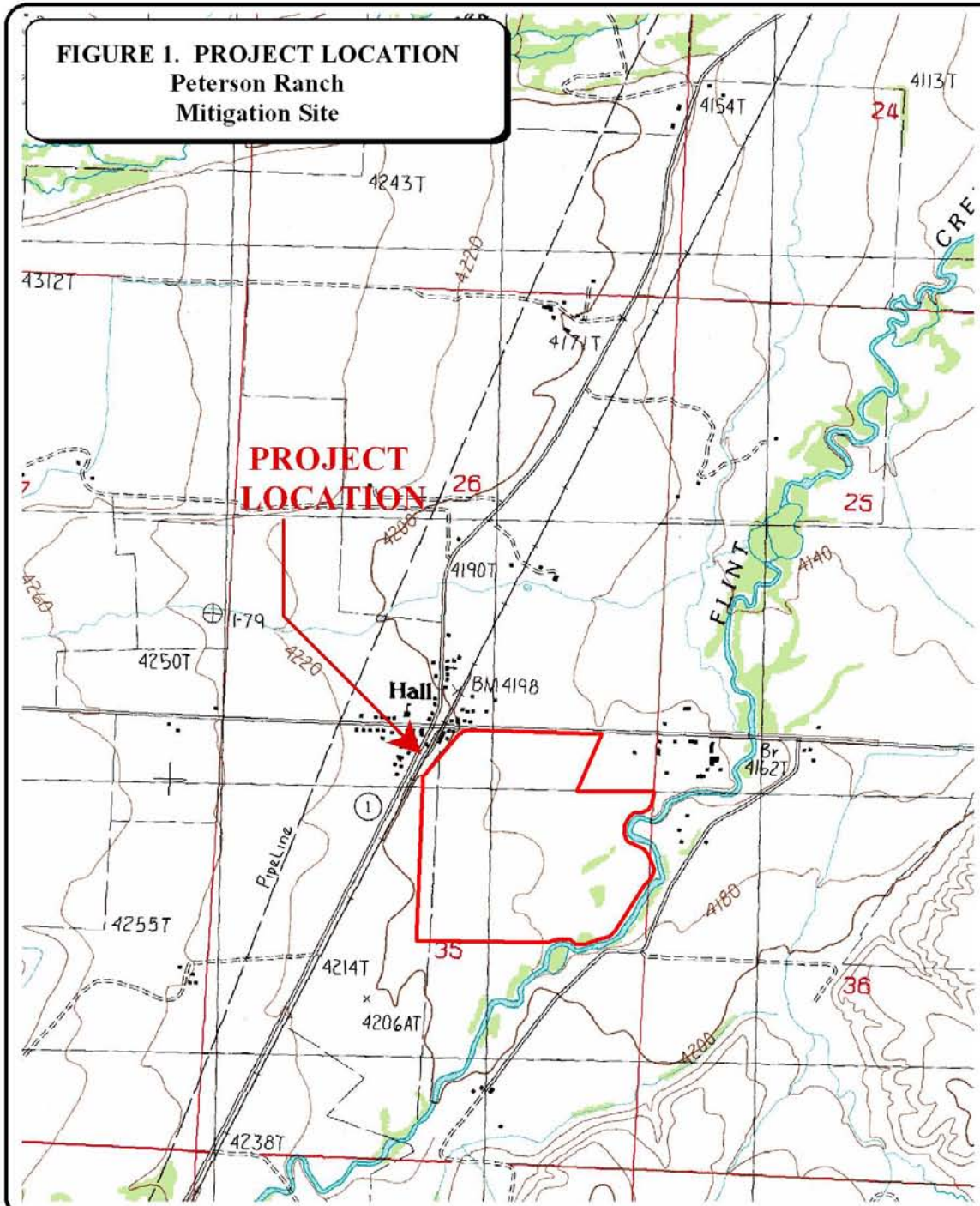
The site was designed to mitigate for specific wetland functions and values impacted by MDT roadway projects. These include riparian, wet meadow, emergent wetland, and open water areas lost to MDT construction. Impacted functions include sediment and nutrient retention, water quality, groundwater recharge, 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



800 0 800 1600 FEET

1: 24,000

PROJECT #: 130091.010
DATE: DEC 2002
LOCATION: HALL, MT
PROJECT MANAGER: B. DUTTON
DRAWN BY: B. STEINEBACH

LAND & WATER CONSULTING, INC.
1120 CEDAR PO BOX 8254 MISSOULA, MT 59807

2.0 METHODS

2.1 Monitoring Dates and Activities

The site was visited on July 24th (mid-season) of 2007. 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. Spring bird visits were conducted until 2006 and were also discontinued.

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.

Noxious weed locations observed during the 2007 field visit were mapped and are illustrated on **Figure 3**.

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 2007 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 Wildlife

Mammal, reptile, and amphibian species observations and other positive indicators of use, such as vocalizations, were recorded on the wetland monitoring form during the site visit. 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 the mid-season visit. No formal census plots, spot mapping, point counts, or strip transects were conducted. 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 14, 2007 aerial photograph was used as a base for **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 2006 aerial photographs in 2007. 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

This mitigation site occurs in Flint Creek Valley floodplain consisting of areas of low topography, small side channels (irrigation ditches) and ponds. The main 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. A secondary source of potential hydrology is seasonal flooding by Flint Creek.

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 – 2007, and thus their

"OW#1" and "OW#2" labels were removed from **Figure 3** in **Appendix A** and replaced with "Excavated Wetland 1" and "Excavated Wetland 2". Water levels within the former OW/ponds 1 and 2 during 2004-2007 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 the summer visits (**Table 1**).

Table 1: ***Approximate percentage of open water (OW) / ponds observed in 2007.***

Visit	Excavation 1	Excavation 2	OW/Pond 3	OW/Pond 4	OW/Pond 5
July 24, 2007	60%	60%	100%	100%	100%

Large excavated (proposed) wetland cells west of the main drainage bisecting the property do not appear to be receiving water as originally intended. With the exception of the excavated areas 1 and 2, 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-seven 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 two upland community types 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 two upland communities observed included Type 2-*Agropyron* and Type 12-*Agropyron/Lepidium*. Type 2 covered the vast majority of the mitigation site and Type 12 is a new community for 2007 monitoring. Plant species observed within each of these communities are listed on the Monitoring Forms (**Appendix B**).

Table 2: ***2002 - 2007 vegetation species list for the Peterson Ranch Wetland Mitigation Site.***

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

Table 2 (continued): ***2002 - 2007 vegetation species list for the Peterson Ranch Wetland Mitigation Site.***

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

[1] **Bolded** species indicate those documented in the analysis area for the first time in 2007.

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

Type 4 was dominated by creeping spike rush (*Eleocharis palustris*), Nebraska sedge (*Carex nebrascensis*) and common cattail (*Typha latifolia*). Type 9 was dominated by cattail, creeping spike rush, and American sloughgrass (*Beckmannia syzigachne*). Type 10 was dominated by redtop (*Agrostis alba*) and American speedwell (*Veronica americana*). During previous monitoring the Type 11 area was recorded as open water within the constructed ponds 1 and 2. During the 2004 monitoring, Type 11 was dominated by American speedwell and milfoil (*Myriophyllum* sp.). 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 2005-2007 monitoring. Types 5 and 7 were the next wettest areas, consisting of emergent vegetation occurring in depressions and side channels throughout the wet meadow complexes. Types 5 and 7 were dominated by Nebraska sedge, broad-leaf cattail, and meadow foxtail (*Alopecurus pratensis*).

Type 3 ass the next wettest wetland type and was classified as scrub-shrub wetland. This area has mature shrub communities growing adjacent to the active side channel (irrigation ditch). Type 3 vegetation was dominated by Bebb willow (*Salix bebbiana*), black cottonwood, Geyer willow (*Salix geyeriana*), and swamp current (*Ribes aureum*). The remaining Types 1, 6, and 8 were the least-wet areas. These areas function as the transitional zone between the wettest areas and drier upland vegetation boundary. These types, though dominated by wetter species, 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 two upland types were present. The Type 2 upland area was 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. Type 12 was located on the west side of the mitigation site along the dry berms created as impoundments for the proposed ponds. Type 12 consisted of mostly invasive and/or aggressive weedy species dominated by clasping pepper-grass (*Lepidium perfoliatum*), tall tumble mustard (*Sisymbrium altissimum*), Canada thistle (*Cirsium arvense*), and musk thistle (*Carduus nutans*). Type 12 also had one native grass species including slender wheatgrass that was intermixed with more dominant weedy species. The noxious weeds within Type 12 were observed to have increased since the 2006 monitoring.

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

Canada thistle locations observed during the 2007 field visit were mapped and are illustrated on **Figure 3** in **Appendix A**. These were individual noxious weed locations or small patches not mapped as a community type. Weed species distributions illustrated on **Figure 3** were also captured in the community types on the **Monitoring Forms** (**Appendix B**). All other noxious weed species were recorded only at the community level and therefore were not mapped as an individual plant or patch. A species of milfoil has been observed on the site and was originally considered the non-native species, but due to new information regarding a native species of milfoil, it is being listed by genus only until further positive identification can be made next season.

Vegetation transect results are detailed on **Monitoring Forms** (**Appendix B**) and are summarized in **Tables 3** and **4** and in **Charts 1** to **4**. Vegetation transect results showed no change in vegetation types for both transect 1 and 2. Wetland areas for transect 1 remained similar to the 2006 monitoring results. Transect 2 remained similar to 2006 wetland composition. Percent vegetative cover observed in 2005, 2006 and 2007 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	2007
Transect Length (feet)	222	222	222	222	222	222
# Vegetation Community Transitions along Transect	1	1	1	1	1	1
# Vegetation Communities along Transect	2	2	2	2	2	2
# Hydrophytic Vegetation Communities along Transect	1	1	1	1	1	1
Total Vegetative Species	14	15	15	17	17	18
Total Hydrophytic Species	9	11	10	11	11	13
Total Upland Species	4	3	3	6	6	5
Estimated % Total Vegetative Cover	85	95	68	60	60	95
% Transect Length Comprised of Hydrophytic Vegetation Communities	49	38	38	38	38	38
% Transect Length Comprised of Upland Vegetation Communities	51	62	62	62	62	62
% Transect Length Comprised of Unvegetated Open Water	0	0	0	0	0	0
% Transect Length Comprised of Bare Substrate	0	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.***

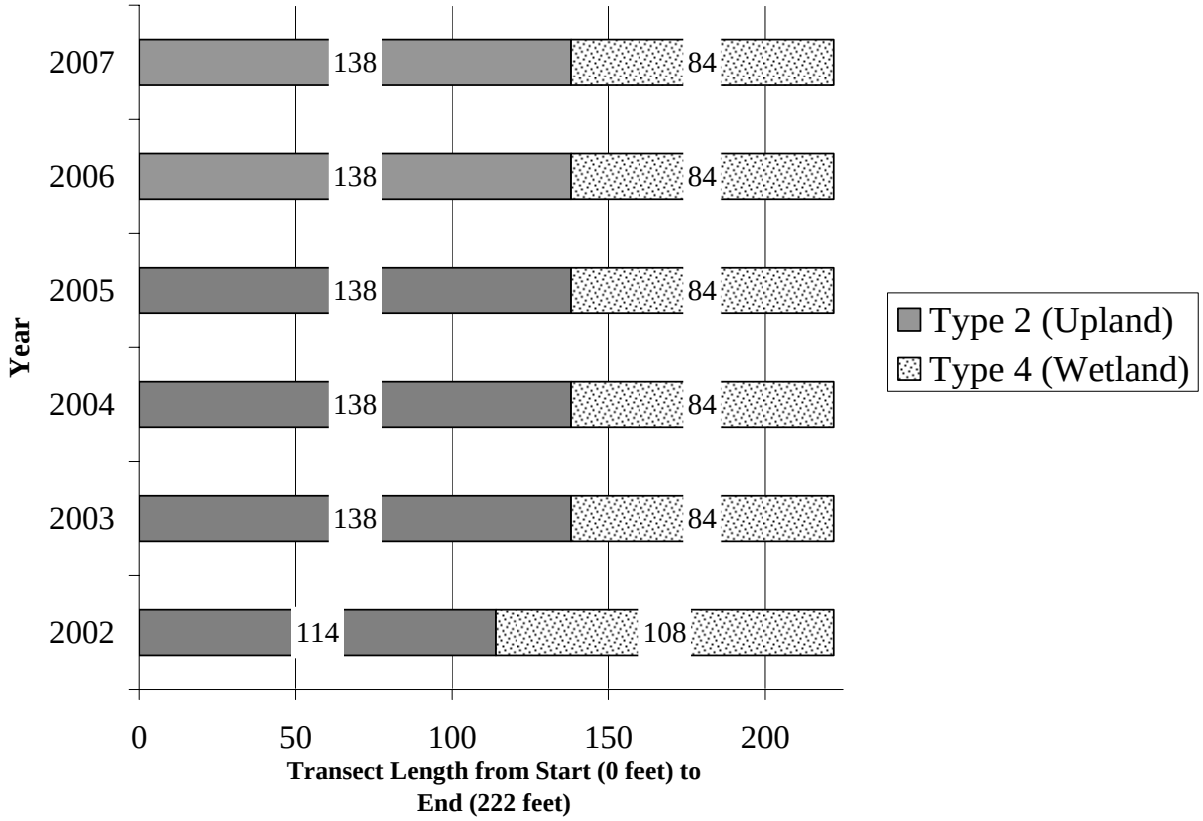


Chart 2: ***Length of vegetation communities within Transect 1 for each year monitored.***

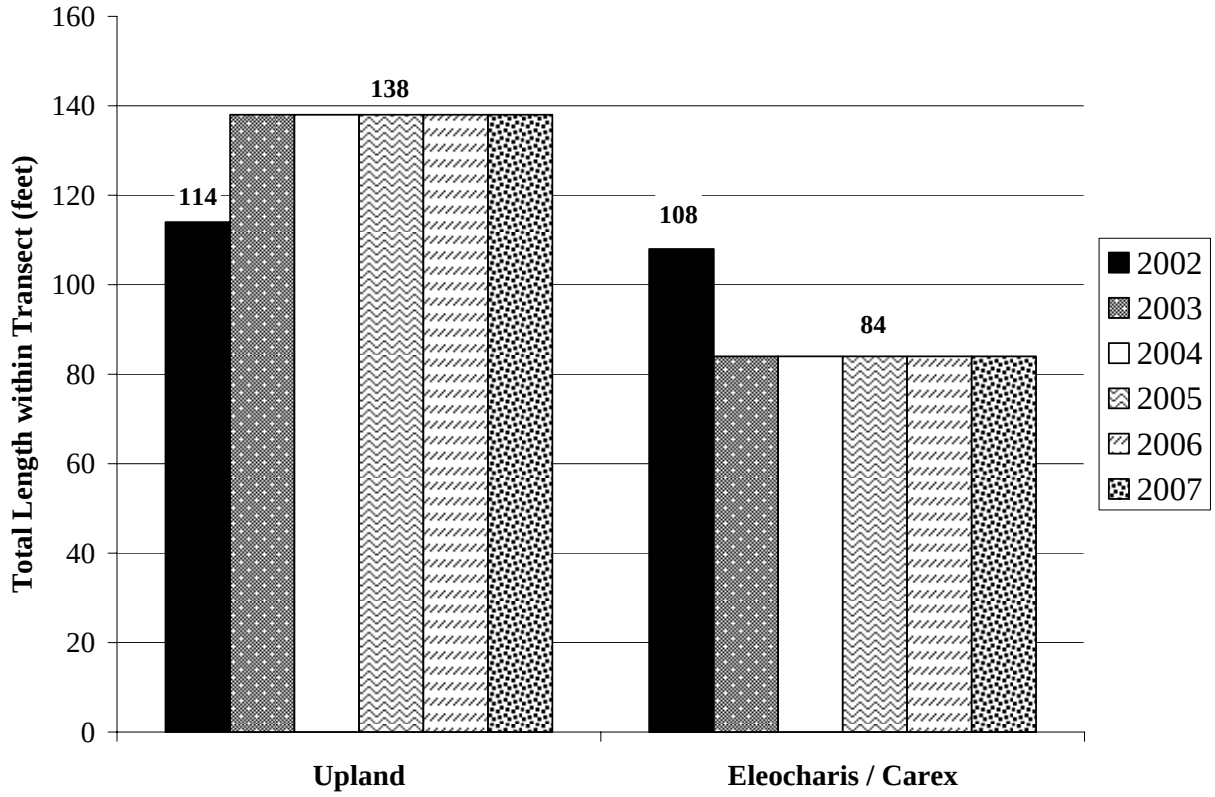


Table 4: ***Transect 2 data summary.***

Monitoring Year	2002	2003	2004	2005	2006	2007
Transect Length (feet)	195	195	195	195	195	195
# Vegetation Community Transitions along Transect	0	1	1	1	1	1
# Vegetation Communities along Transect	1	2	2	2	2	2
# Hydrophytic Vegetation Communities along Transect	0	1	1	1	1	1
Total Vegetative Species	15	13	13	9	14	16
Total Hydrophytic Species	6	6	7	3	6	7
Total Upland Species	6	7	5	6	8	9
Estimated % Total Vegetative Cover	85	95	85	50	50	50
% Transect Length Comprised of Hydrophytic Vegetation Communities	0	10	10	10	5	5
% Transect Length Comprised of Upland Vegetation Communities	100	90	90	90	95	95
% Transect Length Comprised of Unvegetated Open Water	0	0	0	0	0	0
% Transect Length Comprised of Bare Substrate	0	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.***

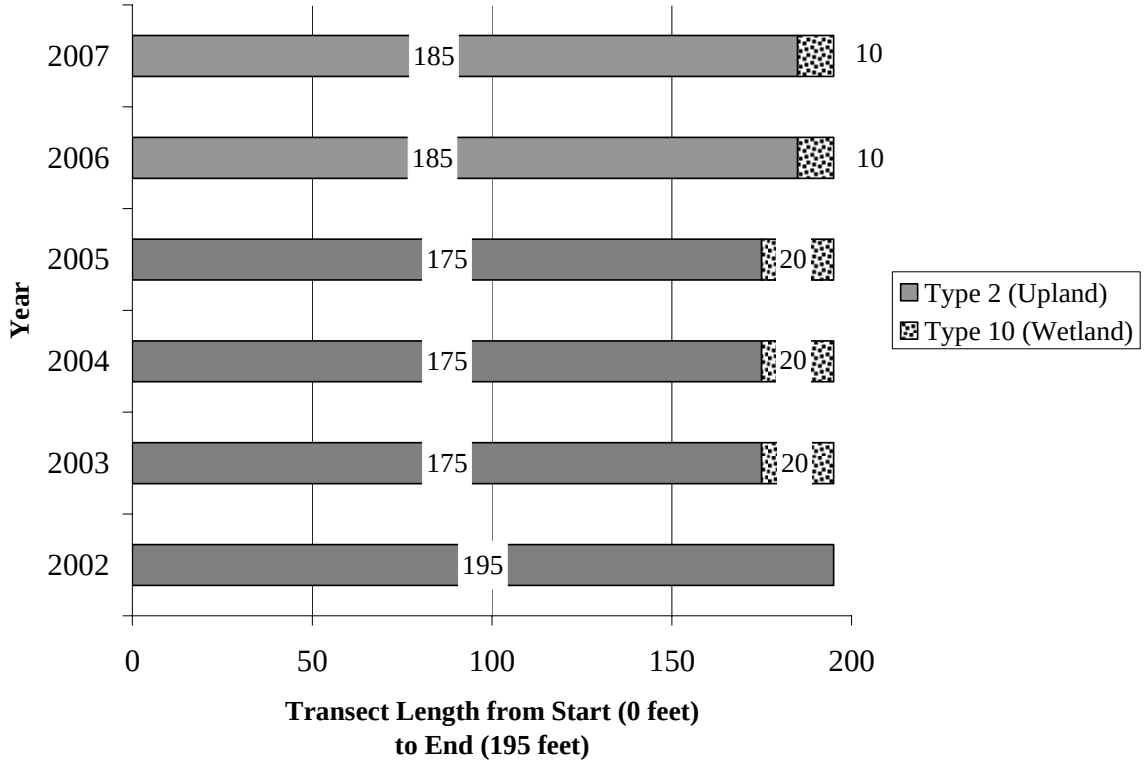
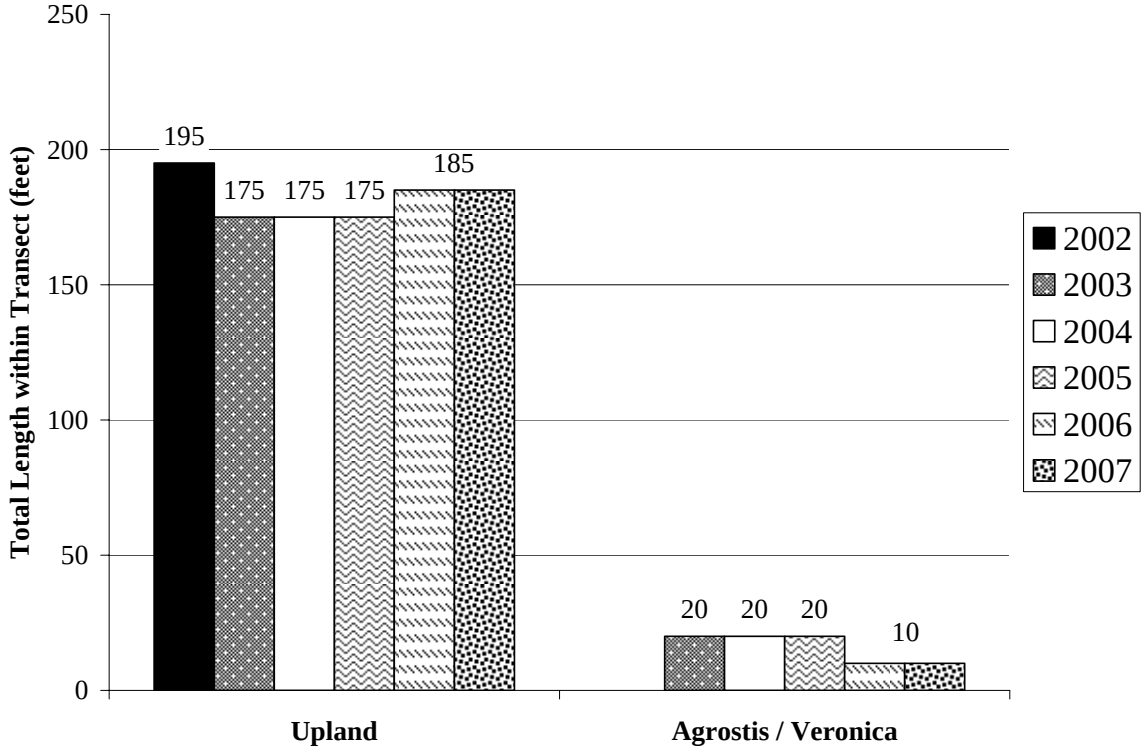


Chart 4: ***Length of vegetation communities within Transect 2 for each year monitored.***



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 2007 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 2007.***

Condition	2002 (acre)	2003 (acre)	2004 (acre)	2005 (acre)	2006 (acre)	2007 (acre)
Gross Wetland Area	25.98	26.23	26.23	26.23	26.70	25.96
Open Water Area	(1.90)	(1.90)	(0.61)	(1.27) [1]	(1.08)	(1.08)
Upland "Islands"	(1.63)	(2.72)	(2.85)	(3.03)	(2.88)	(2.88)
Net Wetland Area	**22.45**	**21.61**	**22.77**	**21.93**	**22.74**	**22.00**

[1] Discrepancies in acreage calculations were identified and corrected in 2006.

Approximately 22.00 wetland acres and 1.08 open water acres are currently within the monitoring area (**Figure 3** in **Appendix A**), for a total of 23.08 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 23.08 – 22.60 = 0.48 acre.

Pre-project and post-project delineation boundaries were observed to be fairly consistent. However, during the 2002-2007 monitoring some differences were observed between pre-project and post-project wetland boundaries. A few such areas of note occur northeast of Excavated Wetland 2, where mapped pre-project wetlands were apparently disturbed by construction and did not exhibit wetland characteristics during the 2002-2007 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.

3.5 Wildlife

Wildlife species, or evidence of wildlife, observed on the site during the 2002 - 2007 monitoring efforts are listed in **Table 6**. Specific evidence observed in 2007, 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 and seven bird species were noted at the mitigation site during the 2007 site visits (**Table 6**).

Table 6: ***Fish and wildlife species observed at the Peterson Ranch Wetland Mitigation Site from 2002 to 2007.***

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

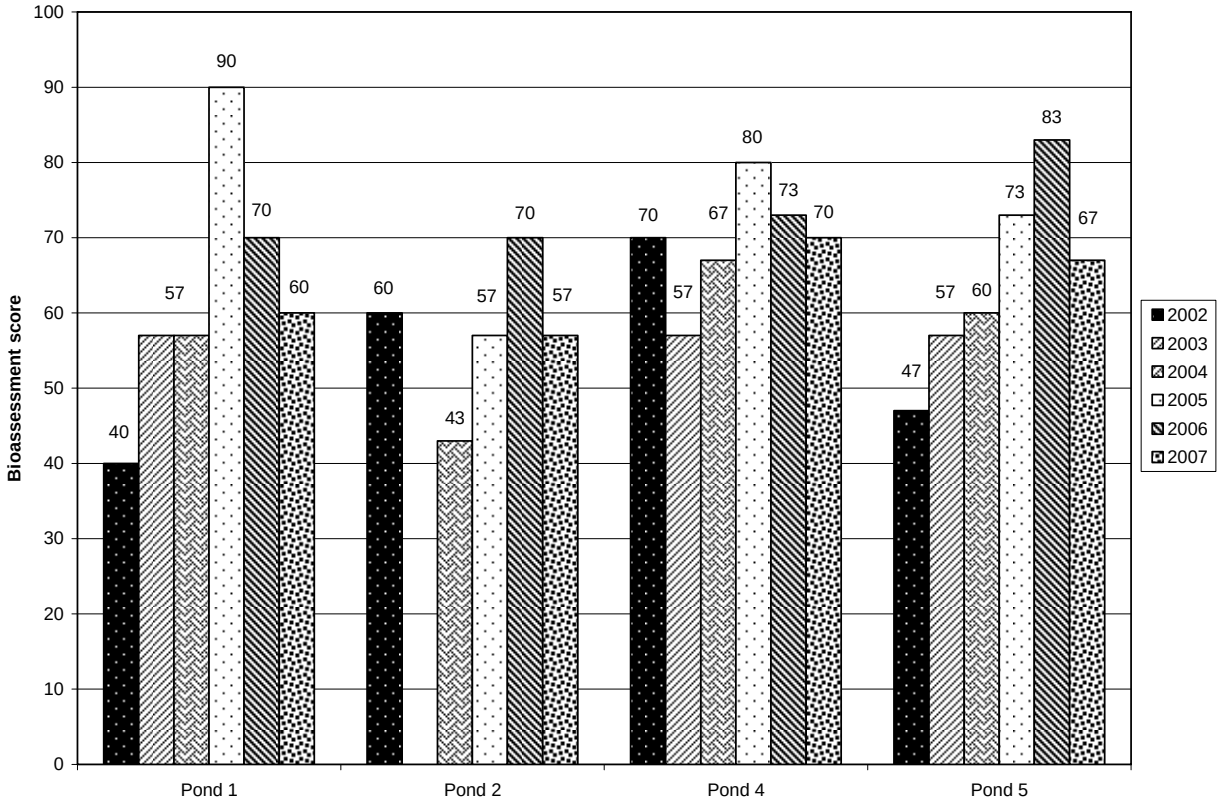
Bolded species were observed during 2007 monitoring. All other species were observed during one or more of the previous monitoring years, but not during 2007.

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 excavated wetlands 1 and 2. Four locations were sampled during the 2007 monitoring. The following analyses in italics and in Chart 5 were provided by Rhithron Associates, Inc. (Bollman 2007).

> ***Excavation 1:*** *Bioassessment scores fell in 2006 and again in 2007 at this site, sub-optimal biological conditions are indicated. Taxa richness dropped from the previous year, and crustacean taxa were apparently not well-established. Odonates, especially the damselfly* Enallagma *sp., and 7 midge taxa dominated the sampled animals. Habitats appear to have been diverse, with macrophyte surfaces and benthic substrates accounting for the most important habitat spaces. Open-water taxa were not common, suggesting dense vegetation. The thermal preference of the invertebrate assemblage was calculated at 19.5ºC.*
>
> ***Excavation 2:*** *The fauna at this site, which entirely lacked an odonate component, suggests that vegetation was more sparse here than at site MS 1. Benthic substrate habitats appear to have been the dominant colonization space for the aquatic invertebrate assemblage. In terms of taxa richness, this site appears to have been notably stable over the course of the monitored period. Similar to the other Peterson Ranch pond sites, the thermal preference of the sampled assemblage was calculated at 19.5ºC, suggesting that these sites are among the warmest of the mitigated wetlands studied in 2007.*
>
> ***OW/Pool 4:*** *The rich invertebrate fauna collected at this site is suggestive of a well-developed wetland assemblage. Macrocrustaceans, especially the amphipod* Gammarus *sp., were abundant here, and open-water taxa were not dominant. Two caddisfly taxa were collected, suggesting that water quality was good. Functional diversity was also characteristic of the invertebrate assemblage. Optimal conditions are indicated by bioassessment scores in 2007. The thermal preference of the community was calculated at 19.2ºC.*
>
> ***OW/Pool 5****: The invertebrate fauna at this site suggests that aquatic habitats are moderately developed here. Diversity diminished since 2006. Assessment scores, however, implied optimal conditions in 2007. Macrocrustaceans were not common, but taxa associated with vegetation, such as the damselfly* Enallagm*a sp. and the snail* Gyraulus *sp. were abundant. Open-water taxa, such as* Haliplus *sp. and the mayflies* Caenis *sp. and* Callibaetis *sp. were also common, indicating diverse habitats. The thermal preference of this assemblage was calculated at 18.5ºC, implying cooler water temperatures here than at any of the other sites in the Peterson complex.*

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



3.7 Functional Assessment

Completed 2007 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 excavated wetlands 1 and 2 and associated emergent wet meadow west of the main drainage bisecting the site (AA 1), scrub-shrub emergent wetlands along the main drainage bisecting the site (AA 2), and created wetland OW/ponds 3, 4, and 5 with associated emergent vegetation east of the main drainage bisecting the site (AA 3). A complete breakdown of ratings for each assessment area and pre-project assessment areas is presented in **Table 7**.

Ratings in 2007 were slightly lower than those derived in 2006. The wetlands on the Peterson Ranch mitigation site are currently rated as Category III (AA 1, 2 and 3) (moderate value). These ratings are primarily due to the moderate ratings for MTNHP 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.

Table 7: ***Summary of 1998 (baseline) and 2007 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[1]	2007 AA 1[1, 2]	2007 AA 2[1, 2]	2007 AA 3[1, 2]
Listed/Proposed T&E Species Habitat	Low (0.3)	Low (0.0)	Low (0.0)	Low (0.0)
MTNHP Species Habitat	Low (0.1)	Low (0.1)	Mod (0.7)	Mod (0.7)
General Wildlife Habitat	Low (0.1)	Mod (0.5)	Mod (0.7)	Mod (0.7)
General Fish/Aquatic Habitat	NA	NA	NA	NA
Flood Attenuation	NA	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)
Sediment, Nutrient, Toxicant Removal	Mod (0.5)	Mod (0.7)	High (1.0)	Mod (0.7)
Sediment/Shoreline Stabilization	NA	Low (0.3)	High (1.0)	High (1.0)
Production Export/Food Chain Support	Mod (0.7)	High (0.9)	High (0.8)	High (0.9)
Groundwater Discharge/Recharge	UNK	High (1.0)	High (1.0)	High (1.0)
Uniqueness	Low (0.2)	Low (0.3)	Low (0.3)	Low (0.3)
Recreation/Education Potential	Low (0.1)	Low (0.1)	Low (0.3)	Low (0.3)
Actual Points / Possible Points	3.0 / 8	5.2 / 11	6.9 / 11	6.9 / 11
% off Possible Score Achieved	38%	47%	63%	63%
Overall Category	III (borderline IV)	III	III	III
Total Acreage of Assessed Wetlands and Open Water within Easement by AA	**22.60**	**6.47**	**3.0**	**13.61**
Functional Units (acreage x actual points) by AA	**67.80**	**33.64**	**20.70**	**93.91**
Total Acreage of Assessed Wetlands and Open Water on Site (acre)	**22.60**	**23.08**		
Total Functional Units on Site	**67.80**	**148.25**		
Net Acreage Gain (assessed wetlands and open water only) (acre)	NA	**0.48**		
Net Functional Unit Gain	NA	**80.45**		

[1] The baseline assessment was performed using the 1996 MDT Assessment Method. The 2007 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, though general trends can be noted.

[2] See completed 2007 MDT functional assessment forms **Appendix B** for further detail.

During 2006, the site received a low rating for T&E habitat due to documented incidental habitat with observation of a bald eagle (*Haliaeetus leucocephalus*) at the site. Since last year's monitoring, the bald eagle has been de-listed as an endangered species and currently is considered a MTNHP species with a S3 rating. In turn, the delisting changed the functional assessment ratings by decreasing the T & E species habitat and lowering the overall category rating to III. The MTNHP species habitat rating remained similar to 2006 and was not changed by the de-listing.

The AAs 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 to 2007) monitoring, AAs 2 and 3 rating for the category MTNHP species habitat increased due to the presences of bobolink (*Dolichonyx oryzivorus*) within the assessment areas. The bobolink is rated as S2 category by the MTNHP. 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 148.25 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 2007 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 with a wet mix consisting of slender wheatgrass, 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, western wheatgrass, 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, 2006 and 2007 monitoring due to extensive herbaceous cover of upland grass species and browse by livestock. The area including excavated wetlands # 1 & 2 west of the main drainage bisecting the site 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, or golden current shrubs were observed in 2007. Only nine chokecherry shrubs were observed in 2007. Survival data are presented in the **Monitoring Forms** (**Appendix B)**.

3.10 Maintenance Needs/Recommendations

Several noxious weeds are present including Canada thistle, hound's tongue, musk thistle, oxeye daisy, and spotted knapweed. These generally consist of scattered individuals with moderate 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 continues to preclude wetland development in many areas. Continued livestock grazing within the area of excavated wetlands 1 and 2 is slowing wetland development.

3.11 Current Credit Summary

At this time approximately 22.00 acres of wetland and 1.08 acres of open water occur on the mitigation site, for a total of 23.08 acres of aquatic habitat. Subtracting the original 22.6 acres of pre-project wetlands from this total yields a current net of approximately 0.48 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 80 functional units to date.

4.0 REFERENCES

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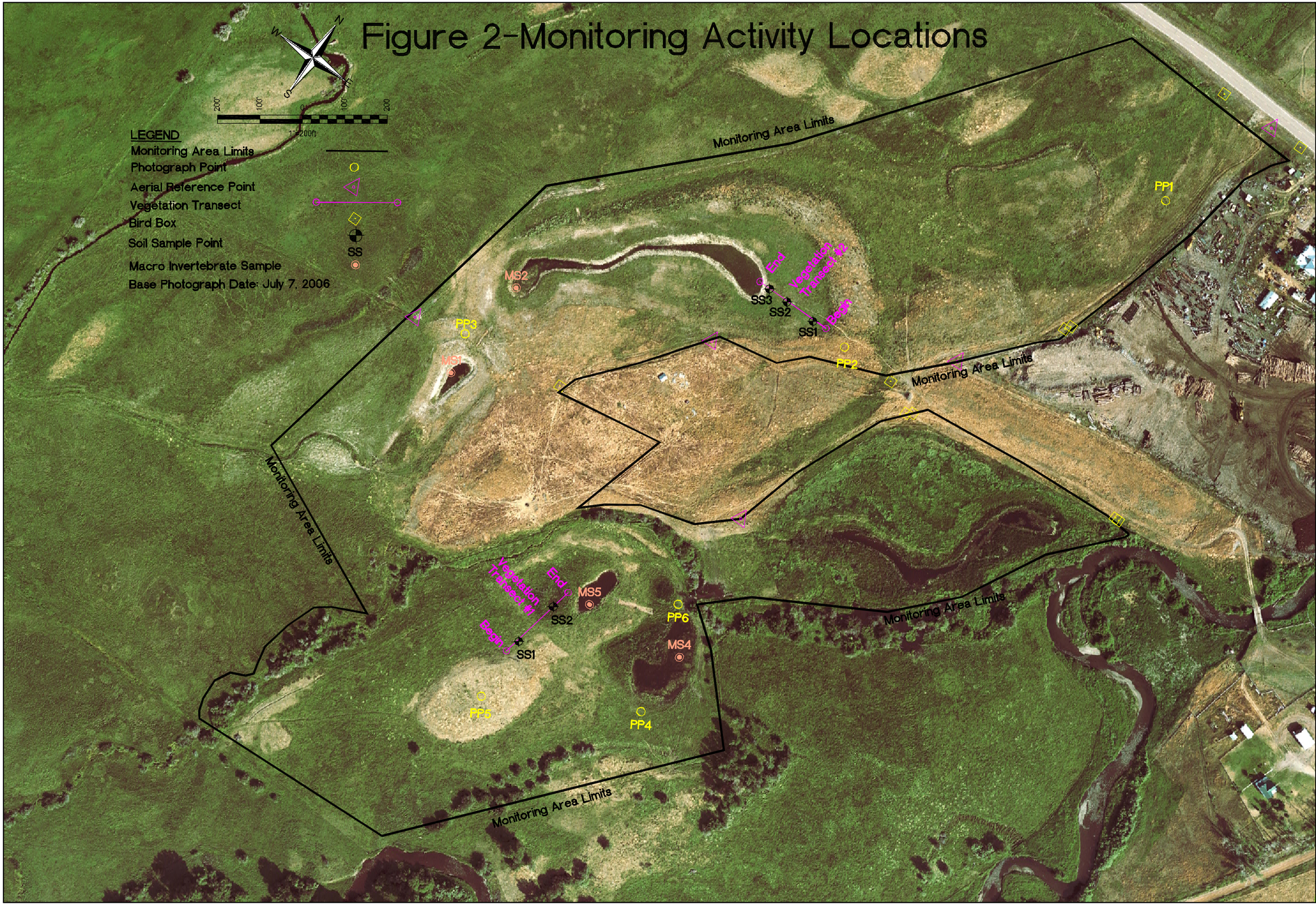
Appendix A

FIGURES 2, 3, & 4

MDT Wetland Mitigation Monitoring
Peterson Ranch
Hall, Montana

Figure 2-Monitoring Activity Locations



PROJECT NAME
MDT Peterson Wetland Mitigation

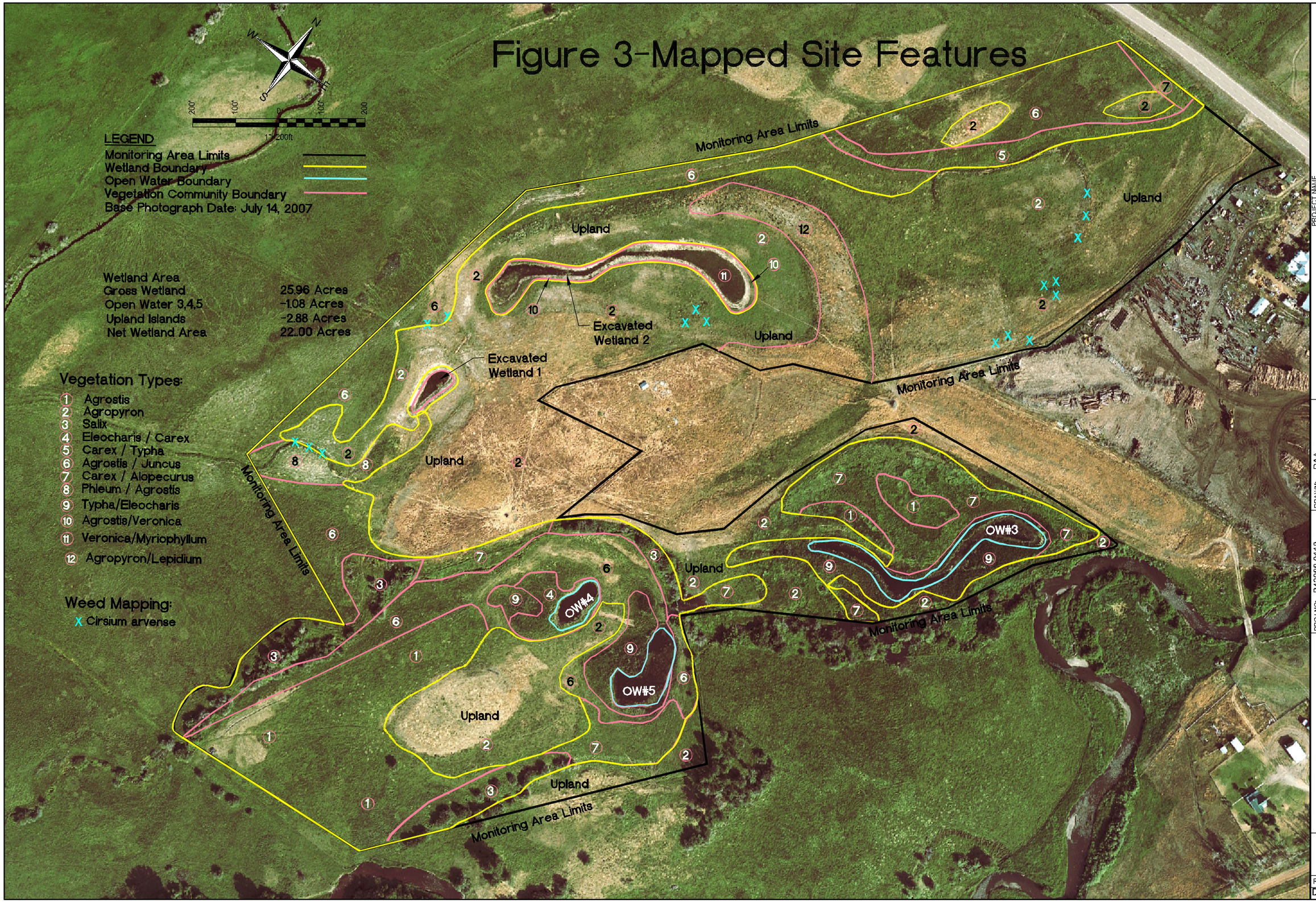
DRAWING TITLE
Monitoring Activity Locations

DRAWN: RA/LL
PROJ MGR: J.Berglund
CHECKED: APPVD:
PROJ NO: B33054.118
LOCATION:
SCALE: 1"=200'
FILE NAME: L:\330054.118\Peterson\dwg\Peterson2007.dwg

PBSJ
1120 Cedar
Missoula, MT 59802

FIGURE
2 OF
REV -
Nov/20/2007

Figure 3-Mapped Site Features



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

DRAWN: RAA
PROJ MGR: J.Bergland
CHECKED: GH | APPVD: GH
PROJ NO: B43088.0118
LOCATION: Hall, MT
SCALE: 1"=200ft
FILE NAME: L:\3300554.118\Peterson\dwg\Peterson2007.dwg

PBS&J
1120 Cedar
Missoula, MT 59802

FIGURE
3 OF
REV -
Dec/10/2007

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

Monitoring Area Limits
WETLAND
UPLAND
WETLAND
UPLAND
Monitoring Area Limits
UPLAND
WETLAND
UPLAND
Monitoring Area Limits
UPLAND
WETLAND
UPLAND
WETLAND
Monitoring Area Limits
UPLAND
WETLAND
UPLAND
WETLAND
Monitoring Area Limits

PROJECT NAME
MDT Peterson Ranch Wetland Mitigation
DRAWING TITLE
Pre-Developed Wetland

PROJ NO: 330054.118
FILE NAME: TASK10BASE2004.dwg
SCALE: 1"= 200ft
LOCATION: Peterson Ranch
DRAWN: RA
CHECKED: GH
APPVD: BD
PROJ MGR: BD

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

SHEET NUMBER
F-4 OF
REV -
DATE: 6-24-05

Appendix B

2007 WETLAND MITIGATION SITE MONITORING FORMS
2007 BIRD SURVEY FORM
2007 COE WETLAND DELINEATION FORMS
2007 FUNCTIONAL ASSESSMENT FORMS

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: 7/24/07
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 & smoky Person(s) conducting the assessment: Greg Howard
Initial Evaluation Date: 7/31/02 Visit #: 12 Monitoring Year: 6
Size of evaluation area: 93 acres Land use surrounding wetland: Agriculture & forestry products

HYDROLOGY

Surface Water
Source:_____
Inundation**:** Present x 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 x 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 x
Record depth of water below ground surface

Well #	Depth	Well #	Depth	Well #	Depth

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

COMMENTS/PROBLEMS: Similar conditions at ponds 1 & 2 as recorded in 2006. Area is heavily disturbed within Community Types 10 & 11 from livestock grazing around pond perimeters. Individual locations of noxious weeds and patches mapped within the easement and illustrated on Figure 3. Observed increase in musk and Canadian thistle. Community Type 12: Agropyron / Lepidium added in 2007 for areas located on the dry berms on west side of easement.

VEGETATION COMMUNITIES

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

Dominant Species	% Cover	Dominant Species	% Cover
Agrostis alba	50	*Typha latifolia*	T
Carex nebrascensis	10	*Scirpus acutus*	T
Agropyron Trachycaulum	P	*Hordeum jubatum*	P
Potentilla anserine	P	*Festuca pratensis*	10
Trifolium pratense	P	*Juncus balticus*	P

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

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

Dominant Species	% Cover	Dominant Species	% Cover
Agropyron trachycaulum	50	*Malva neglecta*	P
Agrostis alba	20	*Thlaspi arvensis*	T
Potentilla anserine	P	*Achillea millefolium*	T
Helianthus annuus	T	*Alopecurus pratensis*	T
Cirsium arvense	T	*Taraxacum officinale*	P
Chrysanthemum leucanthemum	T	*Hordeum jubatum*	P

COMMENTS/PROBLEMS: Dry slopes surrounding created ponds. Area dominated by upland grasses and some invasive species present. Areas moderately grazed during 2007.

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

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

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

Additional Activities Checklist:

X 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
Eleocharis Palustris	40	*Agrostis alba*	20
Carex nebrascensis	P	*Juncus ensifolius*	P
Typha latifolia	20	*Potentilla anserina*	T
Alopecurus pratensis	10	*Beckmannia syzigachne*	P
Polygonum amphibium	T	*Glyceria striata*	T
Juncus confuses	P	*Juncus nodosus*	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
Carex nebrascensis	40		
Typha latifolia	20		
Alopecurus pratensis	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
Agrostis alba	30	*Alopecurus pratensis*	P
Juncus Balticus	40	*Carex nebrascensis*	P
Phleum pretense	10	*Rumex crispus*	T
Trifolium pretense	P	*Triglochin maritimum*	T
Agropyron repens	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
Carex utriculata	50	*Juncus balticus*	P
Alopecurus pratensis	20	*Poa* spp.	T
Veronica Americana	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
Phleum pretense	P	*Typha latifolia*	10
Agrostis alba	30	*Scirpus acutus*	T
Veronica Americana	P	*Hordeum jubatum*	P
Alopecurus pratensis	30	*Glyceria striata*	P
Juncus Balticus	T	*Willow sprigs*	T
Carex nebrascensis	10	*Juncus mertensianus*	P
Beckmannia syzigachne	P	*Eleocharis palustris*	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
Typha latifolia	20	*Potentilla anserina*	P
Eleocharis palustris	20	*Carex nebrascensis*	20
Beckmannia syzigachne	P	*Alopecurus pratensis*	30
Agrostis alba	T	*Glyceria striata*	P
Veronica americana	T	*Scirpus acutus*	10

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
Juncus mertensianus	T	*Eleocharis palustris*	P
Agrostis alba	10	*Trifolium pratense*	T
Veronica americana	10	*Phleum pratense*	T
Alopecurus pratensis	10	*Epilobium ciliatum*	T
Potentilla anserina	P	*Hordeum jubatum*	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

Dominant Species	% Cover	Dominant Species	% Cover
Veronica americana	10	*Scirpus* spp.	P
Typha latifolia	10		
Myriophyllum spp.	60		
Eleocharis palustris	P		

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

Community No.: 12 Community Title (main species): Agropyron / Lepidium

Dominant Species	% Cover	Dominant Species	% Cover
Agropyron trachycaulum	20	*Tragopogon dubius*	T
Elymus cinereus	10	*Poa pratensis*	P
Carduus nutans	P		
Cirsium arvense	P		
Lepidium perfoliatum	40		
Sisymbrium altissimum	T		

COMMENTS/PROBLEMS: New community type for 2007 monitoring. Area located on dry berms within western side of the easement. Areas dominated by mostly aggressive non-native invasive species. Community type has a small percentage of noxious weeds that are increasing annually.

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)
Achillea millefolium	2	*Juncus mertensianus*	10
Agropyron repens	2,6	*Juncus nodosus*	4
Agropyron smithii	2	*Kochia scoparia*	2
Agropyron trachycaulum	2,6,10	*Lepidium perfoliatum*	2
Agrostis alba	1,2,3,4,6,8,9,10	*Lomatium spp.*	2
Alopecurus pratensis	2,4,5,7,8,9	*Lychnis alba*	2
Amaranthus retroflexus	2	*Malva neglecta*	2
Beckmannia syzigachne	5,7,9	*Medicago sativa*	2
Betula occidentalis	3	*Mentha arvensis*	4,7
Bidens cernua	4,6,8	*Myriophyllum spp.*	OW
Bromus inermis	2	*Phalaris arundinaceae*	6,7,8
Bromus tectorum	2	*Phleum pratense*	6,8,10
Carduus nutans	2	*Plantago major*	2
Carex microptera	6	*Poa ampla*	2
Carex nebrascensis	1,4,5,8,9	*Poa pratensis*	2,12
Carex utriculata	1,3,7	*Polygonum amphibium*	4
Centaurea maculosa	2	*Polygonum aviculare*	4
Chenopodium album	2	*Populus tremuloides*	3
Chrysanthemum leucanthemum	2	*Populus trichocarpa*	3
Cirsium arvense	2	*Potentilla anserina*	4,9,10
Cornus stolonifera	3	*Potentilla gracilis*	2
Crataegus douglasii	3	*Prunus virginiana*	2
Cynoglossum officinale	2	*Ribes aureum*	2
Dactylis glomerata	2	*Rosa woodsii*	2,3
Descurainia sophia	2	*Rumex crispus*	2
Elaeagnus commutata	2	*Salix bebbiana*	3
Eleocharis palustris	4,9	*Salix exigua*	3
Elymus cinereus	2	*Salix geyeriana*	3
Elymus triticoides	2	*Scirpus acutus*	1
Epilobium ciliatum	10	*Sisymbrium altissimum*	2
Equisetum arvense	2,4	*Sisyrinchium spp.*	2
Festuca pratensis	2	*Solidago missouriensis*	2
Glyceria striata	7,9	*Taraxacum officinale*	2,6
Helianthus annuus	2	*Thlaspi arvensis*	2
Hordeum jubatum	2	*Tragopogon dubius*	12
Iris missouriensis	4,7	*Triglochin maritimum*	1,6,7
Juncus balticus	6,7	*Trifolium pratense*	2
Juncus confusus	4	*Typha latifolia*	1,4,5,9,10
Juncus ensifolius	4	*Veronica americana*	1,4,7,10,11

COMMENTS/PROBLEMS: One new species identified during 2007: western salsify (*Tragopogon dubius*).

PLANTED WOODY VEGETATION SURVIVAL

Species	Number Originally Planted	Number Observed	Mortality Causes
Prunus virginiana		9	
Salix spp.		650	
Rosa woodsii		-	
Elaeagnus commutata		-	
Ribes aureum		-	
Cornus stolonifera		-	

COMMENTS/PROBLEMS: Similar numbers and conditions exist in 2007 as observed in previous monitoring. Evidence of heavy browse observed on plantings in pond # 1 & 2 areas west of irrigation ditch. Willows counted along pond # 3 (approximately 600) and pond # 5 (50).

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	2				
Coyote					
Frogs					

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:

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

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

COMMENTS/PROBLEMS:

_____

_____

GPS SURVEYING

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

Checklist:

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

COMMENTS/PROBLEMS:

_____

WETLAND DELINEATION

(Attach Corps of Engineers delineation forms)

At each site conduct the items on the checklist below:
_x_ Delineate wetlands according to the 1987 Army Corps manual.
_x_ Delineate wetland-upland boundary on the air photo
___ Survey wetland-upland boundary with a resource grade GPS survey

COMMENTS/PROBLEMS:

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 _x_ NO____
If yes, do they need to be repaired? YES____ NO_x_
If yes, describe problems below and indicate if any actions were taken to remedy the problems.

Were man-made structures build or installed to impound water or control water flow into or out of the wetland? YES____ NO _x_
If yes, are the structures working properly and in good working order? YES____ NO___
If no, describe the problems below.

COMMENTS/PROBLEMS:

MDT WETLAND MONITORING – VEGETATION TRANSECT (continued)

Site: Ponds no. 4 Date: 7/24/07 Examiner: Greg Howard Transect # 1

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

Vegetation type 1:	Agropyron (Community No. 2)	
Length of transect in this type:	138 ft.	feet
Species:		Cover:
Agropyron trachycaulum		20
Bromus inermis		10
Poa pratensis		40
Trifolium pratense		T
Agrostis alba		P
Agropyron repens		20
Taraxacum officinale		P
Juncus balticus		P
Total Vegetative Cover:		95%

Vegetation type 2:	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		30
Polygonum amphibium		T
Agrostis alba		10
Glyceria striata		P
Beckmannia syzigachne		P
Typha latifolia		10
Juncus ensifolius		T
Veronica americana		T
Total Vegetative Cover:		95%

Vegetation type 3:		
Length of transect in this type:		feet
Species:		Cover:
Total Vegetative Cover:		

Vegetation type 4:		
Length of transect in this type:		feet
Species:		Cover:
Total Vegetative Cover:		

MDT WETLAND MONITORING – VEGETATION TRANSECT

Site: Pond no. 2 Date: 7/24/07 Examiner: Greg Howard Transect # 2

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

Vegetation type 1:	Agropyron (Community No. 2)	
Length of transect in this type:	185 ft.	feet
Species:		Cover:
Agropyron trachycaulum		P
Agropyron repens		P
Agrostis alba		20
Potentilla anserina		P
Trifolium pratense		20
Chrysanthemum leucanthemum		T
Cirsium arvense		T
Phleum pratense		P
Poa pratensis		40
Medicago sativa		T
Bromus inermis		T
Taraxacum officinale		P
	Total Vegetative Cover:	90%

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

Vegetation type 3:		
Length of transect in this type:		feet
Species:		Cover:
	Total Vegetative Cover:	

Vegetation type 4:		
Length of transect in this type:		feet
Species:		Cover:
	Total Vegetative Cover:	

MDT WETLAND MONITORING – VEGETATION TRANSECT (back of form)

Cover Estimate		**Indicator Class:**	**Source:**
+ = <1%	3 = 11-20%	+ = Obligate	P = Planted
1 = 1-5%	4 = 21-50%	- = Facultative/Wet	V = Volunteer
2 = 6-10%	5 = >50%	0 = Facultative	

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 food depth (in open water), or at a point where water depths or saturation are maximized. Mark this location with another metal fencepost.

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

Notes:

BIRD SURVEY – FIELD DATA SHEET

Date: 7/24/07

SITE: Peterson Ranch

Survey Time: 9:30-3:00

Bird Species	#	Behavior	Habitat	Bird Species	#	Behavior	Habitat
black-billed magpie	1	L	UP				
great blue heron	1	FO	OW, WM				
killdeer	2	F	US				
mallard	1	F	MA				
marsh wren	2	L, FO	UP, SS				
tree swallow	20	FO	MA				
western meadowlark	1	L	UP				

Notes:
Pond 2 heavily grazed, medium water levels.
Pond 2 = 60% inundated; Pond 1 = 60% inundated; Ponds 3, 4 and 5 = 100% inundated.
No observation of any birds using boxes.
Bird activity low around pond 1 & 2.
Tree swallows near pond 3.
Weather – overcast, humid, smoky and temperatures in the high 80's.

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

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

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

Project/Site:	Peterson Ranch	Date:	7/24/07
Applicant/Owner:	MDT	County:	Granite
Investigator:	Greg Howard	State:	MT

Do Normal Circumstances exist on the site:	x	Yes		No	Community ID:	Upland
Is the site significantly disturbed (Atypical Situation)?		Yes		No	Transect ID:	1 – OW/pool # 4
Is the area a potential Problem Area?:		Yes		No	Plot ID:	1
(If needed, explain on reverse.)						

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1	*Agropyron trachycaulum*	H	FAC	9			
2	*Agropyron repens*	H	FACU	10			
3	*Trifolium pratense*	H	FACU	11			
4	*Taraxacum officinale*	H	FACU	12			
5	*Bromus inermis*	H	--	13			
6	*Agrostis alba*	H	FAC+	14			
7	*Potentilla anserina*	H	OBL	15			
8				16			

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-). 3/7 = 43%

Area dominated by upland vegetation.

HYDROLOGY

Recorded Data (Describe in Remarks):
- ____ Stream, Lake, or Tide Gauge
- ____ Aerial Photographs
- ____ Other
- x No Recorded Data Available

Field Observations:

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

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

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

Wetland Hydrology Indicators:

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

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

No hydrology indicators present at this sampling point.

SOILS

Map Unit Name (Series and Phase): Blossberg loam, 0 to 4 percent slopes

Drainage Class: Poorly drained

Taxonomy (Subgroup): _____

Field Observations

Confirm Mapped Type? _____ Yes x No

Profile Description:

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

Hydric Soil Indicators:

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

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

WETLAND DETERMINATION

Hydrophytic Vegetation Present? _____ Yes X No

Wetland Hydrology Present? _____ Yes X No

Hydric Soils Present? _____ Yes X No

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

Remarks:

Sampling point is considered within upland.

Approved by HQUSACE 2/92

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

Project/Site: Peterson Ranch				Date: 7/24/07	
Applicant/Owner: MDT				County: Granite	
Investigator: Greg Howard				State: MT	
Do Normal Circumstances exist on the site:	x	Yes	___ No	Community ID:	
Is the site significantly disturbed (Atypical Situation)?	___	Yes	___ No	Transect ID:	1– OW/pool # 4
Is the area a potential Problem Area?:	___	Yes	___ No	Plot ID:	2
(If needed, explain on reverse.)					

VEGETATION

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

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-). 9/9 = 100%

Area dominated by hydrophytic vegetation.

HYDROLOGY

___ Recorded Data (Describe in Remarks):
___ Stream, Lake, or Tide Gauge
___ Aerial Photographs
___ Other
x No Recorded Data Available

Field Observations:

Depth of Surface Water: - (in.)

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

Depth to Saturated Soil: 0 (in.)

Wetland Hydrology Indicators:
Primary Indicators:
___ Inundated
x Saturated in Upper 12 Inches
___ Water Marks
___ Drift Lines
___ Sediment Deposits
___ Drainage Patterns in Wetlands
Secondary Indicators (2 or more required):
___ Oxidized Root Channels in Upper 12 Inches
___ Water-Stained Leaves
___ Local Soil Survey Data
___ FAC-Neutral Test
___ Other (Explain in Remarks)

Remarks:
Hydrology indicator present with soils saturated to ground surface.

SOILS

Map Unit Name (Series and Phase): Blossberg loam, 0 to 4 percent slopes

Drainage Class: Poorly drained

Taxonomy (Subgroup): _____

Field Observations
Confirm Mapped Type? x Yes _____ No

Profile Description:

Depth inches	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0 – 6	A1	10 YR 2/1	-	-	Clay loam
6 – 12+	A2	10 YR 2/1	2.5 YR 3/6-	Few / Faint-	Clay

Hydric Soil Indicators:

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

Hydric soil indicators present with low-chroma colors and mottles. Mapped soils listed as hydric in Granite County Soil survey.

WETLAND DETERMINATION

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

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

Remarks:
Sampling point considered within a wetland. Area dominated by emergent vegetation type.

Approved by HQUSACE 2/92

DATA FORM

ROUTINE WETLAND DETERMINATION

(1987 COE Wetlands Delineation Manual)

Project/Site: Peterson Ranch			Date: 7/24/07
Applicant/Owner: MDT			County: Granite
Investigator: Greg Howard			State: MT
Do Normal Circumstances exist on the site:	x Yes	___ No	Community ID:
Is the site significantly disturbed (Atypical Situation)?	___ Yes	___ No	Transect ID: 2 – Pool # 2
Is the area a potential Problem Area?:	___ Yes	___ No	Plot ID: 1
(If needed, explain on reverse.)			

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1	*Agropyron trachycaulum*	H	FAC	9	*Festuca pratensis*	H	FACU+
2	*Agrostis alba*	H	FAC+	10			
3	*Potentilla anserina*	H	OBL	11			
4	*Agropyron repens*	H	FACU	12			
5	*Phleum pratense*	H	FAC-	13			
6	*Taraxacum officinale*	H	--	14			
7	*Trifolium pratense*	H	FACU	15			
8	*Poa pratensis*	H	FAC	16			

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-). 4/9 = 44%

Area dominated by mostly upland grasses and a few invasive species.

HYDROLOGY

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

x No Recorded Data Available

Field Observations:

Depth of Surface Water: -- (in.)

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

Depth to Saturated Soil: -- (in.)

Wetland Hydrology Indicators:

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

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

Remarks:
No hydrology indicator present.

SOILS

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

Profile Description:

Depth inches	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
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:

___	Histosol	___	Concretions
___	Histic Epipedon	___	High Organic Content in surface Layer in Sandy Soils
___	Sulfidic Odor	___	Organic Streaking in Sandy Soils
___	Aquic Moisture Regime	x	Listed on Local Hydric Soils List
___	Reducing Conditions	___	Listed on National Hydric Soils List
x	Gleyed or Low-Chroma Colors	___	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?	___	Yes	x	No	
Wetland Hydrology Present?	___	Yes	x	No	
Hydric Soils Present?	___	Yes	x	No	Is this Sampling Point Within a Wetland? ___ Yes x No

Remarks:
Sampling point considered within an upland area.

DATA FORM

ROUTINE WETLAND DETERMINATION

(1987 COE Wetlands Delineation Manual)

Project/Site: Peterson Ranch	Date: 7/24/07
Applicant/Owner: MDT	County: Granite
Investigator: Greg Howard	State: MT
Do Normal Circumstances exist on the site: x Yes ___ No	Community ID:
Is the site significantly disturbed (Atypical Situation)? ___ Yes ___ No	Transect ID: 2 – Pool # 2
Is the area a potential Problem Area?: ___ Yes ___ No	Plot ID: 2
(If needed, explain on reverse.)	

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1	*Agropyron trachycaulum*	H	FAC	9			
2	*Agrostis alba*	H	FAC+	10			
3	*Hordeum jubatum*	H	FAC+	11			
4	*Veronica americana*	H	OBL	12			
5	*Alopecurus pratensis*	H	FACW	13			
6	*Beckmannia syzigachne*	H	OBL	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. Low cover values for all species.

HYDROLOGY

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

x No Recorded Data Available

Field Observations:

Depth of Surface Water: ___ (in.)

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

Depth to Saturated Soil: 3 (in.)

Wetland Hydrology Indicators:

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

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

Hydrology indicator present with saturated soils to ground surface.

SOILS

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

Profile Description:

Depth inches	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0 – 6	A	10 YR 3/2	-	-	Clay loam
6 – 12+	B	10 YR 4/2	-	-	Sandy clay

Hydric Soil Indicators:

___	Histosol	___	Concretions
___	Histic Epipedon	___	High Organic Content in surface Layer in Sandy Soils
___	Sulfidic Odor	___	Organic Streaking in Sandy Soils
___	Aquic Moisture Regime	x	Listed on Local Hydric Soils List
___	Reducing Conditions	___	Listed on National Hydric Soils List
X	Gleyed or Low-Chroma Colors	___	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?	x	Yes	___	No
Wetland Hydrology Present?	x	Yes	___	No
Hydric Soils Present?	x	Yes	___	No

Is this Sampling Point Within a Wetland? ___ Yes x No

Remarks:
Sampling point considered within a wetland area. The sampling area is located near the fringe of shallow standing water and shoreline. Observations made during 2007 monitoring show area heavily impacted from livestock grazing.

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

1. Project Name: Peterson Ranch **2. Project #:** B43088.00-0110 **Control #:** _____

3. Evaluation Date: 7/24/2007 **4. Evaluator(s):** G. Howard **5. Wetland / Site #(s):** AA-1

6. Wetland Location(s) i. T: 10 N **R:** 13 W **S:** 35 **T:** __ N **R:** __ E **S:** _____

ii. Approx. Stationing / Mileposts: _____

iii. Watershed: 2 - Upper Clark Fork **GPS Reference No. (if applies):** _____

Other Location Information: Excavations # 1, 2 & adjacent emergent wetlands west of main drainage bisecting site.

7. A. Evaluating Agency MDT

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

B. Purpose of Evaluation:

- ☐ Wetlands potentially affected by MDT project
- ☐ Mitigation wetlands; pre-construction
- ☒ Mitigation wetlands; post-construction
- ☐ Other

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

Comments: _____

10. CLASSIFICATION OF WETLAND AND AQUATIC HABITATS IN AA

HGM CLASS [1]	SYSTEM [2]	SUBSYSTEM [2]	CLASS [2]	WATER REGIME [2]	MODIFIER [2]	% OF AA
Riverine	Palustrine	None	Emergent Wetland	Seasonally Flooded	Artifical	60
Riverine	Palustrine	None	Unconsolidated Bottom	Permanently Flooded	Excavated	35
Riverine	Palustrine	None	Aquatic Bed	Permanently Flooded	Excavated	5
---	---	---	---	---	---	

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

Comments: _____

11. ESTIMATED RELATIVE ABUNDANCE (of similarly classified sites within the same Major Montana Watershed Basin)
Common **Comments:** _____

12. GENERAL CONDITION OF AA

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

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

Comments: (types of disturbance, intensity, season, etc.) Livestock grazing.

ii. Prominent weedy, alien, & introduced species: Spotted knapweed, Canada thistle, hound's tongue, and oxeye daisy.

iii. Briefly describe AA and surrounding land use / habitat: Hydrology influenced by irrigation ditches and groundwater. Area consists of two ponds with emergent wetlands and wet medow. Surrounding land use includes residental homes, livestock grazing to the west and timber mill towards the northeast.

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

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

Comments: The number of vegetated classes increased during the 2003 assessment with the addition of aquatic bed class. No new classes found during the 2007 monitoring.

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

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

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

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

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

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

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

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

Primary or Critical habitat **(list species)**	☐ D ☐ S	_____
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 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	---	---	---	---	---	.1 (L)	---

If documented, list the source (e.g., observations, records, etc.)**:** Bald eagle delisted - now rated as S3 species for MNHP.

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)	☐**High**								☒**Moderate**								☐**Low**			
Class Cover Distribution (all vegetated classes)	☐**Even**				☐**Uneven**				☐**Even**				☒**Uneven**				☐**Even**			
Duration of Surface Water in ≥ 10% of AA	**P/P**	**S/I**	**T/E**	**A**	**P/P**	**S/I**	**T/E**	**A**	**P/P**	**S/I**	**T/E**	**A**	**P/P**	**S/I**	**T/E**	**A**	**P/P**	**S/I**	**T/E**	**A**
Low disturbance at AA (see 12)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Moderate disturbance at AA (see 12)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
High disturbance at AA (see 12)	--	--	--	--	--	--	--	--	--	--	--	--	M	--	--	--	--	--	--	--

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)			
	☐ **Exceptional**	☐ **High**	☐ **Moderate**	☐ **Low**
Substantial	--	--	--	--
Moderate	--	--	.5 (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	☐ **Permanent/Perennial**			☐ **Seasonal / Intermittent**			☐ **Temporary / Ephemeral**		
Cover - % of waterbody in AA containing cover objects (*e.g.* submerged logs, large rocks & boulders, overhanging banks, floating-leaved vegetation)	**>25%**	**10-25%**	**<10%**	**>25%**	**10-25%**	**<10%**	**>25%**	**10-25%**	**<10%**
Shading - >75% of streambank or shoreline of AA contains riparian or wetland scrub-shrub or forested communities	--	--	--	--	--	--	--	--	--
Shading – 50 to 75% of streambank or shoreline of AA contains riparian or wetland scrub-shrub or forested communities.	--	--	--	--	--	--	--	--	--
Shading - < 50% of streambank or shoreline of AA contains riparian or wetland scrub-shrub or forested communities.	--	--	--	--	--	--	--	--	--

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

iii. Rating: Use the conclusions from 14D(i) and 14D(ii) above and the matrix below to 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)			
	☐ **Exceptional**	☐ **High**	☐ **Moderate**	☐ **Low**
Native game fish	--	--	--	--
Introduced game fish	--	--	--	--
Non-game fish	--	--	--	--
No fish	--	--	--	--

Comments: _____

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

Applies only to wetlands subject to flooding via in-channel or overbank flow. If wetlands in AA do not 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	☐ **≥ 10 acres**			☒ **<10, >2 acres**			☐ **≤2 acres**		
% of flooded wetland classified as forested, scrub/shrub, or both	**75%**	**25-75%**	**<25%**	**75%**	**25-75%**	**<25%**	**75%**	**25-75%**	**<25%**
AA contains **no outlet or restricted outlet**	--	--	--	--	--	.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 containa 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**.**	☐ **>5 acre feet**			☒ **<5, >1 acre feet**			☐ **≤1 acre foot**		
Duration of surface water at wetlands within the AA	**P/P**	**S/I**	**T/E**	**P/P**	**S/I**	**T/E**	**P/P**	**S/I**	**T/E**
Wetlands in AA flood or pond **≥ 5 out of 10 years**	--	--	--	.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.			
% cover of wetland vegetation in AA	☐ **≥ 70%**		☒ **< 70%**		☐ **≥ 70%**		☐ **< 70%**	
Evidence of flooding or ponding in AA	☐ **Yes**	☐ **No**	☒ **Yes**	☐ **No**	☐ **Yes**	☐ **No**	☐ **Yes**	☐ **No**
AA contains **no or restricted outlet**	--	--	.7 (M)	--	--	--	--	--
AA contains **unrestricted outlet**	--	--	--	--	--	--	--	--

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

Comments: _____

14J. GROUNDWATER DISCHARGE / RECHARGE (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.		
Estimated Relative Abundance from 11	☐rare	☐common	☐abundant	☐rare	☐common	☐abundant	☐rare	☒common	☐abundant
Low disturbance at AA (12i)	--	--	--	--	--	--	--	--	--
Moderate disturbance at AA (12i)	--	--	--	--	--	--	--	.3L	--
High disturbance at AA (12i)	--	--	--	--	--	--	--	--	--

Comments: _____

14L. RECREATION / EDUCATION POTENTIAL

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

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

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

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

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

Ownership	Disturbance at AA from 12(i)		
	☐ Low	☐ Moderate	☒ High
Public ownership	--	--	--
Private ownership	--	--	.1(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	0.00	1	
B. MT Natural Heritage Program Species Habitat	low	0.10	1	
C. General Wildlife Habitat	moderate	0.50	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	0.10	1	
	Total:	**5.20**	**11.00**	____
		Percent of Total Possible Points:	**47%** (Actual / Possible) x 100 [rd to nearest whole #]	

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

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

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

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

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

☐ **I** ☐ **II** ☒ **III** ☐ **IV**

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

1. Project Name: Peterson Ranch **2. Project #:** B43088.00-0110 **Control #:** _____

3. Evaluation Date: 7/24/2007 **4. Evaluator(s):** G. Howard **5. Wetland / Site #(s):** AA-2

6. Wetland Location(s) i. T: 10 N **R:** 13 W **S:** 35 **T:** __ N **R:** __ E **S:** _____

ii. Approx. Stationing / Mileposts: _____

iii. Watershed: 2 - Upper Clark Fork **GPS Reference No. (if applies):** _____

Other Location Information: Mature scrub-shrub type vegetation class along main drainage bisecting site.

7. A. Evaluating Agency MDT

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

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

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

Comments: _____

10. CLASSIFICATION OF WETLAND AND AQUATIC HABITATS IN AA

HGM CLASS [1]	SYSTEM [2]	SUBSYSTEM [2]	CLASS [2]	WATER REGIME [2]	MODIFIER [2]	% OF AA
Riverine	Palustrine	None	Scrub-Shrub Wetland	Seasonally Flooded	Artifical	80
Riverine	Palustrine	None	Emergent Wetland	Seasonally Flooded	Artifical	15
Riverine	Palustrine	None	Rock Bottom	Seasonally Flooded	Artifical	5
---	---	---	---	---	---	

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

Comments: _____

11. ESTIMATED RELATIVE ABUNDANCE (of similarly classified sites within the same Major Montana Watershed Basin)
Common **Comments:** _____

12. GENERAL CONDITION OF AA

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

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

Comments: (types of disturbance, intensity, season, etc.) Livestock grazing.

ii. Prominent weedy, alien, & introduced species: _____

iii. Briefly describe AA and surrounding land use / habitat: Mature scrub-shrub located along an irrigation ditch. Several small pockets of cottonwoods and aspen also present along the same system. Open areas dominated by emergent vegetation.

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

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

Comments: _____

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

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

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

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

Highest Habitat Level	doc/primary	sus/primary	doc/secondary	sus/secondary	doc/incidental	sus/incidental	none
Functional Point & Rating	---	---	---	---	---	---	0 (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	Bald Eagle and 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)	☐**High**								☒**Moderate**								☐**Low**			
Class Cover Distribution (all vegetated classes)	☐**Even**				☐**Uneven**				☐**Even**				☒**Uneven**				☐**Even**			
Duration of Surface Water in ≥ 10% of AA	**P/P**	**S/I**	**T/E**	**A**	**P/P**	**S/I**	**T/E**	**A**	**P/P**	**S/I**	**T/E**	**A**	**P/P**	**S/I**	**T/E**	**A**	**P/P**	**S/I**	**T/E**	**A**
Low disturbance at AA (see 12)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Moderate disturbance at AA (see 12)	--	--	--	--	--	--	--	--	--	--	--	--	H	--	--	--	--	--	--	--
High disturbance at AA (see 12)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

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

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

iii. Rating: Use the conclusions from 14D(i) and 14D(ii) above and the matrix below to 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)			
	☐ **Exceptional**	☐ **High**	☐ **Moderate**	☐ **Low**
Native game fish	--	--	--	--
Introduced game fish	--	--	--	--
Non-game fish	--	--	--	--
No fish	--	--	--	--

Comments: _____

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

Applies only to wetlands subject to flooding via in-channel or overbank flow. If wetlands in AA do not 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	☐ **≥ 10 acres**			☐ **<10, >2 acres**			☒ **≤2 acres**		
% of flooded wetland classified as forested, scrub/shrub, or both	**75%**	**25-75%**	**<25%**	**75%**	**25-75%**	**<25%**	**75%**	**25-75%**	**<25%**
AA contains **no outlet or restricted outlet**	--	--	--	--	--	--	--	.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, accumulated debris and undersized culvert along system.

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**.**	☐ **>5 acre feet**			☒ **<5, >1 acre feet**			☐ **≤1 acre foot**		
Duration of surface water at wetlands within the AA	**P/P**	**S/I**	**T/E**	**P/P**	**S/I**	**T/E**	**P/P**	**S/I**	**T/E**
Wetlands in AA flood or pond **≥ 5 out of 10 years**	--	--	--	.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.			
% cover of wetland vegetation in AA	☒ **≥ 70%**		☐ **< 70%**		☐ **≥ 70%**		☐ **< 70%**	
Evidence of flooding or ponding in AA	☒ **Yes**	☐ **No**	☐ **Yes**	☐ **No**	☐ **Yes**	☐ **No**	☐ **Yes**	☐ **No**
AA contains **no or restricted outlet**	1 (H)	--	--	--	--	--	--	--
AA contains **unrestricted outlet**	--	--	--	--	--	--	--	--

Comments: 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		
	☒Permanent / Perennial	☐Seasonal / Intermittent	☐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	☐ Vegetated component >5 acres						☒ Vegetated component 1-5 acres						☐ Vegetated component <1 acre					
B	☐ High		☐ Moderate		☐ Low		☐ High		☒ Moderate		☐ Low		☐ High		☐ Moderate		☐ Low	
C	☐Y	☐N	☐Y	☐N	☐Y	☐N	☐Y	☐N	☒Y	☐N	☐Y	☐N	☐Y	☐N	☐Y	☐N	☐Y	☐N
P/P	--	--	--	--	--	--	--	--	.8H	--	--	--	--	--	--	--	--	--
S/I	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
T/E/A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Comments: _____

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.		
Estimated Relative Abundance from 11	☐rare	☐common	☐abundant	☐rare	☐common	☐abundant	☐rare	☒common	☐abundant
Low disturbance at AA (12i)	--	--	--	--	--	--	--	--	--
Moderate disturbance at AA (12i)	--	--	--	--	--	--	--	.3L	--
High disturbance at AA (12i)	--	--	--	--	--	--	--	--	--

Comments: _____

14L. RECREATION / EDUCATION POTENTIAL

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

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

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

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

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

Ownership	Disturbance at AA from 12(i)		
	☐ Low	☒ Moderate	☐ High
Public ownership	--	--	--
Private ownership	--	.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	0.00	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	
	Total:	**6.90**	**11.00**	____
		Percent of Total Possible Points:	**63%** (Actual / Possible) x 100 [rd to nearest whole #]	

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

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

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

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

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

☐ **I** ☐ **II** ☒ **III** ☐ **IV**

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

1. Project Name: Peterson Ranch **2. Project #:** B43088.00-0110 **Control #:** _____

3. Evaluation Date: 7/24/2007 **4. Evaluator(s):** G. Howard **5. Wetland / Site #(s):** AA-3

6. Wetland Location(s) i. T: 10 N **R:** 13 W **S:** 35 **T:** __ N **R:** __ E **S:** _____

ii. Approx. Stationing / Mileposts: _____

iii. Watershed: 2 - Upper Clark Fork **GPS Reference No. (if applies):** _____

Other Location Information: Pond #'s 3, 4, and 5.

7. A. Evaluating Agency MDT

B. Purpose of Evaluation:

- ☐ Wetlands potentially affected by MDT project
- ☐ Mitigation wetlands; pre-construction
- ☒ Mitigation wetlands; post-construction
- ☐ Other

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

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

Comments: _____

10. CLASSIFICATION OF WETLAND AND AQUATIC HABITATS IN AA

HGM CLASS [1]	SYSTEM [2]	SUBSYSTEM [2]	CLASS [2]	WATER REGIME [2]	MODIFIER [2]	% OF AA
Riverine	Palustrine	None	Emergent Wetland	Permanently Flooded	Excavated	70
Riverine	Palustrine	None	Unconsolidated Bottom	Permanently Flooded	Excavated	25
Riverine	Palustrine	None	Aquatic Bed	Permanently Flooded	Excavated	5
---	---	---	---	---	---	

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

Comments: _____

11. ESTIMATED RELATIVE ABUNDANCE (of similarly classified sites within the same Major Montana Watershed Basin)
Common **Comments:** _____

12. GENERAL CONDITION OF AA

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

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

Comments: (types of disturbance, intensity, season, etc.) Livestock grazing.

ii. Prominent weedy, alien, & introduced species: Spotted knapweed, Canada thistle, and hound's tongue.

iii. Briefly describe AA and surrounding land use / habitat: Hydrology influenced by groundwater and seasonal flooding of adjacent irrigation ditch. Area has three created wetland ponds. Surrounding land uses include residental homes, agriculture (livestock) and timber mill.

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

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

Comments: The number of vegetated classes increased in 2003 with the addition of the aquatic bed class. No new classes were found during 2007 monitoring.

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

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

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

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

Highest Habitat Level	doc/primary	sus/primary	doc/secondary	sus/secondary	doc/incidental	sus/incidental	none
Functional Point & Rating	---	---	---	---	---	---	0 (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	Bald Eagle
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)	☐**High**								☒**Moderate**								☐**Low**			
Class Cover Distribution (all vegetated classes)	☐**Even**				☐**Uneven**				☐**Even**				☒**Uneven**				☐**Even**			
Duration of Surface Water in ≥ 10% of AA	**P/P**	**S/I**	**T/E**	**A**	**P/P**	**S/I**	**T/E**	**A**	**P/P**	**S/I**	**T/E**	**A**	**P/P**	**S/I**	**T/E**	**A**	**P/P**	**S/I**	**T/E**	**A**
Low disturbance at AA (see 12)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Moderate disturbance at AA (see 12)	--	--	--	--	--	--	--	--	--	--	--	--	H	--	--	--	--	--	--	--
High disturbance at AA (see 12)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

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

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

iii. Rating: Use the conclusions from 14D(i) and 14D(ii) above and the matrix below to 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)			
	☐ **Exceptional**	☐ **High**	☐ **Moderate**	☐ **Low**
Native game fish	--	--	--	--
Introduced game fish	--	--	--	--
Non-game fish	--	--	--	--
No fish	--	--	--	--

Comments: _____

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

Applies only to wetlands subject to flooding via in-channel or overbank flow. If wetlands in AA do not 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	☐ **≥ 10 acres**			☒ **<10, >2 acres**			☐ **≤2 acres**		
% of flooded wetland classified as forested, scrub/shrub, or both	**75%**	**25-75%**	**<25%**	**75%**	**25-75%**	**<25%**	**75%**	**25-75%**	**<25%**
AA contains **no outlet or restricted outlet**	--	--	--	--	--	.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**.**	☐ **>5 acre feet**			☒ **<5, >1 acre feet**			☐ **≤1 acre foot**		
Duration of surface water at wetlands within the AA	**P/P**	**S/I**	**T/E**	**P/P**	**S/I**	**T/E**	**P/P**	**S/I**	**T/E**
Wetlands in AA flood or pond **≥ 5 out of 10 years**	--	--	--	.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.			
% cover of wetland vegetation in AA	☐ **≥ 70%**		☒ **< 70%**		☐ **≥ 70%**		☐ **< 70%**	
Evidence of flooding or ponding in AA	☐ **Yes**	☐ **No**	☒ **Yes**	☐ **No**	☐ **Yes**	☐ **No**	☐ **Yes**	☐ **No**
AA contains **no or restricted outlet**	--	--	.7 (M)	--	--	--	--	--
AA contains **unrestricted outlet**	--	--	--	--	--	--	--	--

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

Comments: _____

14J. GROUNDWATER DISCHARGE / RECHARGE (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.		
Estimated Relative Abundance from 11	☐rare	☐common	☐abundant	☐rare	☐common	☐abundant	☐rare	☒common	☐abundant
Low disturbance at AA (12i)	--	--	--	--	--	--	--	--	--
Moderate disturbance at AA (12i)	--	--	--	--	--	--	--	.3L	--
High disturbance at AA (12i)	--	--	--	--	--	--	--	--	--

Comments: _____

14L. RECREATION / EDUCATION POTENTIAL

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

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

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

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

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

Ownership	Disturbance at AA from 12(i)		
	☐ Low	☒ Moderate	☐ High
Public ownership	--	--	--
Private ownership	--	.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	0.0	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	
	Total:	**6.90**	**11.00**	____
		Percent of Total Possible Points:	**63%** (Actual / Possible) x 100 [rd to nearest whole #]	

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

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

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

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

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

☐ **I** ☐ **II** ☒ **III** ☐ **IV**

Appendix C

2007 REPRESENTATIVE PHOTOGRAPHS

MDT Wetland Mitigation Monitoring
Peterson Ranch
Hall, Montana

PETERSON RANCH WETLAND MITIGATION SITE 2007

Photo Point 1: View looking west across mitigation site. Upland in foreground.

Photo Point 2: View looking west along Transect 2. Upland in foreground and created wetland / pond 2 in background. Increasing distribution of musk thistle and Canadian thistle.

Photo Point 3: View looking north at southern end of created wetland pond 2.

Photo Point 5: View looking north toward pond 5. Emergent vegetation developing around pond fringe.

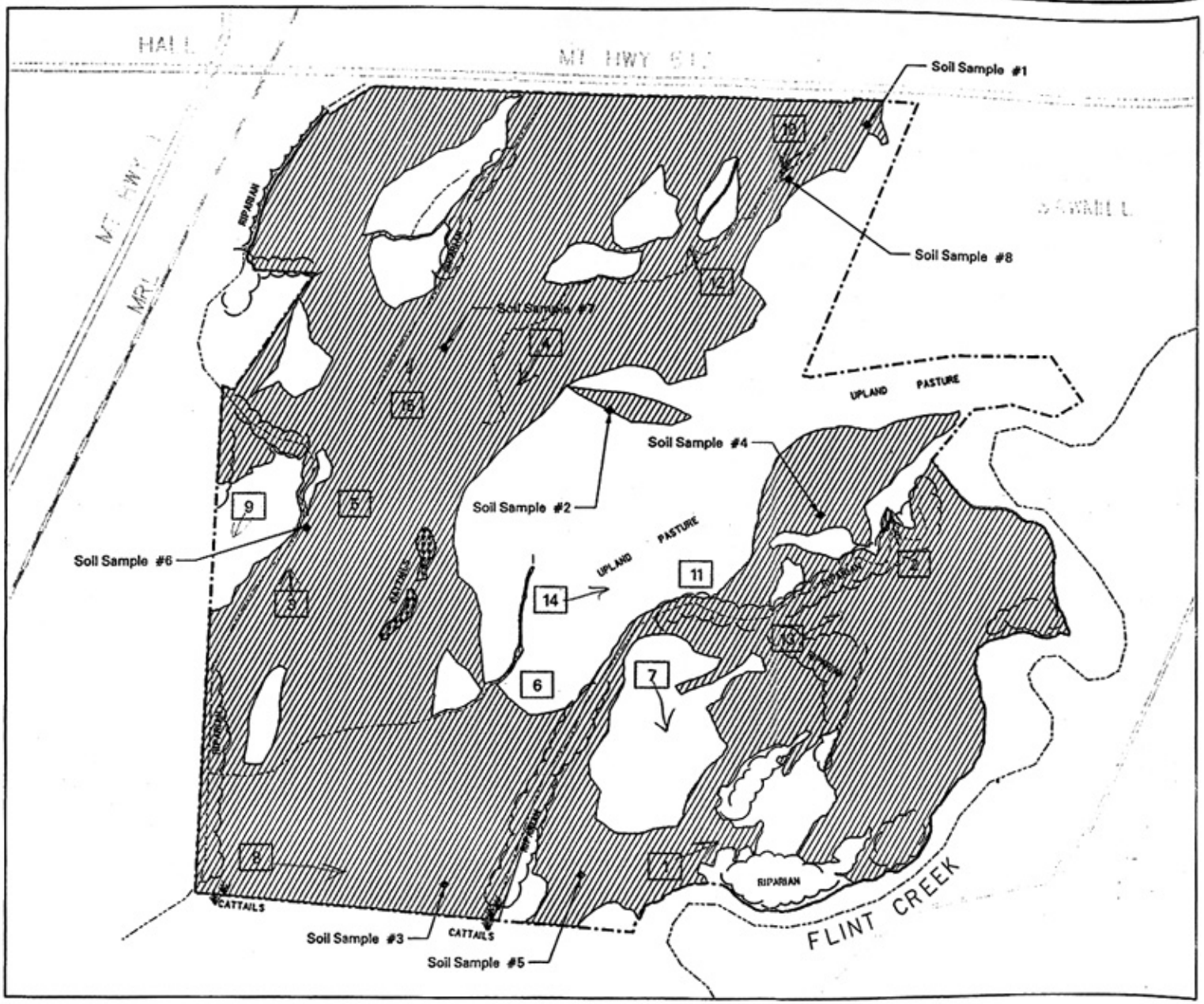
Photo Point 4: View looking northwest across pond 4. Emergent wetlands developing around pond fringe.

Photo Point 5: View looking north toward pond 5. Emergent vegetation increasing around pond fringe.

Appendix D

ORIGINAL SITE PLAN

MDT Wetland Mitigation Monitoring
Peterson Ranch
Hall, Montana



LAND & WATER D-1

N

0 300 FEET

0 100 METERS

LEGEND

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

MAXVILLE-DRUMMOND

PETERSON RANCH WETLAND MITIGATION

EXISTING WETLANDS

MAP SOURCE:
GPS FIELD SURVEY DATA OBTAINED 7/10/98,
AND USGS TIGERLINE DATA OBTAINED FROM
THE MONTANA NRIS WEB SITE

Carter-Burgess

MONTANA DEPARTMENT OF TRANSPORTATION

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

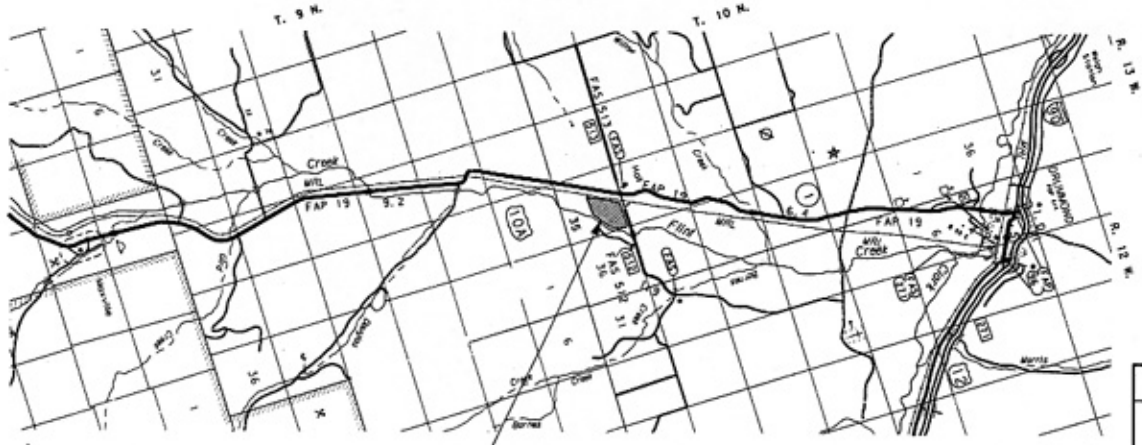
LAND & WATER D-2

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

RECEIVED
MAY 17 2001
ENVIRONMENTAL

RECEIVED
JUN 10 2002
ENVIRONMENTAL

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



PLANS PREPARED BY

Carter•Burgess
113 W. FRONT ST. SUITE 103
MISSOULA, MONTANA 59802
(406) 721-1471

WGM Group, Inc.
3021 PALMER
P.O. BOX 16027
MISSOULA, MONTANA 59808-6027
(406) 728-4611

RELATED PROJECTS

MAXVILLE-DRUMMOND
STPP 19-2(5)48

ASSOCIATED PROJECT AGREEMENT NUMBERS

R/W & UC.	
P.E.	

WGM Group, Inc.

BY Jeremy W. Keene
DATE 5/16/01

MONTANA
DEPARTMENT OF TRANSPORTATION

RECEIVED :
BY Carl A. Pool — PRECONSTRUCTION ENGINEER
DATE May 17, 2001

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

APPROVED :
DIVISION ADMINISTRATOR — DATE

WGM Group, Inc.

DESIGNED BY
DRAWN BY
CHECKED BY
APPROVED BY
WGM Group, Inc.
05/16/2001 11:12:38 AM

713/design/1280TITL.DGN 05/16/2001 11:12:26 AM

TABLE OF CONTENTS

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

NOTES

LAND & WATER D-J

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 SPOIL 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 (DRY) 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

PERIMETER FENCING IS STANDARD NOT BARBED 5-WIRE FENCE WITH WOODEN POSTS (TYPE F5W). PLACE PERIMETER 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.

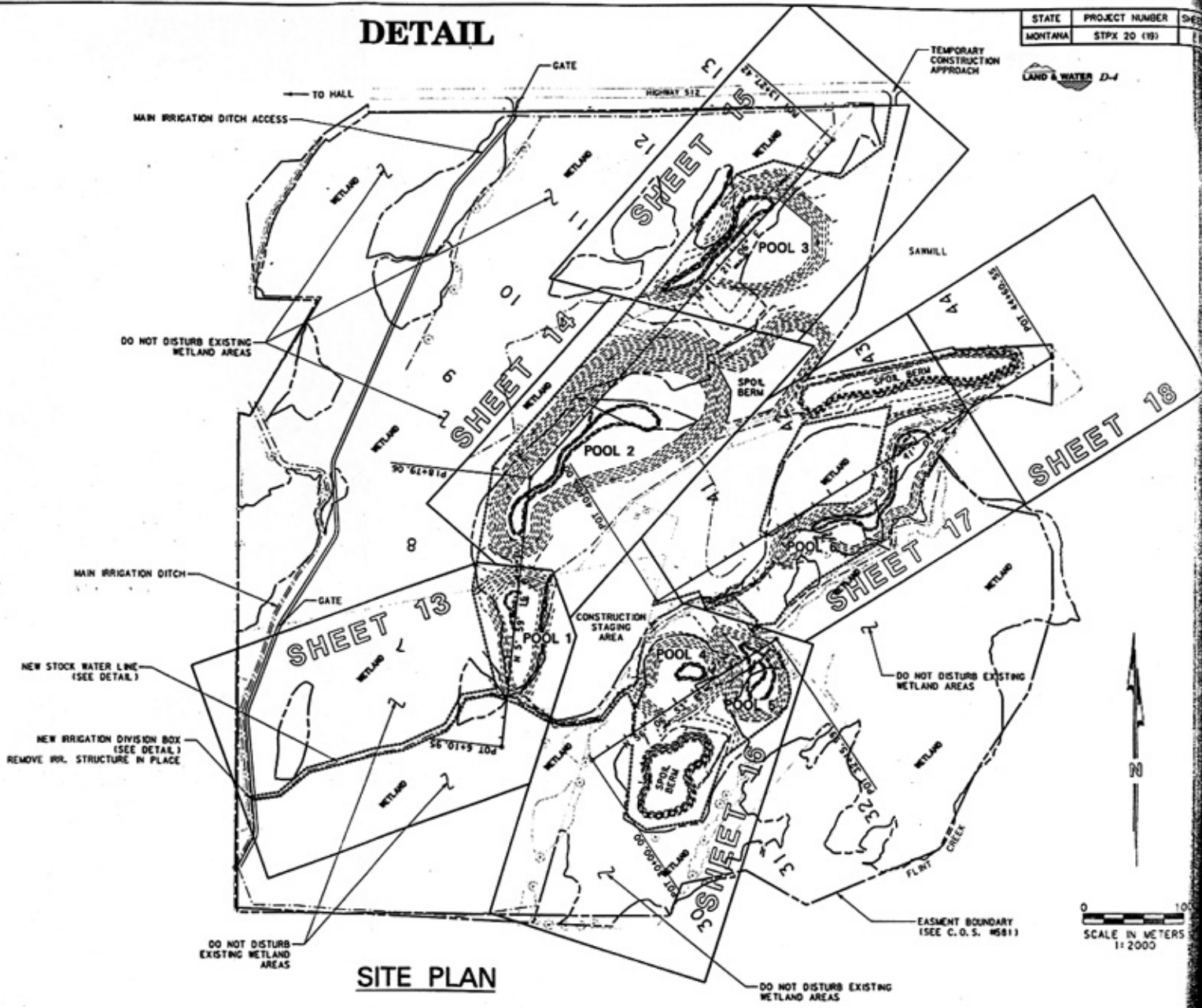
DETAIL

STATE	PROJECT NUMBER	SHEET
MONTANA	STPX 20 (19)	

LAND & WATER D-4

LEGEND

- EASEMENT BOUNDARY
- EXISTING TREES AND SHRUBS
- EXSITING TREE
- EXISTING FENCE
- EXISTING IRRIGATION DITCH
- EXISTING 0.25m CONTOUR
- 1272 EXISTING 1.0m CONTOUR
- CONTROL LINE
- TEMPORARY CONSTRUCTION FENCING
- PROPOSED BERM
- PROPOSED BANK PROTECTION
- PROPOSED 0.25m CONTOUR
- 1272 PROPOSED 1.0m CONTOUR
- REMOVE FENCE
- PROPOSED FENCE



SITE PLAN

NO.	REVISION	DRAWN BY	CHECKED BY	DATE
1	1280DT01.DGN	DRAWN BY	CHECKED BY	05/16/2001
2	1280DT01.DGN	DRAWN BY	CHECKED BY	05/16/2001
3	1280DT01.DGN	DRAWN BY	CHECKED BY	05/16/2001

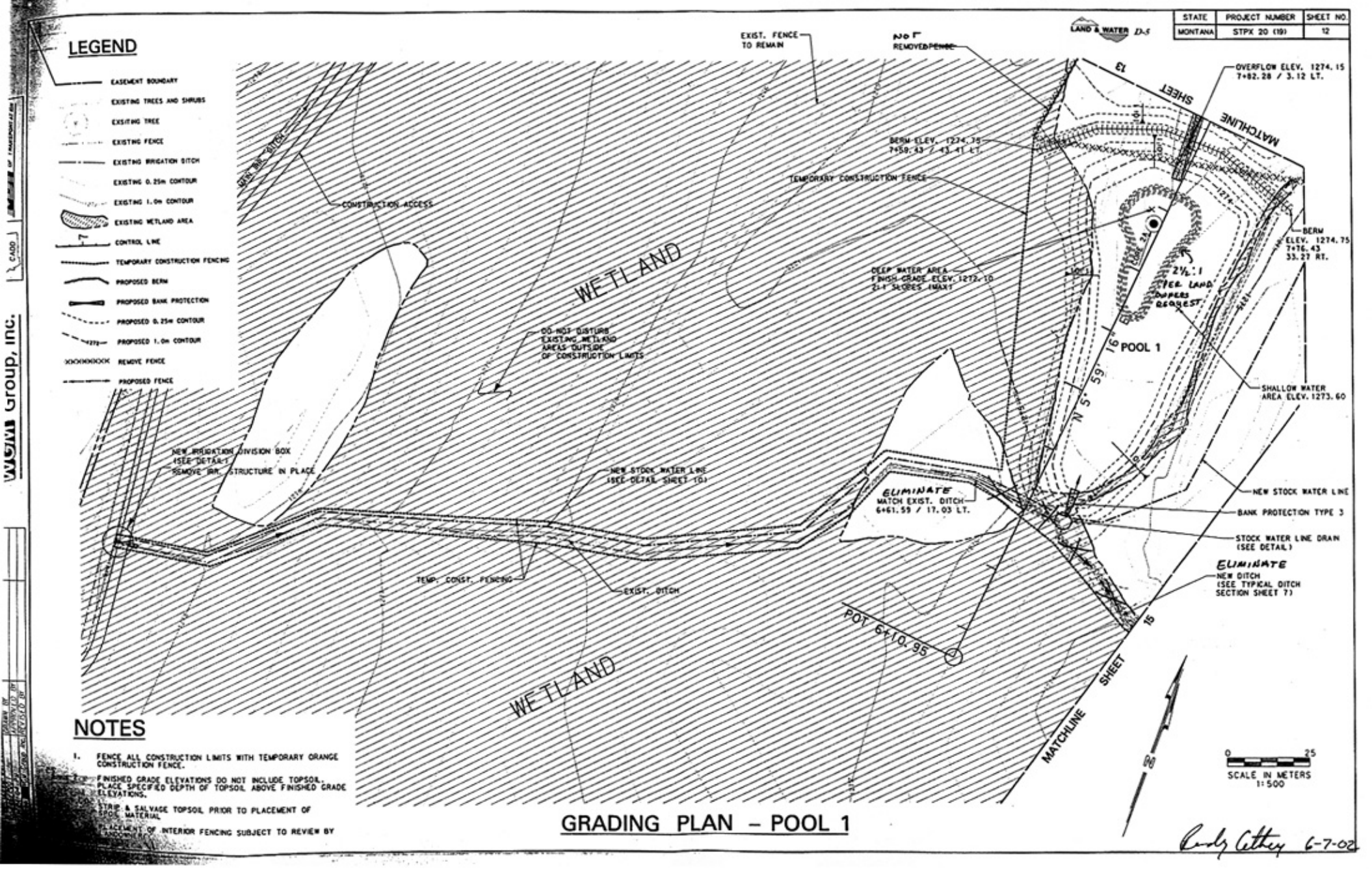
MONTANA DEPARTMENT OF TRANSPORTATION

MONTANA CADD

WGM Group, Inc.

STATE	PROJECT NUMBER	SHEET NO.
MONTANA	STPX 20 (19)	12

LAND & WATER D-5



NOTES

1. FENCE ALL CONSTRUCTION LIMITS WITH TEMPORARY ORANGE CONSTRUCTION FENCE.
2. FINISHED GRADE ELEVATIONS DO NOT INCLUDE TOPSOIL. PLACE SPECIFIED DEPTH OF TOPSOIL ABOVE FINISHED GRADE ELEVATIONS.
3. STRIP & SALVAGE TOPSOIL PRIOR TO PLACEMENT OF SPOIL MATERIAL.
4. PLACEMENT OF INTERIOR FENCING SUBJECT TO REVIEW BY LANDOWNER.

GRADING PLAN – POOL 1

Randy Cathey 6-7-02

Appendix E

BIRD SURVEY PROTOCOL
GPS PROTOCOL

MDT Wetland Mitigation Monitoring
Peterson Ranch
Hall, Montana

BIRD SURVEY PROTOCOL

This protocol was developed by the Montana Department of Transportation (MDT) to monitor bird use within their Wetland Mitigation Sites. Though each wetland mitigation site is vastly different, the bird survey data collection methods were standardized to order to increase repeatability. The protocol uses an "area search within a restricted time frame" to collect data on bird species, density, behavior, and habitat-type use.

Survey Area

Sites that can be entirely walked: Sites where the entire perimeter or area can be walked include, but are not limited to: small ponds, enhanced historic river channels, and wet meadows. If the wetland is not uncomfortably inundated, walk several meandering transects to sufficiently cover the wetland. Meandering transects can be used, even if a small portion of the area is inaccessible (e.g. cannot cross due to inundation). Use binoculars to identify the bird species, to count the number of individuals, and to identify their behavior and habitat type. Data can be recorded directly onto the bird survey form or into a field notebook. The number of meandering transects and their direction (or location) should be recorded in the field notebook and/or drawn onto the aerial photograph or topographic map. Meandering transects are not formal and should not be staked. Each site should be walked and surveyed to the fullest extent within the set time limit.

Sites than cannot be entirely walked: Sites where the entire perimeter or area cannot be walked include, but are not limited to: very large sites (i.e. perimeter of 2-3 miles), and large-bodied waters (i.e. reservoirs), where deep water habitat (> 6 feet) is close to shore. For large-bodied waters where only one area was graded to create or enhance the development of wetland, bird surveys should be walked along meandering transects within or around the graded area (see above.). For sites that cannot be walked, bird surveys should be conducted from many lookout posts, established at key vantage points. The general location of lookout posts should be recorded in the field notebook or drawn onto the aerial photograph or topographic map. Lookout post locations do not need to be staked. Both binoculars and spotting scopes may be used in order to accurately identify and count the birds. Depending upon the size of the open water, more time may be spent viewing the mitigation area from lookout posts than is spent traveling between posts.

Survey Time

Ideally, bird surveys should be conducted in the morning hours when bird activity is often greatest (i.e. sunrise to no later than 11:00 am). Surveys can be completed before 11am if all transects have been walked or all lookout posts have been viewed with no new bird activity observed. For some sites bird surveys may need to be performed in the late afternoon or evening due to traveling constraints or weather. The overall limiting time factor will be the number of budgeted hours for the project.

Data Recording

Bird Species List: Record each bird species observed onto the Bird Survey-Field Data Sheet (or field notebook). Record the bird's common name using the appropriate 4-letter code. The 4-letter code uses the first two letters of the first two word's of the bird's common name or if one name, the first four letters. For example, Mourning Dove is coded as MODO while Mallard is coded as MALL. If an unknown individual is observed, use the 4-letter protocol, but define your

abbreviation at the bottom of the field data sheet. For example, unknown shorebird is UNSB; unknown brown bird is UNBR; unknown warbler is UNWA; and unknown waterfowl is 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 parenthesis; do not fill in the habitat column. For example, a flock of black, medium-sized birds could be coded as UNBB / FO (25).

Bird Density: For each observation record the actual or estimated number of individuals observed per species and per behavior. Totals can be tallied in the office and entered onto the Bird Survey-Field Data Sheet.

Bird Behavior: Bird behavior must be identified by what is known. When a species is observed, the behavior that is immediately exhibited is recorded. Only behaviors that have discreet descriptive terms should be used. The following terms are recommended: breeding pair (BP); foraging (F); flyover (FO); loafing (L), which is defined as sleeping, roosting, or floating with head tucked under wing; and nesting (N). If other behaviors that have a specific descriptive word are observed then it can be used and should later be added to the protocol. Descriptive words or phrases such as "migrating" or "living on site" are unknown behaviors.

Bird Species Habitat Use: When a species is observed, the habitat is also recorded. The following broad habitat categories are used:

- aquatic bed (AB), defined as rooted-floating, floating-leaved, or submergent vegetation.
- marsh (MA), defined as emergent (e.g. cattail, bulrush) vegetation with surface water.
- wet meadow (WM), defined as grasses, sedges, or rushes with little to no surface water.
- scrub-shrub (SS), defined as shrub covered wetland.
- forested (FO), defined as tree covered wetland.
- open water (OW), defined as unvegetated surface water.
- upland (UP), defined as the upland buffer.

Other categories can be used and defined on the data sheet and should later be added to the protocol.

Other Fields

Bird Visit: Each bird survey (i.e. spring, fall, and mid-season) should be completed on separate Bird Survey-Field Data Sheets.

Time: Record the start time and end time on the Bird Survey-Field Data Sheet.

Date: Record the date of the bird survey.

Weather: Record the weather conditions (i.e. temperature, wind, condition).

Notes: Note if a particular individual bird is using a constructed nest box and note the condition of constructed nest box(es). Also record any comments about the site, wildlife, wetland conditions, etc.

GPS MAPPING AND AERIAL PHOTO REFERENCING PROCEDURE

From 2001 through 2006, PBS&J mapped the vegetation community boundaries, photograph points, and other sampling locations in the field using the resource-grade Trimble GEO III GPS (Global Positioning System) unit. The data were collected with a minimum of three positions per feature using Course/Acquisition code. The collected data were then transferred to a personal computer (PC) and differentially corrected to the nearest operating Community Base Station. The corrected data were then exported to ACAD drawings in Montana State Plain Coordinates NAD 83 international feet.

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

In 2007, some sites continued to be mapped using the Trimble GEO III GPS unit while most sites were mapped using the resource-grade Magellan MobileMapper Office GPS unit. The Magellan GPS unit has a comparable accuracy level to the Trimble Geo III unit.

Each year, MDT photographs each mitigation site from the air. These aerial photographs are not geo-referenced, but serve as a visual aid to map wetland development and vegetation communities, and to show approximate locations for various monitoring activities (i.e. photograph points, transects, or macroinvertebrate sampling). Reference points that are observable on the aerial photo (i.e. road, stream channel, or fence) were also marked with the GPS unit in order to better position the aerial photograph. This positioning did not remove any of the distortion inherent to all photos. All mapped features and community boundaries were reviewed by the wetland biologist, to increase the figure's accuracy.

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

2007 MACROINVERTEBRATE SAMPLING PROTOCOL AND DATA

MDT Wetland Mitigation Monitoring
Peterson Ranch
Hall, Montana

AQUATIC INVERTEBRATE SAMPLING PROTOCOL

Equipment List

- D-frame sampling net with 1 mm mesh.
- 1-liter, wide-mouth, plastic sample jars provided by Rhithron Associates, Inc. (Quart sized, wide-mouthed canning jars can be substituted.)
- 95% ethanol (alternatively isopropyl alcohol).
- Pre-printed sample labels (printed on rite-in-the-rain paper); two labels per sample.
- Pencil.
- Clear packaging tape.
- 3-5 gallon plastic pail.
- Large tea strainer or framed screen.
- Cooler with ice for storing sample.

Site Selection

Select a site that is accessible with hip waders or rubber boots. If the substrate is too soft, place a wide board down to walk on. Choose a site that is representative of the overall condition of the wetland. Annual sampling should occur at the same site within the wetland.

Sampling Procedure

Wetland invertebrates (macroinvertebrates) inhabit the substrate, the water column, the stems and leaves of aquatic vegetation, and the water surface. At the given location, each habitat type is sampled and combined into a single 1-liter sample jar. Pre-cautions are made to minimize disturbing the sample site in order to maximize the number of animals collected.

Fill the pail with approximately 1 gallon of wetland water. Ideally, sample the water column from near-shore outward to a depth of 3 feet. Sample the water column using a long sweep of the net, keeping the net at about half the depth of the water. Sample the water surface with a long sweep of the net. Aquatic vegetation is sampled by pulling the net beneath the water surface, for at least a meter in distance. The substrate is sampled by pulling the net along the bottom, bumping it against the substrate several times as you pull. Be sure to place some muck, mud, and/or vegetation into the jar. After sampling a habitat, rinse the net in the bucket and look for insects, crustaceans, and other aquatic invertebrates. It is not necessary to sample habitats in any specific order, but all habitats, if present, are to be sampled. Habitats can be sampled more than once.

Fill about 1 cup of ethanol into the sample jar. Sieve the contents of the bucket through the straining device and pour or carefully scrape the contents of the strainer into the sample jar. Top off the jar with enough ethanol to cover all the material and leave as little headroom as possible. Alternatively, sampled materials can be lifted out of the net and put directly into the jar. Be sure to include some muck, mud, and/or vegetation into the jar. Each macroinvertebrate sampling site should have only one sampling jar.

Using pencil, complete two labels with the required information: project name, project number, date, collector's name, and habitats sampled. Do not complete the label with ink as it will dissolve in ethanol. For wetlands with at least two macroinvertebrate sampling sites, number the site consecutively followed by the total number of sites (e.g. Sample 2 of 3 sites). Place one label into the jar and seal the jar. Dry the jar off, if necessary, and tape the second label to the outside of the jar.

Photograph each macroinvertebrate sampling site.

Sample Handling/Delivery

In the field, keep sample jars cool by placing in a cooler with a small amount of ice.
Deliver samples to the PBS&J office in Missoula, where they will be inventoried and delivered to Rhithron Associates, Inc.

MDT Mitigated Wetland Monitoring Project: Aquatic Invertebrate Monitoring
Summary 2001 – 2007

Prepared for Post, Buckley, Schuh, and Jernigan (PBS&J)
Prepared by W.Bollman, Rhithron Associates, Inc.

INTRODUCTION

Aquatic invertebrate assemblages were collected at a number of mitigated wetlands throughout Montana. This report summarizes data generated from seven years of collection. Over all years of sampling, a total of 182 invertebrate samples were collected. Table 1 lists the currently monitored sites at which aquatic invertebrates were collected in 2007, and summarizes the sampling history of each.

METHODS

Sample processing

Aquatic invertebrate samples were collected at mitigated wetland sites in the summer months of 2001, 2002, 2003, 2004, 2005, 2006 and 2007 by personnel of PBS&J. Sampling procedures utilized were based on the protocols developed by the Montana Department of Environmental Quality (MT DEQ) for wetland sampling. 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.

Standard sorting protocols were applied to achieve representative subsamples of a minimum of 100 organisms. Caton sub-sampling devices (Caton 1991), divided into 30 grids, each approximately 5 cm by 6 cm, were used. Grid contents were examined under stereoscopic microscopes using 10x-30x magnification. All aquatic invertebrates from each selected grid were sorted from the substrate, and placed in 95% ethanol for subsequent identification. Grid selection, examination, and sorting continued until at least 100 organisms were sorted. A large/rare search was conducted to collect any taxa not found in the subsampling procedure.

Organisms were individually examined using 10x – 80x stereoscopic dissecting scopes (Leica S8E and S6E) and identified to the lowest practical taxonomic levels using appropriate published taxonomic references. Identification, counts, life stages, and information about the condition of specimens were recorded on bench sheets. To obtain accuracy in richness measures, organisms that could not be identified to the target level specified in MDEQ protocols were designated as “not unique” if other specimens from the same group could be taken to target levels. Organisms designated as “unique” were those that could be definitively distinguished from other organisms in the sample. Identified organisms were preserved in 95% ethanol in labeled vials, and archived at the Rhithron laboratory. Midges were morphotyped using 10x – 80x stereoscopic dissecting microscopes (Leica S8E and S6E) and representative specimens were slide mounted and examined at 200x – 1000x magnification using an Olympus BX 51 compound microscope. Slide mounted organisms were also archived at the Rhithron laboratory.

Quality assurance systems

Quality control procedures for initial sample processing and subsampling involved checking sorting efficiency. These checks were conducted on 96% of the samples by independent observers 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:

$$SE = \frac{n_1}{n_{1+2}} \times 100$$

where: SE is the sorting efficiency, expressed as a percentage, n_1 is the total number of specimens in the first sort, and n_{1+2} is the total number of specimens in the first and second sorts combined.

Quality control procedures for taxonomic determinations of invertebrates involved checking accuracy, precision and enumeration. At least 10% of samples are targeted for quality assurance procedures. For this project, three samples were randomly selected and all organisms re-identified and counted by an independent taxonomist. Taxa lists and enumerations were compared by calculating a Bray-Curtis similarity statistic (Bray and Curtis 1957) for each

selected sample. Routinely, discrepancies between the original identifications and the QC identifications are discussed among the taxonomists, and necessary rectifications to the data are made. Discrepancies that cannot be rectified by discussions are routinely sent out to taxonomic specialists for identification. However, taxonomic certainty for identifications in this project was high, and no external verifications were necessary.

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 the 12 metrics were developed specifically for this project, since mitigated wetlands were not included in original criteria development.

Scoring criteria for wetland metrics were developed by generally following the tactic used by Stribling et al. (1995). Boxplots were generated using a statistical software package (Statistica™), and distributions, median values, ranges, and quartiles for each metric were examined. For the wetland sites, "optimal" scores were generally those that fell above the 75th percentile (for those metrics that decrease in value in response to stress) or below the 25th percentile (for metrics that respond to stress by an increase in value) of all scores. Additional scoring ranges were established by bisecting the range below the 75th percentile for decreasing scores (or above the 25th percentile for increasing scores) into "sub-optimal" and "poor" assessment categories. A score of 5, 3, or 1 was assigned to optimal, sub-optimal, and poor metric performance, respectively. In this way, metric values were translated into normalized metric scores, and scores for all metrics were summed to produce a total bioassessment score, which is expressed as a percentage of the maximum possible score (60). 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. Data from a total of 167 samples were used to develop criteria.

Several sites in this study supported aquatic fauna characteristic of lotic habitats rather than lentic wetland habitats; these sites were excluded from mitigated wetland scoring criteria development, and were evaluated with a metric battery specific to flowing water habitats. In 2007, the lotic sites were Camp Creek (2 sites), Cloud Ranch stream, Kleinschmidt stream, Jack Creek, and Woodson Creek-Ringling stream. Invertebrate assemblages at these sites were generally characteristic of montane or foothill stream conditions and were assessed using the tested metric battery developed for montane streams of Western Montana (Bollman 1998).

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. However, the nature of the action needed is not determined solely by the index score or impairment classification, 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 - wetlands

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

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

Four composition metrics (%Chironomidae, %Orthocladiinae of Chironomidae, %Crustacea + %Mollusca, and %Amphipoda) measure the relative contributions of certain taxonomic groups that may have significant responses to habitat and/or water quality impacts. For example, amphipods have been demonstrated to increase in abundance in

alkaline conditions. Short-lived, relatively mobile taxa such as chironomids dominate ephemeral environments; many are hemoglobin-bearers capable of tolerating de-oxygenated conditions.

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

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

Summary metric values and scores for the 2007 samples are given in Tables 4a-4c and 5.

In 2007, thermal preference of the invertebrate assemblages was calculated when possible, using the tool developed by Brandt 2001.

Bioassessment metrics – lotic habitats

For sites supporting rheophilic invertebrate assemblages, bioassessment was based on a metric battery and scoring criteria developed for montane regions of Montana (MVFP index: Bollman 1998). The six metrics constituting the bioassessment index used for MVFP sites in this study were selected because, both individually and as an integrated metric battery, they are robust at distinguishing impaired sites from relatively unimpaired sites (Bollman 1998). They have been demonstrated to be more variable with anthropogenic disturbance than with natural environmental gradients (Bollman 1998). Each of the six metrics, and their expected responses to various stressors is described below.

1. Ephemeroptera (mayfly) taxa richness. The number of mayfly taxa declines as water quality diminishes. Impairments to water quality which have been demonstrated to adversely affect the ability of mayflies to flourish include elevated water temperatures, heavy metal contamination, increased turbidity, low or high pH, elevated specific conductance and toxic chemicals. Few mayfly species are able to tolerate certain disturbances to instream habitat, such as excessive sediment deposition.
2. Plecoptera (stonefly) taxa richness. Stoneflies are particularly susceptible to impairments that affect a stream on a reach-level scale, such as loss of riparian canopy, streambank instability, channelization, and alteration of morphological features such as pool frequency and function, riffle development and sinuosity. Just as all benthic organisms, they are also susceptible to smaller scale habitat loss, such as by sediment deposition, loss of interstitial spaces between substrate particles, or unstable substrate.
3. Trichoptera (caddisfly) taxa richness. Caddisfly taxa richness has been shown to decline when sediment deposition affects habitat. In addition, the presence of certain case-building caddisflies can indicate good retention of woody debris and lack of scouring flow conditions.
4. Number of sensitive taxa. Sensitive taxa are generally the first to disappear as anthropogenic disturbances increase. The list of sensitive taxa used here includes organisms sensitive to a wide range of disturbances, including warmer water temperatures, organic or nutrient pollution, toxic pollution, sediment deposition, substrate instability and others. Unimpaired streams of western Montana typically support at least four sensitive taxa (Bollman 1998).
5. Percent filter feeders. Filter-feeding organisms are a diverse group; they capture small particles of organic matter, or organically enriched sediment material, from the water column by means of a variety of adaptations, such as silken nets or hairy appendages. In forested montane streams, filterers are expected to occur in insignificant numbers. Their abundance increases when canopy cover is lost and when water temperatures increase and the accompanying growth of filamentous algae occurs. Some filtering organisms, specifically the Arctopsychid caddisflies (*Arctopsyche* spp. and *Parapsyche* spp.) build silken nets with large mesh sizes that capture small organisms such as chironomids and early-instar mayflies. Here they are considered predators, and, in this study, their abundance does not contribute to the percent filter feeders metric.
6. Percent tolerant taxa. Tolerant taxa are ubiquitous in stream sites, but when disturbance increases, their abundance increases proportionately. The list of taxa used here includes organisms tolerant of a wide range of disturbances, including warmer water temperatures, organic or nutrient pollution, toxic pollution, sediment deposition, substrate instability and others.

Table 1. Montana Department of Transportation Mitigated Wetlands Monitoring Project sites: sampling history. Only those sites monitored in 2007 are included. An asterisk (*) indicates lotic sites.

Site Identifier	2001	2002	2003	2004	2005	2006	2007
Roundup	+	+	+	+	+	+	+
Ridgeway	+	+	+	+	+	+	+
Hoskins Landing MS-1		+	+	+	+		+
Hoskins Landing MS-2							+
Peterson Ranch pond 1		+	+	+	+	+	+
Peterson Ranch pond 2		+		+	+	+	+
Peterson Ranch pond 4		+	+	+	+	+	+
Peterson Ranch pond 5		+	+	+	+	+	+
Camp Creek MS-1*		+	+	+	+	+	+
Camp Creek MS-2*						+	+
Kleinschmidt		+	+	+	+	+	+
Kleinschmidt – stream*			+	+	+	+	+
Cloud Ranch Pond				+	+		+
Cloud Ranch Stream*				+			+
Jack Creek – pond				+	+		+
Jack Creek – McKee*							+
Norem				+	+	+	+
Rock Creek Ranch					+	+	+
Wagner Marsh					+	+	+
Alkali Lake 1						+	+
Charley Creek							+
Woodson pond MI 1							+
Woodson stream MI 2*							+
Little Muddy Creek							+
Selkirk Ranch							+
DH Ranch							+

Table 2. Aquatic invertebrate metrics employed for wetland (lentic) invertebrate assemblages in the MDT mitigated wetlands study, 2001 – 2007.

Metric	Metric calculation	Expected response to degradation or impairment
Total taxa	Count of unique taxa identified to lowest recommended taxonomic level	Decrease
POET	Count of unique Plecoptera, Trichoptera, Ephemeroptera, and Odonata taxa identified to lowest recommended taxonomic level	Decrease
Chironomidae taxa	Count of unique midge taxa identified to lowest recommended taxonomic level	Decrease
Crustacea taxa + Mollusca taxa	Count of unique Crustacea taxa and Mollusca taxa identified to lowest recommended taxonomic level	Decrease
% Chironomidae	Percent abundance of midges in the subsample	Increase
Orthocladiinae / Chironomidae	Number of individual midges in the sub-family Orthocladiinae / total number of midges in the subsample.	Decrease
%Amphipoda	Percent abundance of amphipods in the subsample	Increase
% Crustacea + % Mollusca	Percent abundance of crustaceans in the subsample plus percent abundance of molluscs in the subsample	Increase
HBI	Relative abundance of each taxon multiplied 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 section of individual project monitoring reports. Summary tables for lentic (4a – 4c) and lotic (5) sites and project specific taxa listings and metrics reports are provided on the following pages.)

Quality Assurance

Table 3 gives the results of quality assurance procedures for sample sorting efficiency (SE) and Bray-Curtis similarity statistics for comparisons of taxonomic determinations and enumeration. Sorting efficiency averaged 97.54% for the project, and taxonomic similarity averaged 97.44%.

Table 3. Results of quality control procedures for subsampling and taxonomic and enumeration similarity.

Site name	SE	Bray-Curtis similarity
Roundup	100.00%	
Ridgeway	100.00%	
Hoskins Landing MS-1	100.00%	
Hoskins Landing MS-2	93.40%	
Peterson Ranch pond 1	100.0%	95.38%
Peterson Ranch pond 2	96.64%	
Peterson Ranch pond 4	91.66%	
Peterson Ranch pond 5	96.64%	
Camp Creek MS-1	100.00%	
Camp Creek MS-2	100.00%	96.94%
Kleinschmidt – pond	100.00%	
Kleinschmidt – stream	99.10%	
Cloud Ranch Pond	95.65%	
Cloud Ranch Stream	91.61%	
Jack Creek – pond	n.a.	
Jack Creek - McKee	96.49%	
Norem	100.00%	100.00%
Rock Creek Ranch	100.00%	
Wagner Marsh	100.00%	
Alkali Lake 1	98.04%	
Charley Creek	100.00%	
Woodson pond	91.37%	
Woodson stream	100.00%	
Little Muddy Creek	92.31%	
Selkirk Ranch	95.56%	
DH Ranch	100.00%	

Table 4a. Metric values and scores for wetland (lentic) sites in the MDT mitigated wetland study – 2007 sampling.

	ROUNDUP	RIDGEWAY	HOSKINS LANDING MS-1	HOSKINS LANDING MS-2	PETERSON RANCH 1	PETERSON RANCH 2	PETERSON RANCH 4	PETERSON RANCH 5
Total taxa	7	13	18	21	17	18	26	18
POET	0	2	3	5	2	0	6	4
Chironomidae taxa	5	5	2	8	8	12	12	6
Crustacea + Mollusca	1	2	5	4	4	5	4	4
% Chironomidae	7.62%	30.00%	18.75%	52.68%	36.45%	51.79%	42.59%	14.78%
Orthocladiinae/Chir	0.38	0.17	0.00	0.03	0.08	0.16	0.09	0.12
%Amphipoda	0.00%	10.00%	0.00%	0.00%	0.93%	0.00%	21.30%	1.74%
%Crustacea + %Mollusca	89.52%	15.00%	26.79%	8.04%	10.28%	43.75%	28.70%	37.39%
HBI	8.02	7.11	7.23	6.55	7.42	7.76	6.53	7.23
%Dominant taxon	89.52%	30.00%	17.86%	35.71%	39.25%	23.21%	17.59%	30.43%
%Collector-Gatherers	92.38%	70.00%	78.57%	82.14%	49.53%	71.43%	38.89%	26.96%
%Filterers	0.00%	0.00%	0.89%	6.25%	9.35%	3.57%	1.85%	5.22%
Total taxa	1	1	3	5	3	3	5	3
POET	1	1	3	5	1	1	5	5
Chironomidae taxa	3	3	1	5	5	5	3	3
Crustacea + Mollusca	1	1	3	3	3	3	1	3
% Chironomidae	5	3	3	1	3	1	1	5
Orthocladiinae/Chir	3	1	1	1	1	1	3	1
%Amphipoda	5	3	5	5	5	5	5	5
%Crustacea + %Mollusca	1	5	5	5	5	3	5	3
HBI	1	3	3	5	3	1	5	3
%Dominant taxon	1	5	5	3	3	5	1	5
%Collector-Gatherers	5	3	3	5	3	3	3	1
%Filterers	3	3	3	1	1	3	5	3
Total score	**30**	**32**	**38**	**44**	**36**	**34**	**42**	**40**
Percent of maximum score	**50.00%**	**53.33%**	**63.33%**	**73.33%**	**60.00%**	**56.67%**	**70.00%**	**66.67%**
Impairment classification	**poor**	**sub-optimal**	**optimal**	**optimal**	**sub-optimal**	**sub-optimal**	**optimal**	**optimal**

Table 4b. Metric values and scores for wetland (lentic) sites in the MDT mitigated wetland study – 2007 sampling.

	KLEIN-SCHMIDT POND	CLOUD RANCH POND	JACK CREEK POND	NOREM	ROCK CREEK RANCH	WAGNER MARSH	ALKALI LAKE 1	CHARLEY CREEK
Total taxa	25	13	9	6	18	11	9	13
POET	5	2	0	1	2	2	0	0
Chironomidae taxa	8	11	5	2	4	4	2	3
Crustacea + Mollusca	8	1	4	1	4	0	2	3
% Chironomidae	18.63%	81.54%	92.79%	31.58%	4.76%	11.39%	1.96%	27.17%
Orthocladiinae/Chir	0.53	0.38	0.03	0.00	0.60	0.44	0.50	0.68
%Amphipoda	10.78%	3.08%	0.00%	0.00%	17.14%	0.00%	0.00%	22.83%
%Crustacea + %Mollusca	36.27%	3.08%	7.21%	21.05%	23.81%	0.00%	61.76%	53.26%
HBI	7.35	7.22	9.73	6.63	6.33	7.28	8.07	6.88
%Dominant taxon	13.73%	18.46%	62.16%	26.32%	29.52%	45.57%	60.78%	29.35%
%Collector-Gatherers	53.92%	84.62%	70.27%	57.89%	29.52%	15.19%	70.59%	32.61%
%Filterers	11.76%	9.23%	0.90%	0.00%	0.95%	0.00%	0.00%	0.00%
Total taxa	5	1	1	1	3	1	1	1
POET	5	1	1	1	1	1	1	1
Chironomidae taxa	5	5	3	1	3	3	1	3
Crustacea + Mollusca	5	1	3	1	3	1	1	1
% Chironomidae	3	1	1	3	5	5	5	3
Orthocladiinae/Chir	5	3	1	1	5	3	5	5
%Amphipoda	3	5	5	5	3	5	5	3
%Crustacea + %Mollusca	3	5	5	5	5	5	3	3
HBI	3	3	1	5	5	3	1	5
%Dominant taxon	5	5	1	5	5	3	1	5
%Collector-Gatherers	3	5	3	3	1	1	3	1
%Filterers	1	1	3	3	3	3	3	3
Total score	**46**	**36**	**28**	**34**	**42**	**34**	**30**	**34**
Percent of maximum score	**76.67%**	**60.00%**	**46.67%**	**56.67%**	**70.00%**	**56.67%**	**50.00%**	**56.67%**
Impairment classification	**optimal**	**sub-optimal**	**poor**	**sub-optimal**	**poor**	**sub-optimal**	**poor**	**sub-optimal**

Table 4c. Metric values and scores for wetland (lentic) sites in the MDT mitigated wetland study – 2007 sampling.

	WOODSON POND	LITTLE MUDDY CREEK	SELKIRK RANCH	DH RANCH
Total taxa	12	2	16	8
POET	0	0	2	1
Chironomidae taxa	9	0	8	4
Crustacea + Mollusca	1	1	2	2
% Chironomidae	85.71%	0.00%	77.27%	27.50%
Orthocladiinae/Chir	0.32	0.00	0.61	0.00
%Amphipoda	0.00%	0.00%	0.00%	0.00%
%Crustacea + %Mollusca	2.86%	75.00%	8.18%	64.17%
HBI	9.34	8.50	7.82	7.38
%Dominant taxon	33.33%	75.00%	46.36%	39.17%
%Collector-Gatherers	55.24%	75.00%	32.73%	27.50%
%Filterers	0.00%	0.00%	8.18%	17.50%
Total taxa	1	1	3	1
POET	1	1	1	1
Chironomidae taxa	5	1	5	3
Crustacea + Mollusca	1	1	1	1
% Chironomidae	1	5	1	3
Orthocladiinae/Chir	3	1	5	1
%Amphipoda	5	5	5	5
%Crustacea + %Mollusca	5	1	5	1
HBI	1	1	1	3
%Dominant taxon	5	1	3	3
%Collector-Gatherers	3	3	1	1
%Filterers	3	3	1	1
Total score	**34**	**24**	**32**	**24**
Percent of maximum score	**56.67%**	**40.00%**	**53.33%**	**40.00%**
Impairment classification	**sub-optimal**	**poor**	**sub-optimal**	**poor**

Table 5. Metric values and scores for stream (lotic) sites in the MDT mitigated wetland study – 2007 sampling.

	CAMP CREEK MS-1	CAMP CREEK MS-2	KLEIN-SCHMIDT STREAM	CLOUD RANCH STREAM	JACK CREEK - MCKEE	WOODSON STREAM
E Richness	6	6	0	2	1	1
P Richness	0	0	0	2	0	0
T Richness	4	6	2	4	4	0
Pollution Sensitive Richness	3	4	0	1	0	0
Filterer Percent	4.85%	5.56%	7.14%	3.57%	2.83%	16.67%
Pollution Tolerant Percent	32.04%	34.26%	9.82%	14.29%	58.49%	8.33%
E Richness	3	3	0	1	0	0
P Richness	0	0	0	2	0	0
T Richness	2	3	1	2	2	0
Pollution Sensitive Richness	2	3	0	1	0	0
Filterer Percent	3	2	2	3	3	1
Pollution Tolerant Percent	1	1	2	1	0	2
Total score	**11**	**12**	**5**	**10**	**5**	**3**
Percent of maximum score	**61.11%**	**66.67%**	**27.78%**	**55.56%**	**27.78%**	**16.67%**
Impairment classification	**slight**	**slight**	**moderate**	**slight**	**moderate**	**severe**

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Taxa Listing

Project ID: MDT07PBSJ
RAI No.: MDT07PBSJ011

RAI No.: MDT07PBSJ011 **Sta. Name:** Peterson Ranch Pond MS 1
Client ID:
Date Coll.: 7/24/2007 **No. Jars:** 1 **STORET ID:**

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Non-Insect							
Acari	2	1.87%	Yes	Unknown		5	PR
Cladocera	3	2.80%	Yes	Unknown		8	CF
Nematoda	1	0.93%	Yes	Unknown		5	PA
Hyalellidae							
Hyalella sp.	1	0.93%	Yes	Unknown		8	CG
Lymnaeidae							
Stagnicola sp.	1	0.93%	Yes	Unknown		6	SC
Naididae							
Naididae	10	9.35%	Yes	Unknown		8	CG
Planorbidae							
Gyraulus sp.	6	5.61%	Yes	Unknown		8	SC
Odonata							
Coenagrionidae							
Enallagma sp.	42	39.25%	Yes	Larva		7	PR
Libellulidae							
Libellula sp.	1	0.93%	Yes	Larva		9	PR
Coleoptera							
Haliplidae							
Haliplus sp.	1	0.93%	Yes	Larva		5	PH
Chironomidae							
Chironomidae							
Chironomidae	5	4.67%	No	Pupa		10	CG
Chironomus sp.	9	8.41%	Yes	Larva		10	CG
Cladotanytarsus sp.	9	8.41%	Yes	Larva		7	CG
Dicrotendipes sp.	2	1.87%	Yes	Larva		8	CG
Parakiefferiella sp.	3	2.80%	Yes	Larva		6	CG
Paratanytarsus sp.	3	2.80%	Yes	Larva		6	CG
Psectrocladius sp.	1	0.93%	Yes	Larva		8	CG
Tanytarsus sp.	7	6.54%	Yes	Larva		6	CF
Sample Count	**107**						

Metrics Report

Project ID: MDT07PBSJ
RAI No.: MDT07PBSJ011
Sta. Name: Peterson Ranch Pond MS 1
Client ID:
STORET ID:
Coll. Date: 7/24/2007

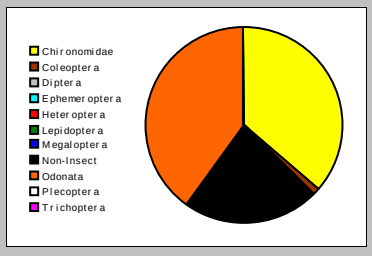
Abundance Measures

Sample Count: 107
Sample Abundance: 583.64 18.33% of sample used

Coll. Procedure:
Sample Notes:

Taxonomic Composition

Category	R	A	PRA
Non-Insect	7	24	22.43%
Odonata	2	43	40.19%
Ephemeroptera			
Plecoptera			
Heteroptera			
Megaloptera			
Trichoptera			
Lepidoptera			
Coleoptera	1	1	0.93%
Diptera			
Chironomidae	7	39	36.45%

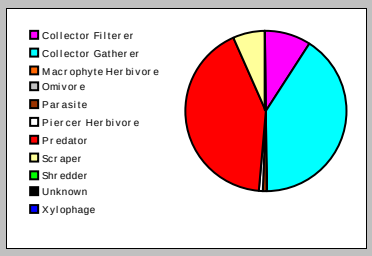


Dominant Taxa

Category	A	PRA
Enallagma	42	39.25%
Naididae	10	9.35%
Cladotanytarsus	9	8.41%
Chironomus	9	8.41%
Tanytarsus	7	6.54%
Gyraulus	6	5.61%
Chironomidae	5	4.67%
Paratanytarsus	3	2.80%
Parakiefferiella	3	2.80%
Cladocera	3	2.80%
Dicrotendipes	2	1.87%
Acari	2	1.87%
Nematoda	1	0.93%
Libellula	1	0.93%
Hyalella	1	0.93%

Functional Composition

Category	R	A	PRA
Predator	3	45	42.06%
Parasite	1	1	0.93%
Collector Gatherer	8	43	40.19%
Collector Filterer	2	10	9.35%
Macrophyte Herbivore			
Piercer Herbivore	1	1	0.93%
Xylophage			
Scraper	2	7	6.54%
Shredder			
Omivore			
Unknown			

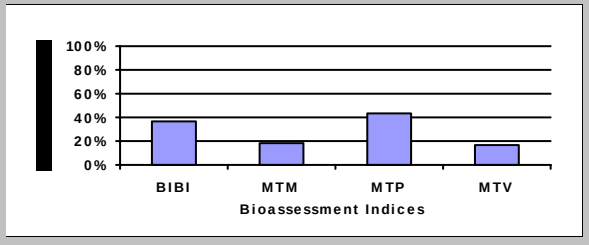


Metric Values and Scores

Metric	Value	BIBI	MTP	MTV	MTM
Composition					
Taxa Richness	17	1	1		0
Non-Insect Percent	22.43%				
E Richness	0	1		0	
P Richness	0	1		0	
T Richness	0	1		0	
EPT Richness	0		0		0
EPT Percent	0.00%		0		0
Oligochaeta+Hirudinea Percent	9.35%				
Baetidae/Ephemeroptera	0.000				
Hydropsychidae/Trichoptera	0.000				
Dominance					
Dominant Taxon Percent	39.25%		2		1
Dominant Taxa (2) Percent	48.60%				
Dominant Taxa (3) Percent	57.01%	3			
Dominant Taxa (10) Percent	90.65%				
Diversity					
Shannon H (loge)	2.109				
Shannon H (log2)	3.043		3		
Margalef D	3.459				
Simpson D	0.199				
Evenness	0.087				
Function					
Predator Richness	3		1		
Predator Percent	42.06%	5			
Filterer Richness	2				
Filterer Percent	9.35%			2	
Collector Percent	49.53%		3		3
Scraper+Shredder Percent	6.54%		1		0
Scraper/Filterer	0.700				
Scraper/Scraper+Filterer	0.412				
Habit					
Burrower Richness	2				
Burrower Percent	10.28%				
Swimmer Richness	1				
Swimmer Percent	0.93%				
Clinger Richness	1	1			
Clinger Percent	6.54%				
Characteristics					
Cold Stenotherm Richness	0				
Cold Stenotherm Percent	0.00%				
Hemoglobin Bearer Richness	3				
Hemoglobin Bearer Percent	15.89%				
Air Breather Richness	0				
Air Breather Percent	0.00%				
Voltinism					
Univoltine Richness	5				
Semivoltine Richness	2	1			
Multivoltine Percent	42.06%		2		
Tolerance					
Sediment Tolerant Richness	2				
Sediment Tolerant Percent	6.54%				
Sediment Sensitive Richness	0				
Sediment Sensitive Percent	0.00%				
Metals Tolerance Index	3.387				
Pollution Sensitive Richness	0	1		0	
Pollution Tolerant Percent	27.10%	3		1	
Hilsenhoff Biotic Index	7.421		0		0
Intolerant Percent	0.00%				
Supertolerant Percent	35.51%				
CTQa	103.500				

Bioassessment Indices

BioIndex	Description	Score	Pct	Rating
BIBI	B-IBI (Karr et al.)	18	36.00%	
MTP	Montana DEQ Plains (Bukantis 1998)	13	43.33%	Moderate
MTV	Montana Revised Valleys/Foothills (Bollman 1998)	3	16.67%	Severe
MTM	Montana DEQ Mountains (Bukantis 1998)	4	19.05%	Severe



Taxa Listing

Project ID: MDT07PBSJ
RAI No.: MDT07PBSJ012

RAI No.: MDT07PBSJ012 **Sta. Name:** Peterson Ranch Pond MS 2
Client ID:
Date Coll.: 7/24/2007 **No. Jars:** 1 **STORET ID:**

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Non-Insect							
Cladocera	1	0.89%	Yes	Unknown		8	CF
Nematoda	1	0.89%	Yes	Unknown		5	PA
Ostracoda	26	23.21%	Yes	Unknown		8	CG
Lymnaeidae							
Stagnicola sp.	6	5.36%	Yes	Unknown		6	SC
Naididae							
Naididae	1	0.89%	Yes	Unknown		8	CG
Planorbidae							
Gyraulus sp.	1	0.89%	Yes	Unknown		8	SC
Planorbidae	15	13.39%	No	Immature		6	SC
Heteroptera							
Corixidae							
Callicorixa sp.	1	0.89%	Yes	Adult		11	PR
Diptera							
Ceratopogonidae							
Ceratopogoninae	2	1.79%	Yes	Larva		6	PR
Chironomidae							
Chironomidae							
Acricotopus sp.	9	8.04%	Yes	Larva		10	CG
Chironomidae	2	1.79%	No	Pupa		10	CG
Chironomus sp.	9	8.04%	Yes	Larva		10	CG
Cladotanytarsus sp.	13	11.61%	Yes	Larva		7	CG
Derotanypus sp.	3	2.68%	Yes	Larva		11	UN
Dicrotendipes sp.	14	12.50%	Yes	Larva		8	CG
Endochironomus sp.	1	0.89%	Yes	Larva		10	SH
Glyptotendipes sp.	1	0.89%	Yes	Larva		10	SH
Paratanytarsus sp.	2	1.79%	Yes	Larva		6	CG
Psectrotanypus sp.	1	0.89%	Yes	Larva		10	PR
Tanytarsini	2	1.79%	No	Larva	Damaged	6	CF
Tanytarsus sp.	1	0.89%	Yes	Larva		6	CF
Sample Count	**112**						

Metrics Report

Project ID: MDT07PBSJ
RAI No.: MDT07PBSJ012
Sta. Name: Peterson Ranch Pond MS 2
Client ID:
STORET ID:
Coll. Date: 7/24/2007

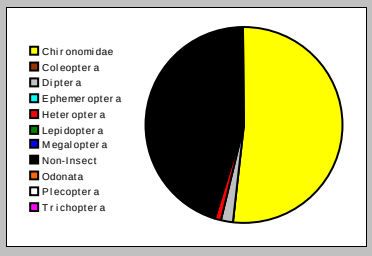
Abundance Measures

Sample Count: 112
Sample Abundance: 516.92 21.67% of sample used

Coll. Procedure:
Sample Notes:

Taxonomic Composition

Category	R	A	PRA
Non-Insect	6	51	45.54%
Odonata			
Ephemeroptera			
Plecoptera			
Heteroptera	1	1	0.89%
Megaloptera			
Trichoptera			
Lepidoptera			
Coleoptera			
Diptera	1	2	1.79%
Chironomidae	10	58	51.79%

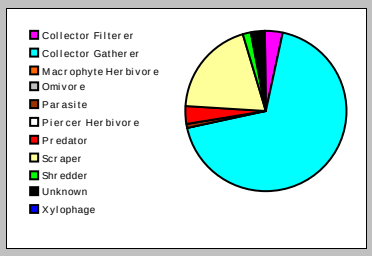


Dominant Taxa

Category	A	PRA
Ostracoda	26	23.21%
Planorbidae	15	13.39%
Dicrotendipes	14	12.50%
Cladotanytarsus	13	11.61%
Chironomus	9	8.04%
Acricotopus	9	8.04%
Stagnicola	6	5.36%
Derotanypus	3	2.68%
Tanytarsini	2	1.79%
Paratanytarsus	2	1.79%
Chironomidae	2	1.79%
Ceratopogoninae	2	1.79%
Nematoda	1	0.89%
Glyptotendipes	1	0.89%
Endochironomus	1	0.89%

Functional Composition

Category	R	A	PRA
Predator	3	4	3.57%
Parasite	1	1	0.89%
Collector Gatherer	7	76	67.86%
Collector Filterer	2	4	3.57%
Macrophyte Herbivore			
Piercer Herbivore			
Xylophage			
Scraper	2	22	19.64%
Shredder	2	2	1.79%
Omivore			
Unknown	1	3	2.68%

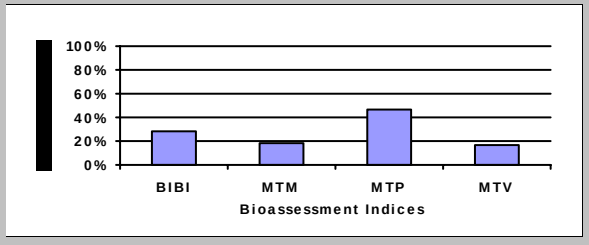


Metric Values and Scores

Metric	Value	BIBI	MTP	MTV	MTM
Composition					
Taxa Richness	18	1	2		0
Non-Insect Percent	45.54%				
E Richness	0	1		0	
P Richness	0	1		0	
T Richness	0	1		0	
EPT Richness	0		0		0
EPT Percent	0.00%		0		0
Oligochaeta+Hirudinea Percent	0.89%				
Baetidae/Ephemeroptera	0.000				
Hydropsychidae/Trichoptera	0.000				
Dominance					
Dominant Taxon Percent	23.21%		3		3
Dominant Taxa (2) Percent	36.61%				
Dominant Taxa (3) Percent	49.11%	5			
Dominant Taxa (10) Percent	88.39%				
Diversity					
Shannon H (loge)	2.260				
Shannon H (log2)	3.260		3		
Margalef D	3.751				
Simpson D	0.137				
Evenness	0.086				
Function					
Predator Richness	3		1		
Predator Percent	3.57%	1			
Filterer Richness	2				
Filterer Percent	3.57%			3	
Collector Percent	71.43%		2		1
Scraper+Shredder Percent	21.43%		2		0
Scraper/Filterer	5.500				
Scraper/Scraper+Filterer	0.846				
Habit					
Burrower Richness	4				
Burrower Percent	23.21%				
Swimmer Richness	1				
Swimmer Percent	0.89%				
Clinger Richness	1	1			
Clinger Percent	0.89%				
Characteristics					
Cold Stenotherm Richness	0				
Cold Stenotherm Percent	0.00%				
Hemoglobin Bearer Richness	6				
Hemoglobin Bearer Percent	37.50%				
Air Breather Richness	0				
Air Breather Percent	0.00%				
Voltinism					
Univoltine Richness	5				
Semivoltine Richness	0	1			
Multivoltine Percent	74.11%		1		
Tolerance					
Sediment Tolerant Richness	2				
Sediment Tolerant Percent	19.64%				
Sediment Sensitive Richness	0				
Sediment Sensitive Percent	0.00%				
Metals Tolerance Index	3.667				
Pollution Sensitive Richness	0	1		0	
Pollution Tolerant Percent	53.57%	1		0	
Hilsenhoff Biotic Index	7.759		0		0
Intolerant Percent	0.00%				
Supertolerant Percent	58.93%				
CTQa	108.000				

Bioassessment Indices

BioIndex	Description	Score	Pct	Rating
BIBI	B-IBI (Karr et al.)	14	28.00%	
MTP	Montana DEQ Plains (Bukantis 1998)	14	46.67%	Moderate
MTV	Montana Revised Valleys/Foothills (Bollman 1998)	3	16.67%	Severe
MTM	Montana DEQ Mountains (Bukantis 1998)	4	19.05%	Severe



Taxa Listing

Project ID: MDT07PBSJ
RAI No.: MDT07PBSJ013

RAI No.: MDT07PBSJ013 **Sta. Name:** Peterson Ranch Pond MS 4
Client ID:
Date Coll.: 7/24/2007 **No. Jars:** 1 **STORET ID:**

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Non-Insect							
Gammaridae							
Gammarus sp.	19	17.59%	Yes	Unknown		4	SH
Hyalellidae							
Hyalella sp.	4	3.70%	Yes	Unknown		8	CG
Lymnaeidae							
Stagnicola sp.	1	0.93%	Yes	Unknown		6	SC
Naididae							
Naididae	1	0.93%	Yes	Unknown		8	CG
Planorbidae							
Gyraulus sp.	7	6.48%	Yes	Unknown		8	SC
Odonata							
Coenagrionidae							
Enallagma sp.	14	12.96%	Yes	Larva		7	PR
Libellulidae							
Leucorrhinia sp.	1	0.93%	Yes	Larva		9	PR
Ephemeroptera							
Baetidae							
Callibaetis sp.	1	0.93%	Yes	Larva		9	CG
Caenidae							
Caenis sp.	3	2.78%	Yes	Larva		7	CG
Heteroptera							
Nepidae							
Ranatra sp.	1	0.93%	Yes	Adult		11	PR
Notonectidae							
Notonecta sp.	1	0.93%	Yes	Adult		5	PR
Trichoptera							
Limnephilidae							
Limnephilus sp.	1	0.93%	Yes	Larva		3	SH
Phryganeidae							
Phryganeidae	1	0.93%	Yes	Larva	Early Instar	4	SH
Coleoptera							
Hydrophilidae							
Hydrophilidae	1	0.93%	Yes	Larva		5	PR
Diptera							
Ceratopogonidae							
Ceratopogoninae	4	3.70%	Yes	Larva		6	PR
Ceratopogoninae	2	1.85%	No	Pupa		6	PR

Taxa Listing

Project ID: MDT07PBSJ
RAI No.: MDT07PBSJ013

RAI No.: MDT07PBSJ013 **Sta. Name:** Peterson Ranch Pond MS 4
Client ID:
Date Coll.: 7/24/2007 **No. Jars:** 1 **STORET ID:**

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Chironomidae							
Chironomidae							
Ablabesmyia sp.	1	0.93%	Yes	Larva		8	CG
Acricotopus sp.	4	3.70%	Yes	Larva		10	CG
Chironomidae	1	0.93%	No	Pupa		10	CG
Cladotanytarsus sp.	2	1.85%	Yes	Larva		7	CG
Clinotanypus sp.	1	0.93%	Yes	Larva		7	PR
Dicrotendipes sp.	3	2.78%	Yes	Larva		8	CG
Endochironomus sp.	11	10.19%	Yes	Larva		10	SH
Micropsectra sp.	1	0.93%	Yes	Larva		4	CG
Paratanytarsus sp.	1	0.93%	Yes	Larva		6	CG
Polypedilum sp.	1	0.93%	Yes	Larva		6	SH
Pseudochironomus sp.	18	16.67%	Yes	Larva		5	CG
Tanytarsus sp.	2	1.85%	Yes	Larva		6	CF
Sample Count	**108**						

Metrics Report

Project ID: MDT07PBSJ
RAI No.: MDT07PBSJ013
Sta. Name: Peterson Ranch Pond MS 4
Client ID:
STORET ID:
Coll. Date: 7/24/2007

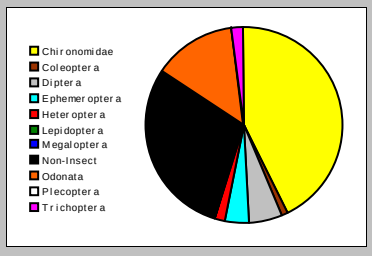
Abundance Measures

Sample Count: 108
Sample Abundance: 617.14 17.50% of sample used

Coll. Procedure:
Sample Notes:

Taxonomic Composition

Category	R	A	PRA
Non-Insect	5	32	29.63%
Odonata	2	15	13.89%
Ephemeroptera	2	4	3.70%
Plecoptera			
Heteroptera	2	2	1.85%
Megaloptera			
Trichoptera	2	2	1.85%
Lepidoptera			
Coleoptera	1	1	0.93%
Diptera	1	6	5.56%
Chironomidae	11	46	42.59%

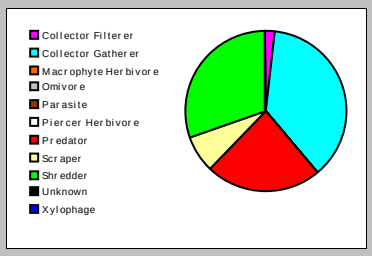


Dominant Taxa

Category	A	PRA
Gammarus	19	17.59%
Pseudochironomus	18	16.67%
Enallagma	14	12.96%
Endochironomus	11	10.19%
Gyraulus	7	6.48%
Ceratopogoninae	6	5.56%
Hyalella	4	3.70%
Acricotopus	4	3.70%
Dicrotendipes	3	2.78%
Caenis	3	2.78%
Tanytarsus	2	1.85%
Cladotanytarsus	2	1.85%
Ranatra	1	0.93%
Callibaetis	1	0.93%
Ablabesmyia	1	0.93%

Functional Composition

Category	R	A	PRA
Predator	7	25	23.15%
Parasite			
Collector Gatherer	11	40	37.04%
Collector Filterer	1	2	1.85%
Macrophyte Herbivore			
Piercer Herbivore			
Xylophage			
Scraper	2	8	7.41%
Shredder	5	33	30.56%
Omivore			
Unknown			

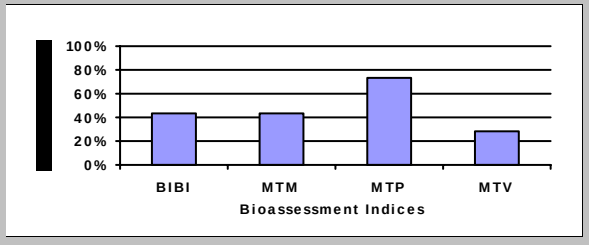


Metric Values and Scores

Metric	Value	BIBI	MTP	MTV	MTM
Composition					
Taxa Richness	26	3	3		2
Non-Insect Percent	29.63%				
E Richness	2	1		1	
P Richness	0	1		0	
T Richness	2	1		1	
EPT Richness	4		1		0
EPT Percent	5.56%		0		0
Oligochaeta+Hirudinea Percent	0.93%				
Baetidae/Ephemeroptera	0.250				
Hydropsychidae/Trichoptera	0.000				
Dominance					
Dominant Taxon Percent	17.59%		3		3
Dominant Taxa (2) Percent	34.26%				
Dominant Taxa (3) Percent	47.22%	5			
Dominant Taxa (10) Percent	82.41%				
Diversity					
Shannon H (loge)	2.645				
Shannon H (log2)	3.816		3		
Margalef D	5.372				
Simpson D	0.095				
Evenness	0.064				
Function					
Predator Richness	7		3		
Predator Percent	23.15%	5			
Filterer Richness	1				
Filterer Percent	1.85%			3	
Collector Percent	38.89%		3		3
Scraper+Shredder Percent	37.96%		3		1
Scraper/Filterer	4.000				
Scraper/Scraper+Filterer	0.800				
Habit					
Burrower Richness	4				
Burrower Percent	25.93%				
Swimmer Richness	2				
Swimmer Percent	1.85%				
Clinger Richness	2	1			
Clinger Percent	2.78%				
Characteristics					
Cold Stenotherm Richness	0				
Cold Stenotherm Percent	0.00%				
Hemoglobin Bearer Richness	8				
Hemoglobin Bearer Percent	39.81%				
Air Breather Richness	2				
Air Breather Percent	1.85%				
Voltinism					
Univoltine Richness	12				
Semivoltine Richness	1	1			
Multivoltine Percent	43.52%		2		
Tolerance					
Sediment Tolerant Richness	2				
Sediment Tolerant Percent	7.41%				
Sediment Sensitive Richness	0				
Sediment Sensitive Percent	0.00%				
Metals Tolerance Index	3.263				
Pollution Sensitive Richness	0	1		0	
Pollution Tolerant Percent	46.30%	3		0	
Hilsenhoff Biotic Index	6.533		1		0
Intolerant Percent	0.00%				
Supertolerant Percent	31.48%				
CTQa	102.000				

Bioassessment Indices

BioIndex	Description	Score	Pct	Rating
BIBI	B-IBI (Karr et al.)	22	44.00%	
MTP	Montana DEQ Plains (Bukantis 1998)	22	73.33%	Slight
MTV	Montana Revised Valleys/Foothills (Bollman 1998)	5	27.78%	Moderate
MTM	Montana DEQ Mountains (Bukantis 1998)	9	42.86%	Moderate



Taxa Listing

Project ID: MDT07PBSJ
RAI No.: MDT07PBSJ014

RAI No.: MDT07PBSJ014 **Sta. Name:** Peterson Ranch Pond MS 5
Client ID:
Date Coll.: 7/24/2007 **No. Jars:** 1 **STORET ID:**

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Non-Insect							
Acari	2	1.74%	Yes	Unknown		5	PR
Cladocera	5	4.35%	Yes	Unknown		8	CF
Hyalellidae							
Hyalella sp.	2	1.74%	Yes	Unknown		8	CG
Lymnaeidae							
Stagnicola sp.	1	0.87%	Yes	Unknown		6	SC
Planorbidae							
Gyraulus sp.	35	30.43%	Yes	Unknown		8	SC
Odonata							
Coenagrionidae							
Enallagma sp.	25	21.74%	Yes	Larva		7	PR
Ephemeroptera							
Baetidae							
Callibaetis sp.	6	5.22%	Yes	Larva		9	CG
Caenidae							
Caenis sp.	7	6.09%	Yes	Larva		7	CG
Heteroptera							
Corixidae							
Corixidae	2	1.74%	Yes	Larva		10	PH
Notonectidae							
Notonecta sp.	1	0.87%	Yes	Adult		5	PR
Notonectidae	1	0.87%	No	Larva		10	PR
Trichoptera							
Leptoceridae							
Mystacides sp.	1	0.87%	Yes	Larva		4	CG
Coleoptera							
Haliplidae							
Haliplus sp.	10	8.70%	Yes	Larva		5	PH
Chironomidae							
Chironomidae							
Cricotopus (Isocladius) sp.	2	1.74%	Yes	Larva		7	SH
Dicrotendipes sp.	5	4.35%	Yes	Larva		8	CG
Polypedilum sp.	5	4.35%	Yes	Larva		6	SH
Psectrocladius sp.	1	0.87%	Yes	Larva		8	CG
Pseudochironomus sp.	3	2.61%	Yes	Larva		5	CG
Tanytarsus sp.	1	0.87%	Yes	Larva		6	CF
Sample Count	**115**						

Metrics Report

Project ID: MDT07PBSJ
RAI No.: MDT07PBSJ014
Sta. Name: Peterson Ranch Pond MS 5
Client ID:
STORET ID:
Coll. Date: 7/24/2007

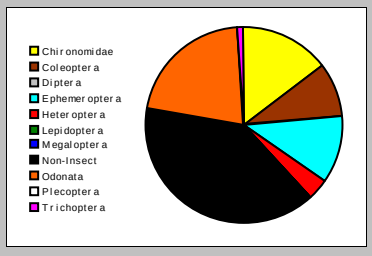
Abundance Measures

Sample Count: 115
Sample Abundance: 287.50 40.00% of sample used

Coll. Procedure:
Sample Notes:

Taxonomic Composition

Category	R	A	PRA
Non-Insect	5	45	39.13%
Odonata	1	25	21.74%
Ephemeroptera	2	13	11.30%
Plecoptera			
Heteroptera	2	4	3.48%
Megaloptera			
Trichoptera	1	1	0.87%
Lepidoptera			
Coleoptera	1	10	8.70%
Diptera			
Chironomidae	6	17	14.78%

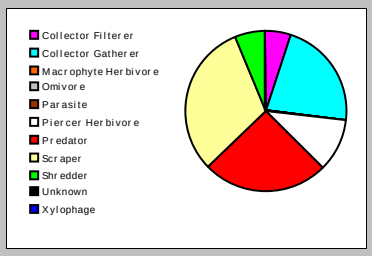


Dominant Taxa

Category	A	PRA
Gyraulus	35	30.43%
Enallagma	25	21.74%
Haliplus	10	8.70%
Caenis	7	6.09%
Callibaetis	6	5.22%
Polypedilum	5	4.35%
Dicrotendipes	5	4.35%
Cladocera	5	4.35%
Pseudochironomus	3	2.61%
Hyalella	2	1.74%
Cricotopus (Isocladius)	2	1.74%
Corixidae	2	1.74%
Acari	2	1.74%
Notonecta	1	0.87%
Mystacides	1	0.87%

Functional Composition

Category	R	A	PRA
Predator	3	29	25.22%
Parasite			
Collector Gatherer	7	25	21.74%
Collector Filterer	2	6	5.22%
Macrophyte Herbivore			
Piercer Herbivore	2	12	10.43%
Xylophage			
Scraper	2	36	31.30%
Shredder	2	7	6.09%
Omivore			
Unknown			

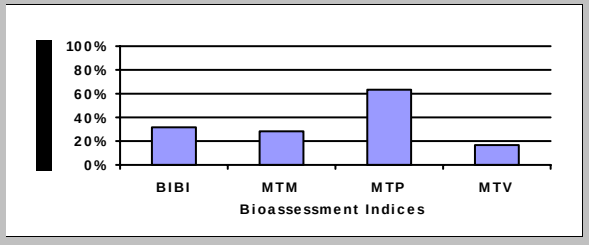


Metric Values and Scores

Metric	Value	BIBI	MTP	MTV	MTM
Composition					
Taxa Richness	18	1	2		0
Non-Insect Percent	39.13%				
E Richness	2	1		1	
P Richness	0	1		0	
T Richness	1	1		0	
EPT Richness	3		1		0
EPT Percent	12.17%		1		0
Oligochaeta+Hirudinea Percent					
Baetidae/Ephemeroptera	0.462				
Hydropsychidae/Trichoptera	0.000				
Dominance					
Dominant Taxon Percent	30.43%		2		2
Dominant Taxa (2) Percent	52.17%				
Dominant Taxa (3) Percent	60.87%	3			
Dominant Taxa (10) Percent	89.57%				
Diversity					
Shannon H (loge)	2.234				
Shannon H (log2)	3.222		3		
Margalef D	3.589				
Simpson D	0.157				
Evenness	0.086				
Function					
Predator Richness	3		1		
Predator Percent	25.22%	5			
Filterer Richness	2				
Filterer Percent	5.22%			2	
Collector Percent	26.96%		3		3
Scraper+Shredder Percent	37.39%		3		1
Scraper/Filterer	6.000				
Scraper/Scraper+Filterer	0.857				
Habit					
Burrower Richness	2				
Burrower Percent	6.96%				
Swimmer Richness	4				
Swimmer Percent	16.52%				
Clinger Richness	3	1			
Clinger Percent	6.96%				
Characteristics					
Cold Stenotherm Richness	0				
Cold Stenotherm Percent	0.00%				
Hemoglobin Bearer Richness	5				
Hemoglobin Bearer Percent	43.48%				
Air Breather Richness	0				
Air Breather Percent	0.00%				
Voltinism					
Univoltine Richness	8				
Semivoltine Richness	1	1			
Multivoltine Percent	26.09%		3		
Tolerance					
Sediment Tolerant Richness	2				
Sediment Tolerant Percent	31.30%				
Sediment Sensitive Richness	0				
Sediment Sensitive Percent	0.00%				
Metals Tolerance Index	3.146				
Pollution Sensitive Richness	0	1		0	
Pollution Tolerant Percent	56.52%	1		0	
Hilsenhoff Biotic Index	7.235		0		0
Intolerant Percent	0.00%				
Supertolerant Percent	49.57%				
CTQa	91.636				

Bioassessment Indices

BioIndex	Description	Score	Pct	Rating
BIBI	B-IBI (Karr et al.)	16	32.00%	
MTP	Montana DEQ Plains (Bukantis 1998)	19	63.33%	Slight
MTV	Montana Revised Valleys/Foothills (Bollman 1998)	3	16.67%	Severe
MTM	Montana DEQ Mountains (Bukantis 1998)	6	28.57%	Moderate



Appendix G

REVEGETATION

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

Species	Kgs(lbs) per Hectare (Acre)
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

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

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.

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	*Salix amygdaloides*
Sandbar Willow	*Salix exigua*
Bebb's Willow	*Salix bebbiana*
Drummond Wilow	*Salix drummondiana*
Yellow Willow	*Salix lutea*

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:

Pay Item	Pay Unit
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.