MONTANA DEPARTMENT OF TRANSPORTATION
WETLAND MITIGATION MONITORING REPORT: YEAR 2007

Rock Creek Ranch
Hinsdale, 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 - 0412

MONTANA DEPARTMENT OF TRANSPORTATION

WETLAND MITIGATION MONITORING REPORT:

YEAR 2007

Rock Creek Ranch
Hinsdale, 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 - 0412

TABLE OF CONTENTS

TABLES

FIGURES

CHARTS

APPENDICES

1.0 INTRODUCTION

This report documents the third year of monitoring at the Rock Creek Ranch wetland mitigation site. The Rock Creek Ranch is located in Valley County, approximately three miles east of Hinsdale along the north side of U.S. Highway 2 (**Figure 1**). The ranch is situated east of Rock Creek and north of the Milk River in Watershed 11. The Montana Department of Transportation (MDT) sought to purchase up to 50 wetland credit acres in Watershed 11 (Milk River) to offset current and potential future wetland impacts resulting from proposed highway construction projects within the watershed.

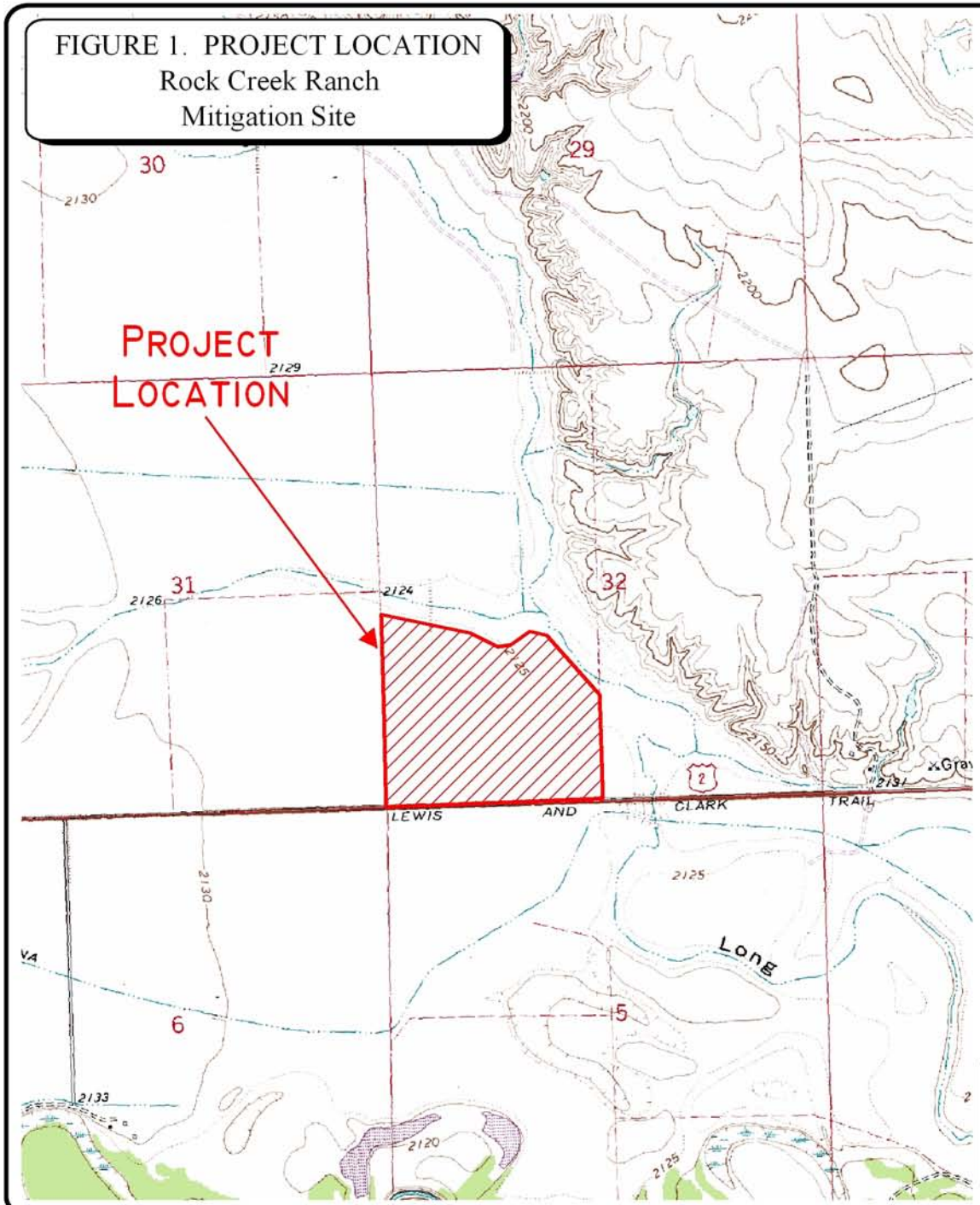
Constructed in fall 2004, the Rock Creek Ranch wetland mitigation project seeks to create / restore (re-establish) up to 75 acres of primarily emergent and, as an added component, scrub/shrub wetlands, within an approximate 116.75-acre perpetual conservation easement in the southeast corner of the ranch property (**Figure 1**). The first 50 acres of successfully established credits would be allocated to MDT, and MDT would have the option of purchasing additional wetland credits developing within the easement. Approximately 1.08 acres of wetlands occurred in the project area prior to construction. This does not include pre-existing wetlands in an excavated east-west trench within the easement just north of U.S. Highway 2, which were not part of the Rock Creek Ranch project, but were previously constructed by MDT to mitigate wetland impacts associated with the Hinsdale East and West project.

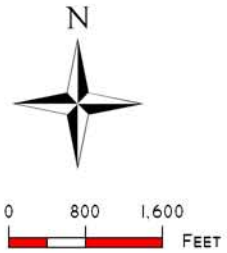
The proposed wetlands are designed to collect water from irrigation and natural seasonal flow down Long Coulee, as well as irrigation return flow and precipitation. As the low point on the ranch, all irrigation return water flows through the wetland mitigation area with the exception of water flowing in the U.S. Highway 2 roadside ditch. Water is retained on the site by two low dikes in the southeast property corner

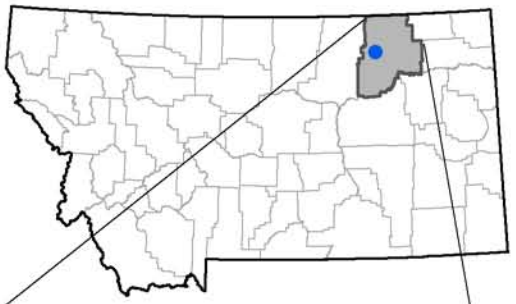
Project components were designed to increase habitat diversity at the site. These include excavating approximately two acres of four foot-deep sinuous “slough” areas within current upland areas to provide open water / vegetated shallows components and maximize edge effect. Spoils from this excavation were placed as two naturally-shaped shallow “islands” within the site. Seedling willow planting occurred in and along the saturated zones of the newly flooded area in spring 2007, with the intent of providing a woody scrub-shrub wetland component. Primary target wetland functions include general wildlife habitat, production export, flood attenuation, short and long-term surface water storage, and sediment/nutrient/toxicant retention and removal. The site is also intended to provide habitat for sensitive wildlife species such as the northern leopard frog (*Rana pipiens*) and Black-Necked Stilt (*Himantopus mexicanus*).

Credit ratios and approximate associated credit acreages agreed to by the Corps of Engineers (COE 2003) are listed in **Table 1**. While up to 76 acres of credit may eventually develop, the short term current MDT credit goal at the site is 50 acres.

FIGURE 1. PROJECT LOCATION
Rock Creek Ranch
Mitigation Site







PROJECT #: 330054.407
DATE: Dec 2005
LOCATION: Hinsdale, MT
PROJECT MANAGER: J. Berglund
DRAWN BY: L. Lundquist

LAND & WATER CONSULTING
PO Box 239
Helena, MT 59624
A Division Of PBSJ

Table 1: ***Credit ratios and acreages for Rock Creek Ranch Wetland Mitigation Site.***

Habitat	Credit Ratio	Credit Acreages
Wetland Creation / Re-Establishment	1:1	75 acres created / re-established 75 acres wetland mitigation credit
Upland Buffer (3,100 x 50 feet along south and southwest wetland borders)	1:4	3.6 acres of buffer established 0.9 acre wetland mitigation credit
Wetland Enhancement (1,000 x 15 feet)	1:3	0.34 acre enhanced 0.11 acre wetland mitigation credit
Total Projected Wetland Mitigation Credit		**76.01 acres**

This report documents the results of 2007 monitoring efforts. The monitoring area is illustrated in **Figure 2** (**Appendix A**).

2.0 METHODS

2.1 Monitoring Dates and Activities

The site was visited on May 7 (spring), July 16 (mid-season), and August 31 (late summer) 2007. The primary purpose of the spring and late season visits was to conduct a bird/general wildlife reconnaissance. The mid-season visit was conducted to document vegetation, soil, and hydrologic conditions used to map wetlands. All information contained on the Wetland Mitigation Site Monitoring Form (**Appendix B**) was collected at this time. Activities and information conducted/collected included: wetland delineation; wetland/open water boundary mapping; vegetation community mapping; vegetation transects; soils data; hydrology data; bird and general wildlife use; photograph points; macro-invertebrate sampling; functional assessment; and (non-engineering) examination of dike structures.

2.2 Hydrology

Hydrologic indicators were evaluated at the site during the mid-season visit. Approximate designed water depths are shown on the conceptual plan in **Appendix D**. Wetland hydrology indicators were recorded 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**).

All additional hydrologic data were recorded on the mitigation site monitoring form (**Appendix B**). Where possible, the boundary between wetlands and open water (no rooted vegetation) aquatic habitats was mapped on the aerial photograph and an estimate of the average water depth at this boundary was recorded.

No groundwater monitoring wells were installed at the site. If located within 18 inches of the ground surface (soil pit depth for purposes of delineation), groundwater depths were documented on the routine wetland delineation data form at each data point.

2.3 Vegetation

General dominant species-based vegetation community types (e.g., *Typha latifolia / Scirpus acutus*) were delineated on a 2006 aerial photograph during the mid-season visit. Standardized community mapping was not employed as many of these systems are geared towards climax vegetation and may not reflect yearly changes. Estimated percent cover of the dominant species in each community type was listed on the site monitoring form (**Appendix B**).

A 10-foot wide belt transect was sampled during the mid-season monitoring event to represent the range of current vegetation conditions. Percent cover was estimated for each vegetative species for each successive vegetation community encountered within the "belt" using the following values: + (<1%); 1 (1-5%); 2 (6-10%); 3 (11-20%); 4 (21-50%); and 5 (>50%). The approximate transect location is depicted on **Figure 2** (**Appendix A**). The transect is used to evaluate changes over time, especially the establishment and increase of hydrophytic vegetation. Transect data were recorded on the mitigation site monitoring form. Photos along the transect were taken from both ends during the mid-season visit.

A comprehensive plant species list was prepared for the site in 2005, and was updated in 2006 and 2007 as new species were encountered. Woody species were planted at this mitigation site in May 2007, and monitoring relative to the survival of such species was therefore conducted for the first time in July 2007.

2.4 Soils

Soils were evaluated during the mid-season visit according to hydric soils determination procedures outlined in the COE 1987 Wetland Delineation Manual. Soil data were recorded for each wetland determination point on the COE Routine Wetland Delineation Data Form (**Appendix B**). The most current terminology used by NRCS was used to describe hydric soils (USDA 1998).

Surface soils were sampled at six locations east of the east dike (**Figure 2** in **Appendix A**) during the mid-season visit and remitted to Energy Labs for pH and conductivity assessment. The purpose was to establish baseline soil (salinity) conditions east of the east dike to facilitate comparison with future sampling in an effort to monitor potential offsite (down-gradient) soil salinity increases associated with project inundation.

2.5 Wetland Delineation

Wetland delineation was conducted during the mid-season visit according the 1987 COE Wetland Delineation Manual. The indicator status of vegetation was derived from the National List of Plant Species that Occur in Wetlands: North Plains Region 4 (Reed 1988). Wetland and upland areas within the monitoring area were investigated for the presence of wetland hydrology, hydrophytic vegetation and hydric soils. The information was recorded on COE Routine Wetland Delineation Data Forms (**Appendix B**). The wetland/upland boundary was recorded with a resource-grade GPS unit. The wetland/upland boundary in combination with the wetland/open water habitat boundary was used to calculate the developed wetland area.

2.6 Mammals, Reptiles, and Amphibians

Mammal, reptile, and amphibian species observations and other positive indicators of use, such as vocalizations, were recorded on the wetland monitoring form during each 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 implemented. A comprehensive list of observed species was compiled. Observations from past years will ultimately be compared with new data.

2.7 Birds

Bird observations were recorded during each visit. No formal census plots, spot mapping, point counts, or strip transects were conducted. During the spring and late season visits, observations were recorded in compliance with the bird survey protocol in **Appendix E**. During the mid-season visit, bird observations were recorded incidental to other monitoring activities. During all visits, observations were categorized by species, activity code, and general habitat association (**Field Data Forms** in **Appendix B**).

2.8 Macroinvertebrates

One macroinvertebrate sample was collected during the mid-season site visit and data recorded on the wetland mitigation monitoring form. Macroinvertebrate sampling procedures are included in **Appendix F**. The approximate location of the sample point is shown on **Figure 2** (**Appendix A**). The sample was preserved as outlined in the sampling procedure and sent to Rhithron Associates for analysis.

2.9 Functional Assessment

A functional assessment was completed using the 1999 MDT Montana Wetland Assessment Method (Berglund 1999). Field data necessary for this assessment were generally collected during the mid-season site visit. An abbreviated field data sheet for the 1999 MDT Montana Wetland Assessment Method was compiled to facilitate rapid collection of field information. The remainder of the functional assessment was completed in the office. For each wetland or group of wetlands (that share similar functions and values) a Functional Assessment Form was completed (**Appendix B**)

2.10 Photographs

Photographs were taken during the mid-season visit showing the current land use surrounding the site, the upland buffer, the monitored area, and the vegetation transect (**Appendix C**). The approximate location of photo points is shown on **Figure 2** (**Appendix A**). All photographs were taken using a digital camera. A description and compass direction for each photograph was recorded on the wetland monitoring form.

2.11 GPS Data

GPS data collected during the 2005 monitoring season included vegetation transect beginning and ending locations, all photograph locations, the macroinvertebrate sample point, and wetland boundaries. During 2007, GPS data collected included wetland boundaries and soil sample locations east of the east dike on adjacent property (for purposes of monitoring changes in salinity east of the dike). Wetland boundary changes observed in 2007 were also documented on a 2006 aerial photograph. Procedures used for GPS mapping and aerial photography referencing are included in **Appendix E**.

2.12 Maintenance Needs

Dike structures were examined during all site visits for obvious signs of breaching, damage, seepage, or other problems. This did not constitute an engineering-level structural inspection, but rather a cursory examination. Current or future potential problems were documented.

3.0 RESULTS

3.1 Hydrology

Approximately 70% of the overall 116.75-acre easement was inundated during the July mid-season visit in 2006, with over 80 acres of the designed wetland area exhibiting inundation. During the July visit, virtually 100% of the designed wetland area was inundated. Water depths ranged between approximately three to four feet deep in the excavated slough areas, and between four inches and two feet deep in the wetland areas. Specific recorded water depths are provided on the attached data forms. At the southeast control structure, the distance from the water surface elevation to the top of the highest stoplog was approximately 12 to 13 inches during the spring visit and 11 inches during the mid-season visit. This was similar to spring 2006 levels and an improvement over the July 2006 level, when the distance was about 20 inches.

According to the Western Regional Climate Center, mean monthly precipitation from January through July from 1955 to 2007 total 7.67 inches for the Glasgow WSO Airport station approximately 25 miles east of the project site. During 2007, 12.16 inches (159 % of the mean) of precipitation were recorded at this station between January and July. Precipitation data were incomplete for the Hinsdale 4 SW station.

3.2 Vegetation

Vegetation species identified on the site are presented in **Table 2** and on the attached data form. During 2007, five wetland community types were identified and mapped on the mitigation area (**Figure 3** in **Appendix A**). These included Type 1: *Typha latifolia* / *Alisma gramanium*, Type 2: *Rumex crispus / Hordeum jubatum*, Type 3: *Populus deltoides* / *Salix*, Type 4: *Alopecurus pratensis*, and Type 8: *Rumex crispus / Typha latifolia*. Wetland communities Type 6: *Typha latifolia / Ammannia robusta* and Type 7: *Typha latifolia / Iva axillaris* were not observed on the

site during 2007, having been replaced by types 1 and 8. Dominant species within each of these communities are listed on the attached data form (**Appendix B**).

Type 1 again expanded in 2007 and occurs commonly in the Long Coulee ditch and in the east third of the site where the large marsh outside the easement fence line is now expanding to the south. Type 2 occurs primarily in newly developing wetland areas throughout the site; generally along outside perimeters. Type 3 occurs in primarily in the pre-existing roadside ditch wetlands along the south mitigation site boundary that were created by MDT. Type 4 occurs as a persistent small patch in the northwest corner of the site. Type 8, newly identified in 2007, occurs adjacent to Type 1 communities.

Types 6 and 7 were replaced in 2007 by types 1 and 8. Type 6 was largely comprised of scarlet ammannia (*Ammannia robusta*), a plant listed as a species of concern by the Montana Natural Heritage Program (MTNHP) and only known from three historic occurrences in Garfield and Phillips counties. In 2006, Type 6 was mapped in two primary areas: along the south dike and in the approximate center of the site. Type 6 was likely not apparent in 2007 due to increased inundation depth and duration in response to increased precipitation; this type may reappear when conditions are again suitable. Type 7 was transitional to Type 1 and generally occured along the outer limits of Type 1 areas. Notably, several seedling plains cottonwood (*Populus deltoides*) and peach-leaf willow (*Salix amygdaloides*) were observed emerging along some excavated slough margins (west slough) within the site.

Upland communities vary and include foxtail barley (*Hordeum jubatum*) and curly dock (*Rumex crispus*) dominated areas with kochia (*Kochia scoparia*), areas dominated by native upland species such as slender wheatgrass (*Agropyron trachycaulum*) and western wheatgrass (*Agropyron smithii*), and formerly cultivated fields dominated by domestic wheat and oats.

Vegetation transect results are detailed in the attached data form (**Appendix B**), and are summarized in **Table 3** and in **Charts 1** and **2**.

Table 2: ***2005-2007 Rock Creek Ranch vegetation species list.***

Species[1]	Region 4 Wetland Indicator Status
Agropyron repens	FAC
Agropyron smithii	FACU
Agropyron trachycaulum	FACU
Agrostis alba	FACW
Alisma gramineum	OBL
Alopecurus pratensis	FACW
Ammannia robusta	OBL
Artemisia cana	FACU
Artemisia frigida	--
Beckmannia syzigachne	OBL
Bromus inermis	--
Carex vesicaria	OBL
Chenopodium album	FAC
Cirsium arvense	FACU
Echinochloa crusgalli	FACW
Eleocharis palustris	OBL

[1] **Bolded** species indicate those observed for the first time in 2007.

Table 2 (continued): ***2005-2007 Rock Creek Ranch vegetation species list.***

Species[1]	Region 4 Wetland Indicator Status
Grindelia squarrosa	UPL
Helianthus annuus	FACU
Hordeum jubatum	FACW
Iva axillaris	FACU
Kochia scoparia	FAC
Lactuca serriola	FACU
Lemna minor	OBL
Lepidium densiflorum	FACU
Medicago sativa	--
Melilotus alba	FACU-
Melilotus officinalis	FACU-
Najas guadalupensis	OBL
Oats - domestic	--
Phleum pratense	FACU
Plantago major	FAC
Polygonum amphibium	OBL
Populus deltoides	FAC
Populus trichocarpa	**FACW**
Potamogeton pectinatus	OBL
Rumex crispus	FACW
Sagittaria cuneata	OBL
Salix amygdaloides	FACW
Salix exigua	FACW+
Salix lasiandra	**FACW+**
Salix lutea	**FACW+**
Scirpus acutus	OBL
Scirpus maritimus	NI
Spartina pectinata	FACW
Thlaspi arvense	**NI**
Tragopogon dubius	--
Typha latifolia	OBL
wheat - domestic	--

[1] **Bolded** species indicate those observed for the first time in 2007.

Table 3: ***2005-2007 Transect 1 data summary.***

Monitoring Year	2005	2006	2007
Transect Length (feet)	385	385	385
# Vegetation Community Transitions along Transect	2	1	1
# Vegetation Communities along Transect	2	2	2
# Hydrophytic Vegetation Communities along Transect	1	2	2
Total Vegetative Species	9	7	6
Total Hydrophytic Species	5	6	6
Total Upland Species	4	1	0
Estimated % Total Vegetative Cover	100	70	80
% Transect Length Comprised of Hydrophytic Vegetation Communities	30	100	100
% Transect Length Comprised of Upland Vegetation Communities	70	0	0
% Transect Length Comprised of Unvegetated Open Water	0	0	0
% Transect Length Comprised of Bare Substrate	0	0	

Chart 1: ***Transect map showing vegetation types from start (0 feet) to the end (385 feet) of transect 1 for 2005-2007.***

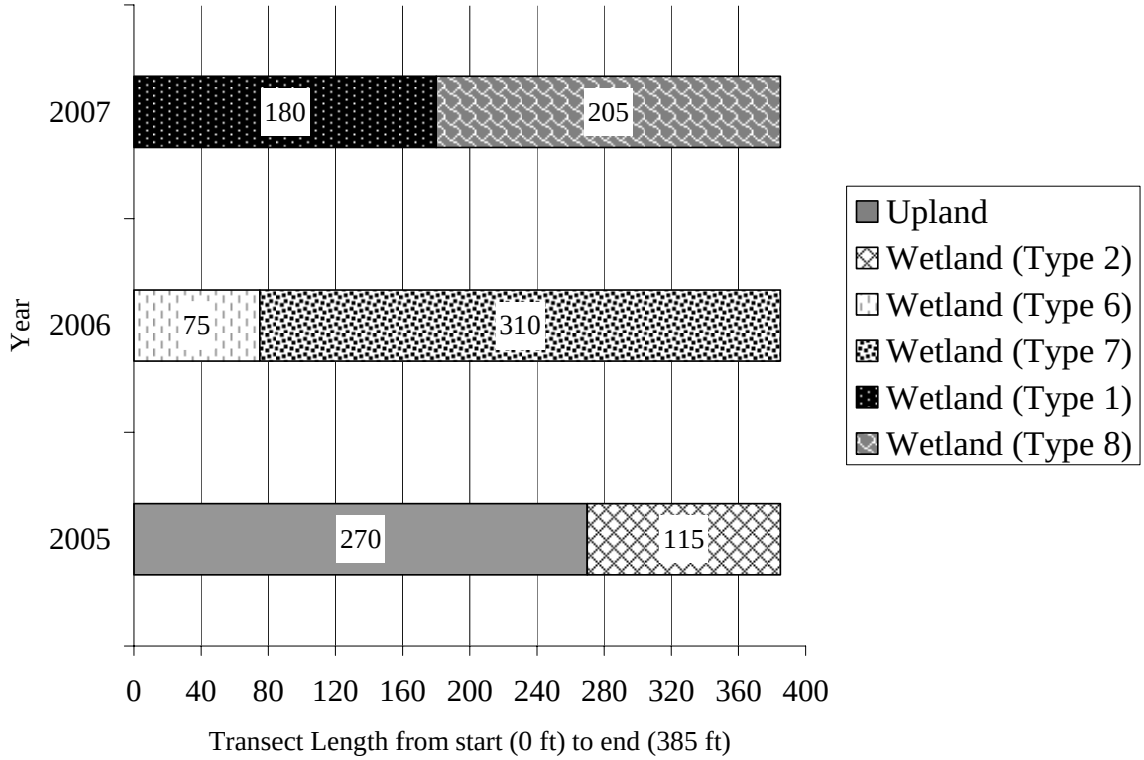
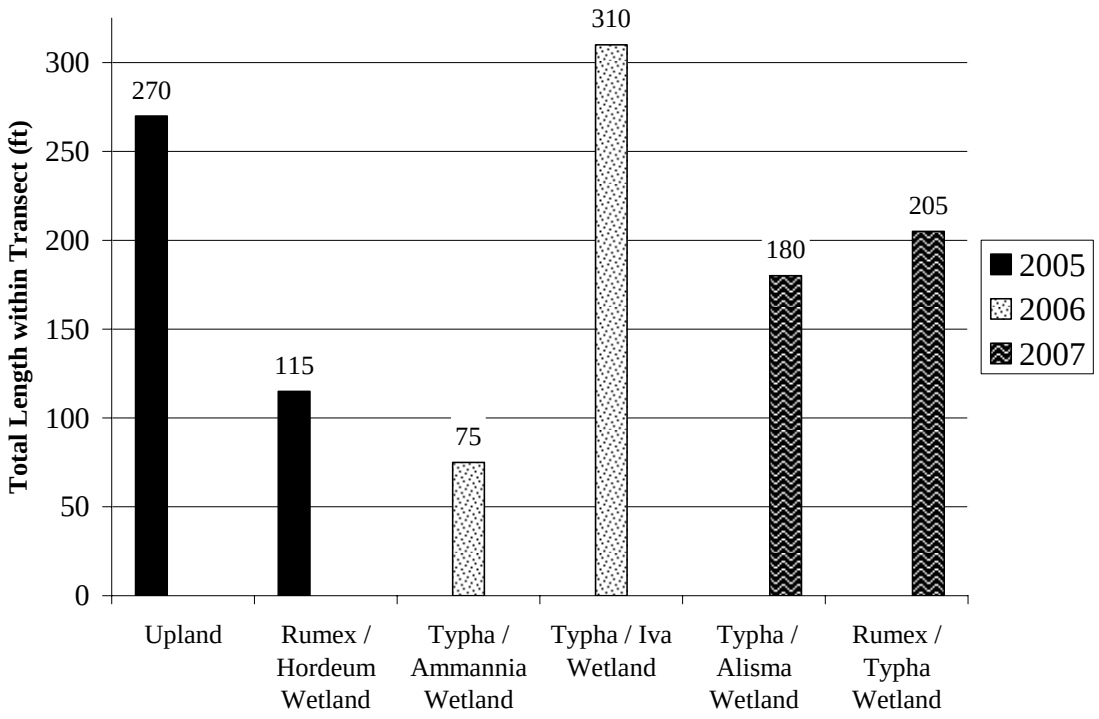


Chart 2: ***Length of vegetation communities within Transect 1 for 2005-2007.***



Cottonwood (40 cubic-inch) and three willow species (30 cubic-inch and one-gallon) were planted at the site in 2007. Observed mortality of planted woody vegetation species is summarized below in **Table 4**. Only observations of dead, obviously planted individuals were recorded in order to make the most efficient use of available monitoring time.

Table 4: ***2007 observed mortality of planted woody species.***

Species	Estimated # Originally Planted	Observed # Dead[1]	Comments
Populus trichocarpa (40 cubic-inch)	42	30	Planting was accomplished in spring (May) during what would normally have been peak inundation. However, peak inundation was achieved later in 2007 due to plentiful early summer precipitation. Mortality was likely due to longer and deeper inundation conditions than were anticipated during 2007.
Salix amygdaloides (one-gallon)	126	61	Same comment as above. These two species experienced higher mortality due to inundation depth and duration than did *S. exigua*.
Salix lutea (30 cubic-inch)	211		
Salix exigua (30 cubic-inch)	465	20	Same comment as above
TOTAL	**844**	**111**	Assumed % survival was 87%. An additional 53 total plants were "questionable" as of late August, still retaining minimal leaves, but showing signs of significant stress. This was possibly due to removal of all stoplogs at the main control structure in July, resulting in early drawdown.

[1] Dead were counted, but species were estimated because leaves were often absent.

3.3 Soils

Soil at the mitigation site is mapped as Harlem clay. Permeability is slow (0.06 to 0.2 inches / hour), and this soil type is considered "favorable" for reservoir development (Soil Conservation Service 1984). The NRCS excavated four soil pits in the current designed inundation area with a backhoe in November 2000. Pit logs indicated clay to depths of 25, 32, and 29 inches in three of the pits (the apparent maximum pit depths). At a fourth pit, soil was classified as silty clay to 12 inches, clay from 12 to 22 inches, and loam / clay loam from 22 to 40 inches. Harlem clay is not included on the Valley County hydric soils list. These characteristics were generally confirmed during 2005 - 2007 monitoring. Soils sampled in wetland areas consistently were comprised of clay with a matrix color of 2.5Y4/1 to 10YR 4/1. All wetland soils were saturated or inundated at the time of the survey.

Soil sample laboratory analysis results are presented in **Appendix B**. Conductivity values ranged from 0.72 to 7.69 mmhos/cm and pH values ranged from 6.7 to 7.9. Sampling will continue in subsequent years and will be compared with these results.

3.4 Wetland Delineation

Delineated wetland boundaries are illustrated on **Figure 3** (**Appendix A**). Completed wetland delineation forms are included in **Appendix B**. Soils, vegetation, and hydrology are discussed in preceding sections. Although they are shown on **Figure 3** (**Appendix A**) delineation acreage results for 2007 did not include the pre-existing MDT-created wetland ditches along the south easement border, just north of U.S. Highway 2, as these areas are technically not part of the Rock Creek Ranch mitigation project. Delineation results are listed in **Table 5**.

Table 5: ***2007 Wetland delineation results for Rock Creek Ranch Wetland Mitigation Site.***

Aquatic Habitat	Acreage
Wetland	87.41
Open Water	0.00
Total Aquatic Habitat	**87.41**

Approximately 1.08 acres of wetlands occurred on the site prior to project implementation. Consequently, the net aquatic habitat developed to date is 87.41 – 1.08 = 86.33 acres, an increase of 4.64 acres since 2006.

3.5 Wildlife

Wildlife species, or evidence of wildlife, observed on the site during 2005 and 2006 monitoring efforts are listed in **Table 6**. Specific evidence observed, and activity codes pertaining to birds, are provided on the completed monitoring form in **Appendix B**. Five mammal, two amphibian, one reptile, and 25 bird species were noted using portions of the mitigation site during 2007.

Of special interest were observations of northern leopard frogs (*Rana pipiens*) during 2005-2007. Leopard frogs are considered a "species of special concern" by the MTNHP due largely to their apparent extirpation from the portion of their historic distribution west of the Continental Divide. This species has been assigned the rank of S1 (critically imperiled) in intermountain valleys and S3 (rare occurrence and/or restricted range and/or vulnerable to extinction) in the Great Plains region (which includes the project area) by the MTNHP.

3.6 Macroinvertebrates

Macroinvertebrate sampling results are provided in **Appendix F** and were summarized below in italics by Rhithron Associates, Inc. (Bollman 2007) and in **Chart 3**.

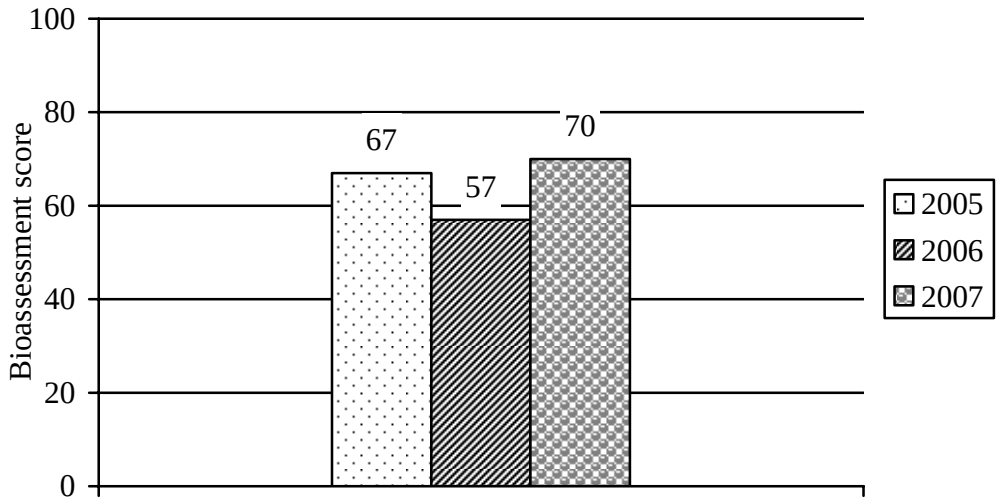
Bioassessment scores indicated optimal conditions at this site in 2007. The abundance of biting midges (Ceratopogoninae) suggests the proximity of cattle. Leeches, macrocrustaceans, and the dragonfly Sympetrum *sp. were collected, suggesting a functioning wetland with well established aquatic vegetation. Open-water habitats appear to have also been important at the site. Warm water temperatures are implied by the thermal preference of the assemblage, which was calculated as 19.6ºC.*

Table 6: ***2005-2007 fish and wildlife species observed[1] on the Rock Creek Ranch Wetland Mitigation Site.***

FISH	
None	
AMPHIBIAN	
Northern Leopard Frog (*Rana pipiens*)	**Western Chorus Frog (*Pseudacris triseriata*)**
REPTILE	
Plains Garter Snake (*Thamnophis radix*)	
BIRD	
American Avocet (*Recurvirostra americana*)	**Northern Harrier (*Circus cyaneus*)**
American Coot (*Fulica americana*)	**Northern Pintail (*Anas acuta*)**
American Crow (*Corvus brachyrhynchos*)	Northern Rough-winged Swallow (*Stelgidopteryx serripennis*)
American White Pelican (*Pelecanus erythrorhynchos*)	**Northern Shoveler (*Anas clypeata*)**
Bald Eagle (*Haliaeetus leucocephalus)*	Redhead (*Aythya americana*)
Bank Swallow (*Riparia riparia*)	Red-tailed Hawk (*Buteo jamaicensis)*
Black-necked Stilt (*Himantopus mexicanus*)	**Red-winged Blackbird (*Agelaius phoeniceus)***
Blue-winged Teal (*Anas discors*)	**Ring-necked Pheasant (*Phasianus colchicus*)**
Brewer's Blackbird (*Euphagus cyanocephalus*)	Ruddy Duck (*Oxyura jamaicensis*)
Brown-headed Cowbird (*Molothrus ater*)	Sandhill Crane (*Grus Canadensis*)
Bullock's Oriole (*Icterus bullockii*)	Savannah Sparrow (*Passerculus sandwichensis*)
Canada Goose (*Branta canadensis*)	Semipalmated Sandpiper (*Calidris pusilla*)
Common Snipe (*Gallinago gallinago*)	**Sora (*Porzana carolina*)**
Common Yellowthroat (*Geothlypis trichas)*	Swainson's Hawk (*Buteo swainsoni*)
Eared Grebe (*Podiceps nigricollis*)	Townsend's Warbler (*Dendroica townsendi*)
Eastern Kingbird (*Tyrannus tyrannus*)	Tree Swallow (*Tachycineta bicolor*)
European Starling (*Sturnus vulgaris*)	Upland Sandpiper (*Bartramia longicauda*)
Gadwall (*Anas strepera*)	**Vesper Sparrow (*Pooecetes gramineus*)**
Killdeer (*Charadrius vociferous*)	**Western Meadowlark (*Sturnella neglecta*)**
Long-billed Curlew (*Numenius americanus*)	Western Sandpiper (*Calidris mauri*)
Long-billed Dowitcher (*Limnodromus scolopaceus*)	Western Tanager (*Piranga ludoviciana*)
Mallard (*Anas platyrhynchos*)	**Willet (*Catoptrophorus semipalmatus*)**
Marbled Godwit (*Limosa fedoa*)	Willow Flycatcher (*Empidonax traillii*)
Marsh Wren (*Cistothorus palustris*)	**Wilson's Phalarope (*Phalaropus tricolor*)**
Mourning Dove (*Zenaida macroura*)	**Yellow-headed Blackbird (*Xanthocephalus xanthocephalus*)**
MAMMAL	
Coyote (*Canis latrans*)	**Raccoon (*Procyon lotor*)**
Deer (*Odocoileus sp.*)	**Richardson's Ground Squirrel (*Spermophilus richardsonii*)**
Mink (*Mustela vison*)	White-tailed Jack Rabbit (*Lepus townsendii*)

[1] **Bolded** species indicate those observed during 2007 monitoring.

Chart 3: ***Macroinvertebrate bioassessment scores for 2005-2007.***



3.7 Functional Assessment

The completed 2007 functional assessment form is presented in **Appendix B**. Functional assessment results are summarized in **Table 7**. For comparative purposes, the functional assessment results for baseline conditions are also included in **Table 7**.

The site currently rates as a Category II wetland, a substantial improvement over baseline Category IV ratings. More significantly, the site has gained almost 575 functional units over baseline conditions. Prominent functions include general wildlife habitat, surface water storage, sediment/nutrient/toxicant removal, documented MTNHP species habitat (northern leopard frog, scarlet ammannia), and production export.

3.8 Photographs

Representative photographs taken from photo-points and transect ends are provided in **Appendix C**. **Figures 2** and **3** (**Appendix A**) are based on the 2007 aerial photograph.

3.9 Maintenance Needs/Recommendations

All dikes were in good condition during the spring, mid-season, and late season visits with no indications of seepage observed during 2007.

Table 7: ***Summary of pre-project and 2007 wetland function/value ratings and functional points*** [1] ***at the Rock Creek Ranch Mitigation Project***

Function and Value Parameters From the 1999 MDT Montana Wetland Assessment Method	Pre-Project Wetland Ditches (2003)	Pre-Project Isolated Wetland Patches (2003)	Post-Project 2007
Listed/Proposed T&E Species Habitat	Low (0.3)	Low (0.0)	Low (0.3)
MTNHP Species Habitat	Low (0.1)	Low (0.1)	High (1.0)
General Wildlife Habitat	Low (0.3)	Low (0.1)	High (0.9)
General Fish/Aquatic Habitat	NA	NA	NA
Flood Attenuation	Low (0.2)	NA	Mod (0.6)
Short and Long Term Surface Water Storage	Low (0.3)	Low (0.3)	High (0.9)
Sediment, Nutrient, Toxicant Removal	Low (0.3)	Mod (0.5)	High (1.0)
Sediment/Shoreline Stabilization	Low (0.2)	NA	NA
Production Export/ Food Chain Support	Low (0.3)	Low (0.2)	Mod (0.7)
Groundwater Discharge/Recharge	Low (0.1)	Low (0.1)	Low (0.1)
Uniqueness	Low (0.1)	Low (0.1)	Mod (0.4)
Recreation/Education Potential	Low (0.1)	Low (0.1)	Mod (0.7)
Actual Points/Possible Points	2.3 / 11	1.5 / 9	6.6 / 10
% of Possible Score Achieved	21	17	66
Overall Category	IV	IV	II
Total Acreage of Assessed Wetlands within Easement (ac)	**0.77**	**0.31**	**87.41**
Functional Units (acreage x actual points) (fu)	**1.77**	**0.47**	**576.9**
Net Acreage Gain (ac)	**NA**	**NA**	**86.33**
Net Functional Unit Gain (fu)	**NA**	**NA**	**574.66**

[1] See completed MDT functional assessment form in **Appendix B** for further detail.

3.10 Current Credit Summary

Approximately 87.41 acres of wetlands were delineated on the mitigation site in 2007. Approximately 1.08 acres of wetlands occurred on the site prior to project implementation. Consequently, the net aquatic habitat created / restored to date is 87.41 – 1.08 = 86.33 acres. This is credited at a 1:1 ratio.

Additionally, the pre-existing 1.08 acres were enhanced at a credit ratio of 1:3, resulting in 0.36 acre of credit. Finally, approximately 3.6 acres of upland buffer were included in the easement at a credit ratio of 1:4, resulting in 0.9 acre of credit.

As of 2007, the maximum assignable credit at the Rock Creek Ranch mitigation site is 86.33 + 0.36 + 0.9 = 87.59 acres, or 175% of the initial 50-acre goal. Additional wetland communities are likely to form and stabilize with consistent inundation from year to year

4.0 REFERENCES

Berglund, J. 1999. *MDT Montana Wetland Assessment Method*. May 25th. Prepared for Montana Department of Transportation and Morrison-Maierle, Inc. Prepared by Western EcoTech. Helena, Montana. 18 pp.

Bollman, W. 2007. MDT Mitigated Wetland Monitoring Project – Aquatic Invertebrate Monitoring Summary 2001-2007. Rhithron Associates, Inc. Missoula, Montana.

Environmental Laboratory. 1987. *Corps of Engineers Wetlands Delineation Manual*. U.S. Army Corps of Engineers, Washington, DC.

Ralph, C.J., Geupel, G.R., Pyle, P., Martin, T.E., and D.F. DeSante. 1993. *Handbook of field methods for monitoring landbirds*. Gen. Tech. Rep. PSW-GTR-144. Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Dept. of Agriculture. 41 p.

Reed, P.B. 1988. *National list of plant species that occur in wetlands: North Plains (Region 4).* Biological Report 88(26.4), May 1988. U.S. Fish and Wildlife Service. Washington, D.C.

Soil Conservation Service. 1984. Soil survey of Valley County, Montana. Bozeman, Montana.

Urban, L. 2002. Wetland Mitigation Specialist, Montana Department of Transportation, Helena, Montana. June 27th meeting.

U.S. Army Corps of Engineers (COE). 2003. Letter from Allan Steinle to Jeff Berglund (Land & Water Consulting) regarding Rock Creek Ranch MDT Wetland Mitigation Reserve. June 30th. Corps File # 2003-90-258. U.S. Army Corps of Engineers, Helena, Montana.

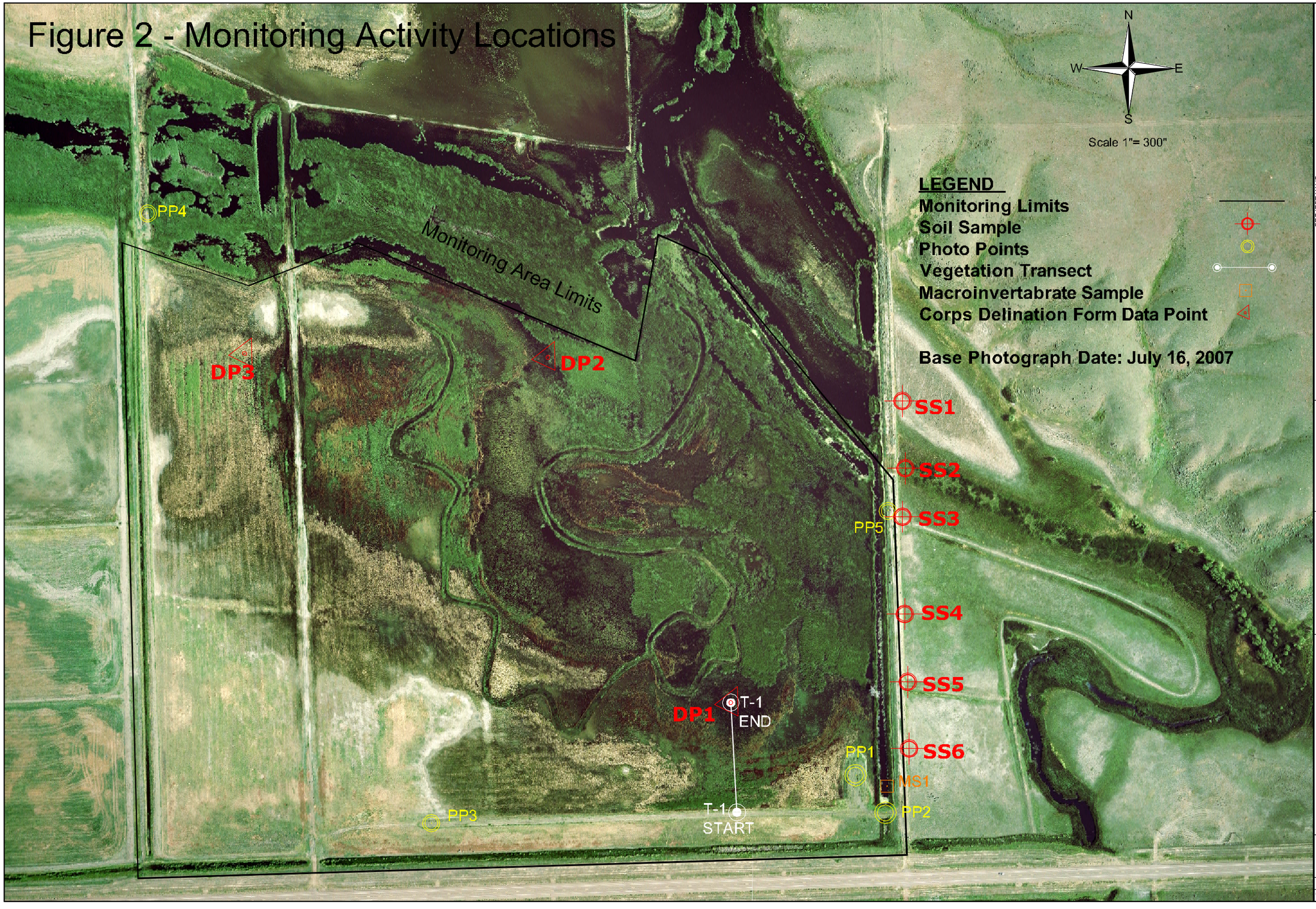
USDA Natural Resources Conservation Service (NRCS). 1998. *Field Indicators of Hydric Soils in the United States*, Version 4. G. Hurt, P. Whited and R. Pringle (eds.). USDA, NRCS Fort Worth, Texas.

Appendix A

FIGURES 2 & 3

MDT Wetland Mitigation Monitoring
Rock Creek Ranch
Hinsdale, Montana

Figure 2 - Monitoring Activity Locations



PROJECT NAME
MDT Rock Creek Ranch Wetland Mitigation
DRAWING TITLE
Monitoring Activity Locations

PROJ NO:	B43088.0413
LOCATION:	Hinsdale
SCALE:	1"=300'
FILE NAME:	L:\330054.414\RockCreek\dwg\RockCr2007.dwg
DRAWN:	LLL
PROJ MGR:	J. Berglund
CHECKED:	
APPVD:	

PBSJ
1120 Cedar
Missoula, MT 59802

FIGURE
2 OF 3
REV -
Oct/12/2007

Figure 3 - Mapped Site Features 2007

PROJECT NAME
MDT Rock Creek Ranch Wetland Mitigation
DRAWING TITLE
Mapped Site Features 2007

PROJ NO: B33054.414	DRAWN: LL
LOCATION: Hinsdale, MT	PROJ MGR: J.Berglund
SCALE: 1"=300'	CHECKED:
FILE NAME: L:\33054.414\RockCreek\dwg\RockCr2007.dwg	APPVD:

1120 Cedar
Missoula, MT 59802
PBSJ

FIGURE
3 OF
REV -
Nov/09/2007

Appendix B

2007 WETLAND MITIGATION SITE MONITORING FORM
2007 BIRD SURVEY FORMS
2007 WETLAND DELINEATION FORMS
2007 FUNCTIONAL ASSESSMENT FORMS
2007 SOIL SAMPLE LAB RESULTS

MDT Wetland Mitigation Monitoring
Rock Creek Ranch
Hinsdale, Montana

PBS&J / MDT WETLAND MITIGATION SITE MONITORING FORM

Project Name: **Rock Creek Ranch Mitigation** Project Number: **B43088.00 0414**
Assessment Date: **July 16, 2007** Person(s) conducting the assessment: **Berglund**
Location: **West of Hinsdale, north of US HGWY 2** MDT District: **Glendive** Milepost: **520**
Legal Description: T **27N** R **43E** Section **1**
Weather Conditions: **Sunny, dry, calm** Time of Day: **7:00 - 13:30**
Initial Evaluation Date: **May 18, 2005** Monitoring Year: **3** # Visits in Year: **2**
Size of evaluation area: **119 acres** Land use surrounding wetland: **Agricultural**

HYDROLOGY

Surface Water Source: **Rock Creek Canal irrigation return, runoff, ppt.**
Inundation: **Present** Average Depth: **8"** Range of Depths: **0-3 feet**
Percent of assessment area under inundation: **100%**
Depth at emergent vegetation-open water boundary: **3 feet**
If assessment area is not inundated then are the soils saturated within 12 inches of surface: **Yes**
Other evidence of hydrology on the site (ex. – drift lines, erosion, stained vegetation, etc.):
Drift lines, drainage patterns, and drowned vegetation present.

Groundwater Monitoring Wells: **Absent**
Record depth of water below ground surface (in feet):

Well Number	Depth	Well Number	Depth	Well Number	Depth

Additional Activities Checklist:
☒ Map emergent vegetation-open water boundary on aerial photograph.
☒ Observe extent of surface water during each site visit and look for evidence of past surface water elevations (drift lines, erosion, vegetation staining, etc.)
☐ Use GPS to survey groundwater monitoring well locations, if present.

COMMENTS / PROBLEMS:
The excavated slough area is 3-4 feet deep. Inundation ranges from approximately 4 inches to 2 feet deep. At the SE control structure, distance from current water elevation to top of top stoplog is approximately 11". During the May 7th visit, distance between water surface and top stoplog at SE structure was about 12 to 13", and inundation of proposed wetland areas was approximately 90%.

VEGETATION COMMUNITIES

Community Number: **1** Community Title (main spp): **Typha latifolia / Alisma gramanium**

Dominant Species	% Cover	Dominant Species	% Cover
TYP LAT	5 = > 50%	SCI ACU	1 = 1-5%
ALI GRA	5 = > 50%	SCI MAR	1 = 1-5%
ELE PAL	4 = 21-50%	NAJ FLE	1 = 1-5%
BEC SYZ	3 = 11-20%		
RUM CRI	1 = 1-5%		
CAR VES	1 = 1-5%		

Comments / Problems: **Occurs in main ditch and sloughs and continued to spread dramatically in east half of site.**

Community Number: **2** Community Title (main spp): **Rumex crispus / Hordeum jubatum**

Dominant Species	% Cover	Dominant Species	% Cover
RUM CRI	5 = > 50%		
HOR JUB	5 = > 50%	ELE PAL	1 = 1-5%
KOC SCO	2 = 6-10%	DOMESTIC OATS	1 = 1-5%
AGR REP	2 = 6-10%	TYP LAT	2 = 6-10%
IVA AXI	3 = 11-20%	ALI GRA	1 = 1-5%
ECH CRU	1 = 1-5%	ALO PRA	1 = 1-5%

Comments / Problems: **One of the predominant types on the site as the site transitions to wetter communities.**

Community Number: **3** Community Title (main spp): **Populus / Salix**

Dominant Species	% Cover	Dominant Species	% Cover
POP DEL	5 = > 50%		
SAL EXI	3 = 11-20%		
SAL AMY	4 = 21-50%		
TYP LAT	4 = 21-50%		
RUM CRI	1 = 1-5%		

Comments / Problems: **This type occurs mainly in the former MDT excavated mitigation area along the south property line.**

Community Number: **4** Community Title (main spp): **Alopecurus pratensis**

Dominant Species	% Cover	Dominant Species	% Cover
ALO PRA	5 = > 50%		
RUM CRI	2 = 6-10%		
HOR JUB	2 = 6-10%		
CHE ALB	1 = 1-5%		
TYP LAT	3 = 11-20%		

Comments / Problems: **Occurs as small patch in the northwest corner of the site - Appears to be shifting to Type 1.**

VEGETATION COMMUNITIES (continued)

Community Number: **5** Community Title (main spp): **Upland**

Dominant Species	% Cover	Dominant Species	% Cover
DOMESTIC OATS	5 = > 50%	ARG TRA	3 = 11-20%
DOMESTIC WHEAT	5 = > 50%	ART CAN	1 = 1-5%
RUM CRI	2 = 6-10%		
HOR JUB	2 = 6-10%		
KOC SCO	2 = 6-10%		
AGR SMI	4 = 21-50%		

Comments / Problems: **Composition of the upland community varies throughout the site.**

Community Number: **6** Community Title (main spp): **Typha / Ammania**

Dominant Species	% Cover	Dominant Species	% Cover
TYP LAT	4 = 21-50%		
AMM ROB	4 = 21-50%		
ALI GRA	3 = 11-20%		
HOR JUB	1 = 1-5%		
BEC SYZ	1 = 1-5%		
RUM CRI	1 = 1-5%		

Comments / Problems: **New in 2006, but not observed in 2007 - presumably due to slightly increased and prolonged inundation. Ammania robusta is a sensitive species.**

Community Number: **7** Community Title (main spp): **Typha / Iva**

Dominant Species	% Cover	Dominant Species	% Cover
TYP LAT	4 = 21-50%		
IVA AXI	4 = 21-50%		
ALI GRA	1 = 1-5%		
RUM CRI	1 = 1-5%		

Comments / Problems: **New in 2006, but not observed in 2007. Was mainly replaced by Types 1 and 8 in 2007.**

Community Number: **8** Community Title (main spp): **Rumex / Typha**

Dominant Species	% Cover	Dominant Species	% Cover
RUM CRI	5 = > 50%		
ALI GRA	3 = 11-20%		
TYP LAT	3 = 11-20%		
NAJ GUA	3 = 11-20%		
POL AMP	2 = 6-10%		

Comments / Problems: **New in 2007, replacing much of Type 7.**

VEGETATION COMMUNITIES (continued)

Community Number: ___ Community Title (main spp): _____

Dominant Species	% Cover	Dominant Species	% Cover

Comments / Problems: _____

Community Number: ___ Community Title (main spp): _____

Dominant Species	% Cover	Dominant Species	% Cover

Comments / Problems: _____

Community Number: ___ Community Title (main spp): _____

Dominant Species	% Cover	Dominant Species	% Cover

Comments / Problems: _____

Community Number: ___ Community Title (main spp): _____

Dominant Species	% Cover	Dominant Species	% Cover

Comments / Problems: _____

Additional Activities Checklist:

☒ Record and map vegetative communities on aerial photograph.

COMPREHENSIVE VEGETATION LIST

Plant Species	Vegetation Community Number (s)	Plant Species	Vegetation Community Number (s)
Agropyron repens	2,5	*Phleum pratense*	5
Agropyron smithii	5	*Plantago major*	2,5
Agropyron trachycaulum	2,5	*Polygonum amphibium*	8
Agrostis alba	1,2	*Populus deltoides*	3
Alisma gramineum	1, 2, 8	*Populus trichocarpa*	2, 8
Alopecurus pratensis	1, 2, 4	*Potamogeton pectinatus*	1
Ammania robusta (Coccinea)	6 (ABSENT 2007)	*Rumex crispus*	1,2,4,5, 8
Artemisia cana	5	*Sagittaria cuneata*	1
Artemisia frigida	5	*Salix amygdaloides*	2, 3, 8
Beckmannia syzigachne	1, 2	*Salix exigua*	2, 8, 3
Bromus inermis	5	*Salix lutea*	2, 8
Carex vesicaria	1	*Scirpus acutus*	1
Chenopodium album	1,2,4	*Scirpus maritimus*	1
Cirsium arvense	1,2,5	*Spartina pectinata*	1
Echinochloa crusgalli	1,2	*Thlaspi arvense*	5
Eleocharis palustris	1,2	*Tragopogon dubius*	5
Grindelia squarrosa	5	*Typha latifolia*	1, 2, 3, 4, 8
Helianthus annuus	5	*Wheat - domestic*	2,5
Hordeum jubatum	2,4,5		
Iva axillaris	2,5		
Kochia scoparia	2,5		
Lactuca serriola	2,5		
Lemna minor	1		
Lepidium densiflorum	2,5		
Medicago sativa	5		
Melilotus alba	5		
Melilotus officinalis	5		
Najas guadalupensis	1, 8		
Oats - domestic	2,5		

Comments / Problems: Ammannia robusta newly discovered in 2006 at the site (two populations). but was not observed in 2007 - presumably due to increased inundation period. This annual species is listed as a species of concern by the Montana Natural Heritage Program. Also, seedling POP DEL and SAL AMY are starting to emerge along the western-most excavated slough in 2006 and were observed in 2007. POP TRI, SAL EXI, SAL LUT, and SAL AMY were planted in 2007.

PLANTED WOODY VEGETATION SURVIVAL

Species	Estimated # Originally Planted	Observed # Dead[1]	Comments
Populus trichocarpa (40 cubic-inch)	42	30	Planting was accomplished in spring (May) during what would normally have been peak inundation. However, peak inundation was achieved later in 2007 due to plentiful early summer precipitation. Mortality was likely due to longer and deeper inundation conditions than were anticipated during 2007.
Salix amygdaloides (one-gallon)	126	61	Same comment as above. These two species experienced higher mortality due to inundation depth and duration than did S. exigua.
Salix lutea (30 cubic-inch)	211		
Salix exigua (30 cubic-inch)	465	20	Same comment as above
Totals	844	111	Assumed % survival was 87%. An additional 53 total plants were "questionable" as of late August, still retaining minimal leaves, but showing signs of significant stress. This was possibly due to removal of all stoplogs at the main control structure in July, resulting in early drawdown.

1: Dead were counted, but species were estimated (leaves often absent).

Comments / Problems: <u>Planting was implemented in May 2007. See comments in table above.</u>

WILDLIFE

Birds

Were man-made nesting structures installed? **No**
If yes, type of structure: **NA** How many? **NA**
Are the nesting structures being used? **NA**
Do the nesting structures need repairs? **NA**

Mammals and Herptiles

Mammal and Herptile Species	Number Observed	Indirect Indication of Use			
		Tracks	Scat	Burrows	Other
Mink	3	☐	☐	☐	
Richardson's ground squirrel		☐	☐	☒	
Deer		☒	☒	☐	
Raccoon		☒	☐	☐	
Western chorus frog	30	☐	☐	☐	
Northern leopard frog	15	☐	☐	☐	
Plains garter snake	1	☐	☐	☐	
Coyote		☐	☒	☐	

Additional Activities Checklist:
Yes Macroinvertebrate Sampling (if required)

Comments / Problems: Numbers above were recorded during July visit. During May visit, thousands of western chorus frogs were heard and observed throughout inundated portions of the site.

PHOTOGRAPHS

Using a camera with a 50mm lens and color film take photographs of the following permanent reference points listed in the check list below. Record the direction of the photograph using a compass. When at the site for the first time, establish a permanent reference point by setting a ½ inch rebar or fencepost extending 2-3 feet above ground. Survey the location with a resource grade GPS and mark the location on the aerial photograph.

Photograph Checklist:

- ☒ One photograph for each of the four cardinal directions surrounding the wetland.
- ☒ At least one photograph showing upland use surrounding the wetland. If more than one upland exists then take additional photographs.
- ☒ At least one photograph showing the buffer surrounding the wetland.
- ☒ One photograph from each end of the vegetation transect, showing the transect.

Location	Photograph Frame #	Photograph Description	Compass Reading (°)
		see attached photosheets	

Comments / Problems: _____

GPS SURVEYING

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

GPS Checklist:

- ☒ Jurisdictional wetland boundary.
- ☒ 4-6 landmarks that are recognizable on the aerial photograph.
- ☒ Start and End points of vegetation transect(s).
- ☒ Photograph reference points.
- ☐ Groundwater monitoring well locations.

Comments / Problems: _____

WETLAND DELINEATION

(attach COE delineation forms)

At each site conduct these checklist items:

- ☒ Delineate wetlands according to the 1987 Army COE manual.
- ☒ Delineate wetland – upland boundary onto aerial photograph.

Yes 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 any completed abbreviated field forms, if used)

Comments / Problems: _____

MAINTENANCE

Were man-made nesting structure installed at this site? **No**
If yes, do they need to be repaired? **NA**
If yes, describe the problems below and indicate if any actions were taken to remedy the problems.

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

Comments / Problems: **Water surface elevation currently about 11" below top of stoplog in SE control structure.**

MDT WETLAND MONITORING – VEGETATION TRANSECT

Site: **Rock Creek Ranch** Date: **July 16, 2007** Examiner: **Berglund**
Transect Number: **1** Approximate Transect Length: **385 feet** Compass Direction from Start: **6˚** Note: _____

Vegetation Type A: **Typha / Alisma (CT 1)**	
Length of transect in this type: 180 feet	
Plant Species	**Cover**
TYP LAT	4 = 21-50%
ALO PRA	1 = 1-5%
HOR JUB	1 = 1-5%
RUM CRI	2 = 6-10%
ALI GRA	4 = 21-50%
WETLAND COMMUNITY	
Total Vegetative Cover:	80%

Vegetation Type B: **Rumex / Typha**	
Length of transect in this type: 205 feet	
Plant Species	**Cover**
RUM CRI	5 = > 50%
TYP LAT	2 = 6-10%
ALI GRA	4 = 21-50%
NAJ GUA	3 = 11-20%
WETLAND COMMUNITY	
Total Vegetative Cover:	60%

Vegetation Type C:	
Length of transect in this type: feet	
Plant Species	**Cover**
W	
Total Vegetative Cover:	%

Vegetation Type D:	
Length of transect in this type: feet	
Plant Species	**Cover**
Total Vegetative Cover:	%

MDT WETLAND MONITORING – VEGETATION TRANSECT

Cover Estimate		**Indicator Class**	**Source**
+ = < 1%	3 = 11-10%	+ = 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): **70%**

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

Estimate cover within a 10 foot 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.

Comments: **Site is developing wetland characteristics; dramatically changed again in 2007, becoming much wetter.**

BIRD SURVEY – FIELD DATA SHEET

Date: 5/07/07

SITE: Rock Creek Ranch

Survey Time: 1455-1800

Bird Species	#	Behavior	Habitat	Bird Species	#	Behavior	Habitat
American Avocet	2	F	MA				
American Coot	50	F	MA				
Blue-Winged Teal	50	F, N	MA				
Canada Goose	20	F	MA				
Eared Grebe	6	F	MA				
Eastern Kingbird	1	F	UP				
Gadwall	20	F	MA				
Killdeer	30	N, F	MA				
Long-billed Curlew	1	F	MA				
Mallard	20	F	MA				
Marsh Wren	4	F	MA				
Northern Pintail	6	F	MA				
Northern Shoveler	20	F	MA				
Red-Winged Blackbird	50	N, F	MA				
Ring-necked Pheasant	6	F	UP				
Vesper Sparrow	12	F	UP				
Western Meadowlark	6	F	UP				
Willet	12	F	MA				
Wilson's Phalarope	10	F	MA				
Yellow-Headed Blackbird	50	F, N	MA				

Notes: Thousands of western chorus frogs throughout inundated portions of site, several Richardson's ground squirrel burrows on uplands, scattered deer and raccoon tracks. Plains garter snake observed.
Approximately 14" from water surface in SE control structure to top of top stoplog. Approximately 12" from water surface to top of spillway along east dike.
Site is about 80% inundated, vast majority at 2-3 inches – water still entering site.
Dry, sunny, windy conditions.
Many bird species heard within inaccessible, well-vegetated portions of site.

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

BIRD SURVEY – FIELD DATA SHEET

Date: 7/16/07

SITE: Rock Creek Ranch

Survey Time: 07:00-13:00

Bird Species	#	Behavior	Habitat	Bird Species	#	Behavior	Habitat
American coot	20	N, F	MA				
Blue-wing teal	30+	BD, N	MA				
Brown-headed cowbird	6	F	UP				
Canada goose	8	F	MA				
Common snipe	6	N, F	MA				
Eastern kingbird	4	F	MA				
Gadwall	15	F	MA				
Killdeer	30	BD, F	MA				
Marsh wren	6	BD	MA				
Mourning dove	4	F	UP				
Northern harrier	2	F	MA, UP				
Red-winged blackbird	50	BD, N	MA				
Sora	2	BD	MA				
Western meadowlark	10	BD, F	UP				
Willet	10	F, BD	MA				
Wilson's phalarope	25	BD, F	MA				
Yellow-headed blackbird	50	BD, N	MA				

Notes: Hundreds of western chorus frogs throughout inundated portions of site, also numerous northern leopard frogs; several Richardson's ground squirrel burrows on uplands, scattered deer and raccoon tracks. Plains garter snake observed, along with several mink.
Approximately 11" from water surface in SE control structure to top of top stoplog.
Site is about 100% inundated, vast majority at 4-8 inches – water still entering site.
Dry, sunny, windy conditions.
Many bird species heard within inaccessible, well-vegetated portions of site.

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

BIRD SURVEY – FIELD DATA SHEET

Date: 8/31/07

SITE: Rock Creek Ranch

Survey Time: 07:00-9:30

Bird Species	#	Behavior	Habitat	Bird Species	#	Behavior	Habitat
American coot	12	F	MA				
Blue-wing teal	12	F	MA				
Canada goose	4	FO	MA				
Gadwall	10	F	MA				
Killdeer	35	F	MA, MF				
Northern harrier	2	F	MA				
Northern Pintail	6	F	MA				
Sora	2	F	MA				

Notes: Boards had been pulled at SE corner structure to facilitate adjacent WRP project construction; site was approximately 10% inundated (mainly in east ditch and portions of excavated sloughs). Most of the site was still saturated near the ground surface. Standing water present near access rd and cottonwoods. Several white-tailed deer observed on and adjacent to site; about 12 northern leopard frogs noted; raccoon tracks observed throughout site.
Conditions: dry, calm, sunny.
* No inundation anticipated to remain by October, so this seasonal visit conducted earlier than normal in 2007.

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: **Rock Creek Ranch**	Date: **July 16, 2007**
Applicant / Owner: **Rock Creek Lands LLP**	County: **Valley**
Investigator: **Berglund**	State: **MT**

Do Normal Circumstances exist on the site? **Yes**	Community ID: **Emergent**
Is the site significantly disturbed (Atypical Situation)? **No**	Transect ID: **1**
Is the area a potential Problem Area? **No**	Plot ID: **1**
(If needed, explain on reverse side)	

VEGETATION

Dominant Species	Stratum	Indicator	Dominant Species	Stratum	Indicator
1. *TYP LAT*	Herb	OBL	11.		
2. *NAJ GUA*	Herb	OBL	12.		
3. *RUM CRI*	Herb	FACW	13.		
4. *ALI GRA*	Herb	OBL	14.		
5.			15.		
6.			16.		
7.			17.		
8.			18.		
9.			19.		
10.			20.		

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-): **4** / **4** = **100**%	FAC Neutral: **4** / **4** = **100**%
Remarks: **wetter habitat than in 2006.**	

HYDROLOGY

No Recorded Data (Describe in Remarks): **N/A** Stream, Lake, or Tide Gauge **N/A** Aerial Photographs **N/A** Other **Yes** No Recorded Data	Wetland Hydrology Indicators Primary Indicators: **YES** Inundated **YES** Saturated in Upper 12 Inches **YES** Water Marks **YES** Drift Lines **YES** Sediment Deposits **YES** Drainage Patterns in Wetland
Field Observations: Depth of Surface Water **N/A** **18** (in.) Depth to Free Water in Pit **N/A** **0** (in.) Depth to Saturated Soil **N/A** **0** (in.)	Secondary Indicators (2 or more required): **NO** Oxidized Root Channels in Upper 12 inches **NO** Water-Stained Leaves **NO** Local Soil Survey Data **YES** FAC-Neutral Test **NO** Other (Explain in Remarks)
Remarks: **Inundated to 18" depth.**	

SOILS

Map Unit Name (Series and Phase): **Harlem Clay**
Map Symbol: **23** Drainage Class: **WD** Mapped Hydric Inclusion? **No**
Taxonomy (Subgroup): **Ustic Torrifluvents** Field Observations confirm Mapped Type? **Yes**

Profile Description

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Color(s) (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
6	B	2.5 Y 4/1	/ /	N/A N/A	Clay
		/	/ /	N/A N/A	
		/	/ /	N/A N/A	
		/	/ /	N/A N/A	
		/	/ /	N/A N/A	

Hydric Soil Indicators:

- **NO** Histosol
- **NO** Histic Epipedon
- **NO** Sulfidic Odor
- **NO** Aquic Moisture Regime
- **NO** Reducing Conditions
- **YES** Gleyed or Low-Chroma Colors
- **NO** Concretions
- **NO** High Organic Content in Surface Layer in Sandy Soils
- **NO** Organic Streaking in Sandy Soils
- **NO** Listed on Local Hydric Soils List
- **NO** Listed on National Hydric Soils List
- **NO** Other (Explain in Remarks)

Remarks: **Inundated soils**

WETLAND DETERMINATION

Hydrophytic Vegetation Present? **YES**
Wetland Hydrology Present? **YES**
Hydric Soils Present? **YES**

Is this Sampling Point within a Wetland? **YES**

Remarks: **Plot taken at north end of Transect 1 in former (pre-project) upland area.**

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

Project / Site: **Rock Creek Ranch**	Date: **July 16, 2007**
Applicant / Owner: **Rock Creek Lands LLP**	County: **Valley**
Investigator: **Berglund**	State: **MT**

Do Normal Circumstances exist on the site? **Yes**	Community ID: **Emergent**
Is the site significantly disturbed (Atypical Situation)? **No**	Transect ID: **2**
Is the area a potential Problem Area? **No**	Plot ID: **2**
(If needed, explain on reverse side)	

VEGETATION

Dominant Species	Stratum	Indicator	Dominant Species	Stratum	Indicator
1. *TYP LAT*	Herb	OBL	11.		
2. *SCI ACU*	Herb	OBL	12.		
3. *ALI GRA*	Herb	OBL	13.		
4. *ELE PAL*	Herb	OBL	14.		
5.			15.		
6.			16.		
7.			17.		
8.			18.		
9.			19.		
10.			20.		
Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-): **4** / **4** = **100**%			FAC Neutral: **4** / **4** = **100**%		
Remarks:					

HYDROLOGY

No Recorded Data (Describe in Remarks): **N/A** Stream, Lake, or Tide Gauge **N/A** Aerial Photographs **N/A** Other **Yes** No Recorded Data	Wetland Hydrology Indicators Primary Indicators: **YES** Inundated **YES** Saturated in Upper 12 Inches **YES** Water Marks **YES** Drift Lines **YES** Sediment Deposits **NO** Drainage Patterns in Wetland
Field Observations: Depth of Surface Water = **20** (in.) Depth to Free Water in Pit **N/A** ____ (in.) Depth to Saturated Soil **N/A** ____ (in.)	Secondary Indicators (2 or more required): **NO** Oxidized Root Channels in Upper 12 inches **NO** Water-Stained Leaves **NO** Local Soil Survey Data **YES** FAC-Neutral Test **NO** Other (Explain in Remarks)
Remarks: **Site inundated to 20".**	

PBSJ

SOILS

Map Unit Name (Series and Phase): **Harlem Clay**
Map Symbol: **23** Drainage Class: **WD** Mapped Hydric Inclusion? **No**
Taxonomy (Subgroup): **Ustic Torrifluvents** Field Observations confirm Mapped Type? **Yes**

Profile Description

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Color(s) (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
6	B	2.5 Y 4/1	/ /	N/A N/A	Clay
		/	/ /	N/A N/A	
		/	/ /	N/A N/A	
		/	/ /	N/A N/A	
		/	/ /	N/A N/A	

Hydric Soil Indicators:

- **NO** Histosol
- **NO** Histic Epipedon
- **NO** Sulfidic Odor
- **NO** Aquic Moisture Regime
- **NO** Reducing Conditions
- **YES** Gleyed or Low-Chroma Colors
- **NO** Concretions
- **NO** High Organic Content in Surface Layer in Sandy Soils
- **NO** Organic Streaking in Sandy Soils
- **NO** Listed on Local Hydric Soils List
- **NO** Listed on National Hydric Soils List
- **NO** Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present? **YES**
Wetland Hydrology Present? **YES**
Hydric Soils Present? **YES**

Is this Sampling Point within a Wetland? **YES**

Remarks: **2006 Plot taken approximately 100 feet south and west of south "tip" in jog of north propert boundary within former (pre-project) upland area. The exact same area could not be accessed in 2007 due to inundation, but 2007 plot taken approximately 200-300 feet to west in same habitat type.**

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

Project / Site: **Rock Creek Ranch**	Date: **July 16, 2007**
Applicant / Owner: **Rock Creek Lands LLP**	County: **Valley**
Investigator: **Berglund**	State: **MT**

Do Normal Circumstances exist on the site? **Yes** Is the site significantly disturbed (Atypical Situation)? **No** Is the area a potential Problem Area? **No** (If needed, explain on reverse side)	Community ID: **Emergent** Transect ID: **3** Plot ID: **3**

VEGETATION

Dominant Species	Stratum	Indicator	Dominant Species	Stratum	Indicator
1. *TYP LAT*	Herb	OBL	11.		
2. *HOR JUB*	Herb	FACW	12.		
3. *RUM MAR*	Herb	FACW+	13.		
4. *ALO PRA*	Herb	FACW	14.		
5.			15.		
6.			16.		
7.			17.		
8.			18.		
9.			19.		
10.			20.		
Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-): **4** / **4** = **100**%			FAC Neutral: **4** / **4** = **100**%		
Remarks: **TYP and HOR are main dominants in 2007.**					

HYDROLOGY

No Recorded Data (Describe in Remarks): **N/A** Stream, Lake, or Tide Gauge **N/A** Aerial Photographs **N/A** Other **Yes** No Recorded Data	Wetland Hydrology Indicators Primary Indicators: **YES** Inundated **YES** Saturated in Upper 12 Inches **YES** Water Marks **YES** Drift Lines **YES** Sediment Deposits **NO** Drainage Patterns in Wetland
Field Observations: Depth of Surface Water **N/A** **12** (in.) Depth to Free Water in Pit **N/A** ____ (in.) Depth to Saturated Soil = **0** (in.)	Secondary Indicators (2 or more required): **NO** Oxidized Root Channels in Upper 12 inches **NO** Water-Stained Leaves **NO** Local Soil Survey Data **YES** FAC-Neutral Test **NO** Other (Explain in Remarks)
Remarks: **Inundated to 12" depth.**	

PBS&J

SOILS

Map Unit Name (Series and Phase): **Harlem Clay**
Map Symbol: **23** Drainage Class: **WD** Mapped Hydric Inclusion? **No**
Taxonomy (Subgroup): **Ustic Torrifluvents** Field Observations confirm Mapped Type? **Yes**

Profile Description

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Color(s) (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
6	B	2.5 Y 4/1	2.5 Y 4/4	Common Distinct	Clay
		/	/	N/A	
			/	N/A	
		/	/	N/A	
			/	N/A	
		/	/	N/A	
			/	N/A	
		/	/	N/A	
			/	N/A	

Hydric Soil Indicators:

- **NO** Histosol
- **NO** Histic Epipedon
- **NO** Sulfidic Odor
- **NO** Aquic Moisture Regime
- **NO** Reducing Conditions
- **YES** Gleyed or Low-Chroma Colors
- **NO** Concretions
- **NO** High Organic Content in Surface Layer in Sandy Soils
- **NO** Organic Streaking in Sandy Soils
- **NO** Listed on Local Hydric Soils List
- **NO** Listed on National Hydric Soils List
- **NO** Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present? **YES**
Wetland Hydrology Present? **YES**
Hydric Soils Present? **YES**

Is this Sampling Point within a Wetland? **YES**

Remarks: **Plot taken approximately 200-300 feet south of north easement fence in west half of site within former (pre-project) upland area.**

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

1. Project Name: Rock Creek Ranch Wetland Mitigation **2. Project #:** B43054.00-0413 **Control #:** NA

3. Evaluation Date: 7/16/2007 **4. Evaluator(s):** Berglund **5. Wetland / Site #(s):** Rock Creek Ranch Complex

6. Wetland Location(s) i. T: 31 N **R:** 37 E **S:** 32 **T:** __ N **R:** __ E **S:** _____

ii. Approx. Stationing / Mileposts: Just north of US Highway 2, east of Hinsdale and 20 miles west of Glasgow.

iii. Watershed: 11 - Milk **GPS Reference No. (if applies):** NA

Other Location Information: On Rock Creek Ranch, Valley County

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): 300+ (visually estimated)
_____ (measured, e.g. GPS)

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

Comments: AA includes 1.08 pre-existing acres; ditch wetlands along Highway 2 not included.

10. CLASSIFICATION OF WETLAND AND AQUATIC HABITATS IN AA

HGM CLASS [1]	SYSTEM [2]	SUBSYSTEM [2]	CLASS [2]	WATER REGIME [2]	MODIFIER [2]	% OF AA
Depression	Palustrine	None	Emergent Wetland	Seasonally Flooded	Impounded	95
Depression	Palustrine	None	Unconsolidated Bottom	Seasonally Flooded	Impounded	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.	---	low disturbance	---
AA not cultivated, but moderately grazed or hayed or selectively logged or has been subject to relatively minor clearing, or fill placement, or hydrological alteration; contains few roads or buildings.	---	---	---
AA cultivated or heavily grazed or logged; subject to relatively substantial fill placement, grading, clearing, or hydrological alteration; high road or building density.	---	---	---

Comments: (types of disturbance, intensity, season, etc.) Adjacent lands are cultivated haylands and pasture; lands to north put into WRP program.

ii. Prominent weedy, alien, & introduced species: DOMESTIC WHEAT, DOMESTIC OATS, LEP DEN

iii. Briefly describe AA and surrounding land use / habitat: AA consists of large impounded emergent marsh; the AA only includes those wetlands within the conservation easement boundary, even though substantive pre-existing wetlands extend to the north and west. Surrounding land use is agricultural.

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

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

Comments: Scattered shrubs occur in the excavated ditch to the south, but this area was not included in the AA. Shrubs planted in 2007, but do not yet form community type.

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	Whooping Crane
No usable habitat	☐ D	☐ S	_____

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

Highest Habitat Level	doc/primary	sus/primary	doc/secondary	sus/secondary	doc/incidental	sus/incidental	none
Functional Point & Rating	---	---	---	---	---	.3 (L)	---

If documented, list the source (e.g., observations, records, etc.)**:** Pair of bald eagles observed foraging at site during October 2006 bird survey, but eagles now de-listed.

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	Scarlet Ammannia (Ammannia robusta)
Secondary habitat **(list species)**	☒ D	☐ S	Northern leopard frog
Incidental habitat **(list species)**	☐ D	☐ S	_____
No usable habitat	☐ D	☐ S	_____

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

Highest Habitat Level	doc/primary	sus/primary	doc/secondary	sus/secondary	doc/incidental	sus/incidental	none
Functional Point & Rating	1 (H)	---	---	---	---	---	---

If documented, list the source (e.g., observations, records, etc.)**:** Large population of Ammannia robusta discovered on site in 2006. This species is ranked "SH" as it was know only from historic occurrences in Montana - that warrants S1-S3 ranking. Northern leopard frogs observed in 05, 06, and 07.

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)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	H	--	--
Moderate disturbance at AA (see 12)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
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	--	.9 (H)	--	--
Moderate	--	--	--	--
Low	--	--	--	--

Comments: Numerous waterfowl and shorebirds observed at the site during spring and summer visits.

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 14F)

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**	--	--	.6 (M)	--	--	--	--	--	--
AA contains **unrestricted outlet**	--	--	--	--	--	--	--	--	--

ii. Are residences, businesses, or other features which may be significantly damaged by floods located within 0.5 miles downstream of the AA? (check)
☐**Y** ☒**N** **Comments:** Flooded by Long Coulee and irrigation return.

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**	--	.9 (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: Site treats adjacent agricultural runoff.

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 %	--	--	--

Comments: _____

14I. PRODUCTION EXPORT / FOOD CHAIN SUPPORT

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

A	☒ Vegetated component >5 acres						☐ Vegetated component 1-5 acres						☐ Vegetated component <1 acre					
B	☐ High		☐ Moderate		☒ Low		☐ High		☐ Moderate		☐ Low		☐ High		☐ Moderate		☐ Low	
C	☐Y	☐N	☐Y	☐N	☒Y	☐N	☐Y	☐N	☐Y	☐N	☐Y	☐N	☐Y	☐N	☐Y	☐N	☐Y	☐N
P/P	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
S/I	--	--	--	--	.7M	--	--	--	--	--	--	--	--	--	--	--	--	--
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	--
No Discharge/Recharge indicators present	0.1 (L)
Available Discharge/Recharge information inadequate to rate AA D/R potential	--

Comments: _____

14K. UNIQUENESS

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

Replacement Potential	AA contains fen, bog, warm springs or mature (>80 yr-old) forested wetland or plant association listed as "S1" by the MTNHP.			AA does not contain previously cited rare types and structural diversity (#13) is high or contains plant association listed as "S2" by the MTNHP.			AA does not contain previously cited rare types or associations and structural diversity (#13) is low-moderate.		
Estimated Relative Abundance from 11	☐rare	☐common	☐abundant	☐rare	☐common	☐abundant	☐rare	☒common	☐abundant
Low disturbance at AA (12i)	--	--	--	--	--	--	--	.4M	--
Moderate disturbance at AA (12i)	--	--	--	--	--	--	--	--	--
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	.7(M)	--	--

Comments: Good potential for educational study, given its access and proximity to Hinsdale.

FUNCTION, VALUE SUMMARY, AND OVERALL RATING

Function and Value Variables	Rating	Actual Functional Points	Possible Functional Points	Functional Units (Actual Points x Estimated AA Acreage)
A. Listed/Proposed T&E Species Habitat	low	0.30	1	
B. MT Natural Heritage Program Species Habitat	high	1.00	1	
C. General Wildlife Habitat	high	0.90	1	
D. General Fish/Aquatic Habitat	N/A		--	
E. Flood Attenuation	moderate	0.60	1	
F. Short and Long Term Surface Water Storage	high	0.90	1	
G. Sediment/Nutrient/Toxicant Removal	high	1.00	1	
H. Sediment/Shoreline Stabilization	N/A		--	
I. Production Export/Food Chain Support	moderate	0.70	1	
J. Groundwater Discharge/Recharge	low	0.10	1	
K. Uniqueness	moderate	0.40	1	
L. Recreation/Education Potential	moderate	0.70	1	
	Total:	**6.60**	**10.00**	____
		Percent of Total Possible Points:	**66%** (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**

ENERGY LABORATORIES, INC. • *P.O. Box 30916 • 1120 South 27th Street • Billings, MT 59107-0916*
800-735-4489 • 406-252-6325 • 406-252-6069 fax • eli@energylab.com

LABORATORY ANALYTICAL REPORT

Client: PBS and J
Project: Rock Creek Ranch
Lab ID: B07072406-001
Client Sample ID: RC1

Report Date: 08/09/07
Collection Date: 07/17/07
DateReceived: 07/31/07
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
SATURATED PASTE							
pH, sat. paste	7.40	s.u.		0.10		ASAM10-3.2	08/08/07 14:18 / srm
Conductivity, sat. paste	1.15	mmhos/cm		0.01		ASA10-3	08/08/07 14:18 / srm

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

ENERGY LABORATORIES, INC. • *P.O. Box 30916 • 1120 South 27th Street • Billings, MT 59107-0916*
800-735-4489 • 406-252-6325 • 406-252-6069 fax • eli@energylab.com

LABORATORY ANALYTICAL REPORT

Client: PBS and J
Project: Rock Creek Ranch
Lab ID: B07072406-002
Client Sample ID: RC3

Report Date: 08/09/07
Collection Date: 07/17/07
DateReceived: 07/31/07
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
SATURATED PASTE							
pH, sat. paste	6.70	s.u.		0.10		ASAM10-3.2	08/08/07 14:18 / srm
Conductivity, sat. paste	0.74	mmhos/cm		0.01		ASA10-3	08/08/07 14:18 / srm

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

ENERGY LABORATORIES, INC. • *P.O. Box 30916 • 1120 South 27th Street • Billings, MT 59107-0916*
800-735-4489 • 406-252-6325 • 406-252-6069 fax • eli@energylab.com

LABORATORY ANALYTICAL REPORT

Client: PBS and J
Project: Rock Creek Ranch
Lab ID: B07072406-003
Client Sample ID: RC4

Report Date: 08/09/07
Collection Date: 07/17/07
DateReceived: 07/31/07
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
SATURATED PASTE							
pH, sat. paste	7.30	s.u.		0.10		ASAM10-3.2	08/08/07 14:18 / srm
Conductivity, sat. paste	0.72	mmhos/cm		0.01		ASA10-3	08/08/07 14:18 / srm

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

ENERGY LABORATORIES, INC. • *P.O. Box 30916 • 1120 South 27th Street • Billings, MT 59107-0916*
800-735-4489 • 406-252-6325 • 406-252-6069 fax • eli@energylab.com

LABORATORY ANALYTICAL REPORT

Client:	PBS and J	**Report Date:**	08/09/07
Project:	Rock Creek Ranch	**Collection Date:**	07/17/07
Lab ID:	B07072406-004	**DateReceived:**	07/31/07
Client Sample ID:	RC5	**Matrix:**	Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
SATURATED PASTE							
pH, sat. paste	7.90	s.u.		0.10		ASAM10-3.2	08/08/07 14:18 / srm
Conductivity, sat. paste	4.28	mmhos/cm		0.01		ASA10-3	08/08/07 14:18 / srm

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

ENERGY LABORATORIES, INC. • *P.O. Box 30916 • 1120 South 27th Street • Billings, MT 59107-0916*
800-735-4489 • 406-252-6325 • 406-252-6069 fax • eli@energylab.com

LABORATORY ANALYTICAL REPORT

Client: PBS and J
Project: Rock Creek Ranch
Lab ID: B07072406-005
Client Sample ID: RC6

Report Date: 08/09/07
Collection Date: 07/17/07
DateReceived: 07/31/07
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
SATURATED PASTE							
pH, sat. paste	7.60	s.u.		0.10		ASAM10-3.2	08/08/07 14:18 / srm
Conductivity, sat. paste	7.69	mmhos/cm		0.01		ASA10-3	08/08/07 14:18 / srm

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

Appendix C

2007 REPRESENTATIVE PHOTOGRAPHS

MDT Wetland Mitigation Monitoring
Rock Creek Ranch
Hinsdale, Montana

ROCK CREEK RANCH WETLAND MITIGATION SITE 2007

Photo Point 1: Facing north. *Typha* / *Alisma* wetland in foreground and *Rumex* / *Typha* wetland in background.

Photo Point 1: Facing west. *Hordeum* / *Rumex* wetland in foreground.

Photo Point 2: Facing north along Long Coulee Ditch from SE control structure.

Photo Point 3: Facing north. Upland with fallow domestic wheat and oats. Wetland in far background.

Photo Point 3: Facing east along new dike structure.

Photo Point 4: Facing east along easement fence line. Note new wetland encroaching into easement from the north (left).

ROCK CREEK RANCH WETLAND MITIGATION SITE 2007

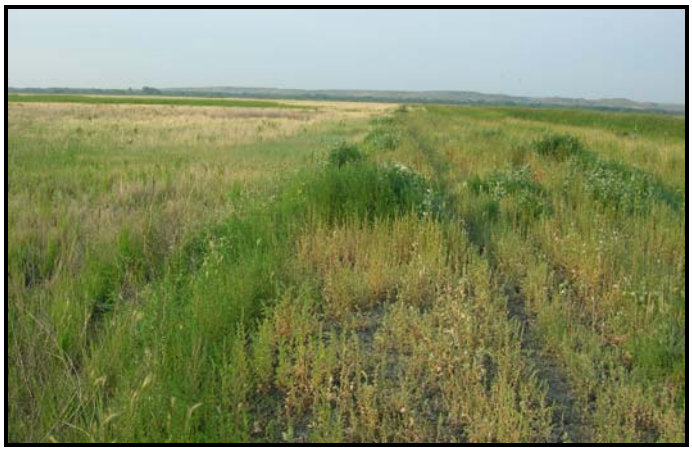


Photo Point 4: Facing south along ditch spoil pile.

Photo Point 5: Facing northwest along easement fence line. Pre-existing wetland is to right of fence and new wetland is to left.

Photo Point 5: Facing west. Long Coulee Ditch wetland in foreground and new wetland in background.

Photo Point 5: Facing south / southwest along dike. Long Coulee Ditch wetland along dike toe and new wetland in background.

Photo from Transcect 1 start. Facing north along transcect. Note new *Typha* / *Alisma* wetland in foreground.

Photo from Transect 1 end. Facing south along transcect. Note new *Rumex* / *Typha* wetland in foreground.

Appendix D

CONCEPTUAL SITE LAYOUT

MDT Wetland Mitigation Monitoring
Rock Creek Ranch
Hinsdale, Montana

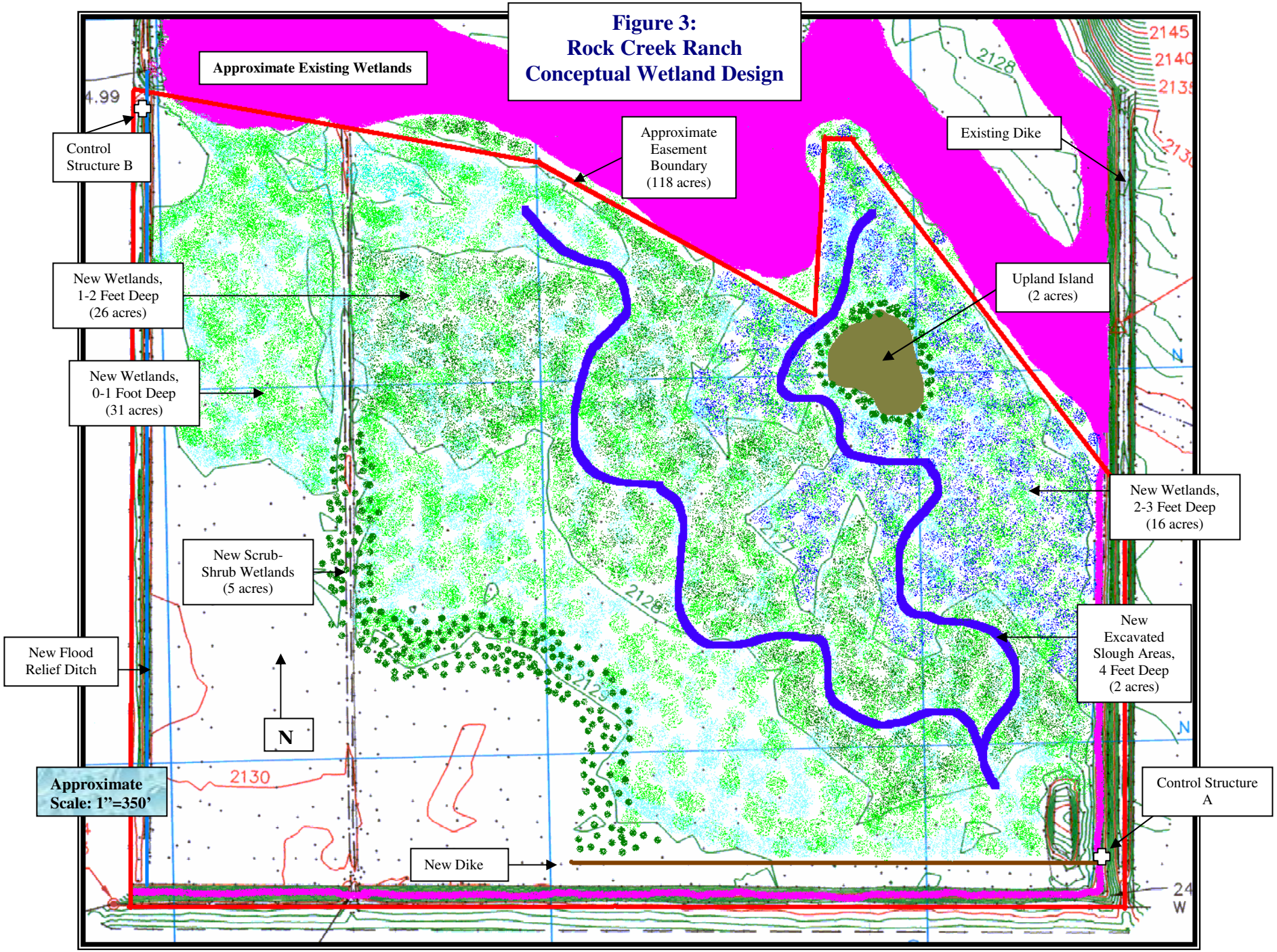


Figure 3:
Rock Creek Ranch
Conceptual Wetland Design
Approximate Existing Wetlands
Control Structure B
Approximate Easement Boundary (118 acres)
Existing Dike
New Wetlands, 1-2 Feet Deep (26 acres)
Upland Island (2 acres)
New Wetlands, 0-1 Foot Deep (31 acres)
New Wetlands, 2-3 Feet Deep (16 acres)
New Scrub-Shrub Wetlands (5 acres)
New Excavated Slough Areas, 4 Feet Deep (2 acres)
New Flood Relief Ditch
N
Approximate Scale: 1"=350'
Control Structure A
New Dike
2145
2140
2128
2130
2127
2126
2129

Appendix E

BIRD SURVEY PROTOCOL
GPS PROTOCOL

MDT Wetland Mitigation Monitoring
Rock Creek Ranch
Hinsdale, 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
Rock Creek Ranch
Hinsdale, 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**

LITERATURE CITED

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

Brandt, D. 2001. Temperature Preferences and Tolerances for 137 Common Idaho Macroinvertebrate Taxa. Report to the Idaho Department of Environmental Quality, Coeur d' Alene, Idaho.

Bray, J. R. and J. T. Curtis. 1957. An ordination of upland forest communities of southern Wisconsin. Ecological Monographs 27: 325-349.

Caton, L. W. 1991. Improving subsampling methods for the EPA's "Rapid Bioassessment" benthic protocols. Bulletin of the North American Benthological Society. 8(3): 317-319.

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

Taxa Listing

Project ID: MDT07PBSJ
RAI No.: MDT07PBSJ016

RAI No.: MDT07PBSJ016 **Sta. Name:** Rock Creek Ranch
Client ID:
Date Coll.: 7/16/2007 **No. Jars:** 1 **STORET ID:**

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Non-Insect							
Acari	2	1.90%	Yes	Unknown		5	PR
Cladocera	1	0.95%	Yes	Unknown		8	CF
Copepoda	4	3.81%	Yes	Unknown		8	CG
Glossiphoniidae							
Helobdella sp.	4	3.81%	No	Immature		6	PA
Helobdella stagnalis	1	0.95%	Yes	Unknown		10	PR
Hyalellidae							
Hyalella sp.	18	17.14%	Yes	Unknown		8	CG
Planorbidae							
Helisoma sp.	2	1.90%	Yes	Unknown		6	SC
Odonata							
Libellulidae							
Sympetrum sp.	1	0.95%	Yes	Larva		9	PR
Ephemeroptera							
Baetidae							
Callibaetis sp.	2	1.90%	Yes	Larva		9	CG
Heteroptera							
Corixidae							
Hesperocorixa sp.	1	0.95%	Yes	Adult		10	PH
Coleoptera							
Dytiscidae							
Hygrotus sp.	4	3.81%	Yes	Adult		5	PR
Haliplidae							
Haliplus sp.	31	29.52%	Yes	Larva		5	PH
Hydrophilidae							
Helophorus sp.	1	0.95%	Yes	Adult		11	SH
Diptera							
Ceratopogonidae							
Ceratopogoninae	7	6.67%	No	Pupa		6	PR
Ceratopogoninae	17	16.19%	Yes	Larva		6	PR
Chaoboridae							
Chaoboridae	3	2.86%	Yes	Larva		8	PR
Ephydridae							
Ephydridae	1	0.95%	Yes	Pupa		6	CG
Chironomidae							
Chironomidae							
Chironomini	1	0.95%	No	Larva	Early Instar	6	CG
Corynoneura sp.	2	1.90%	Yes	Larva		7	CG
Paratanytarsus sp.	1	0.95%	Yes	Larva		6	CG
Pseudosmittia sp.	1	0.95%	Yes	Larva		6	CG
Sample Count	**105**						

Metrics Report

Project ID: MDT07PBSJ
RAI No.: MDT07PBSJ016
Sta. Name: Rock Creek Ranch
Client ID:
STORET ID:
Coll. Date: 7/16/2007

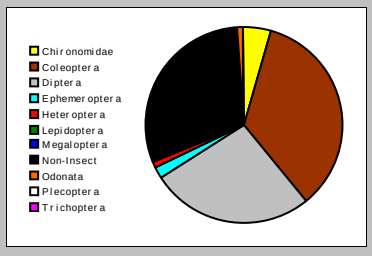
Abundance Measures

Sample Count: 105
Sample Abundance: 741.18 14.17% of sample used

Coll. Procedure:
Sample Notes:

Taxonomic Composition

Category	R	A	PRA
Non-Insect	6	32	30.48%
Odonata	1	1	0.95%
Ephemeroptera	1	2	1.90%
Plecoptera			
Heteroptera	1	1	0.95%
Megaloptera			
Trichoptera			
Lepidoptera			
Coleoptera	3	36	34.29%
Diptera	3	28	26.67%
Chironomidae	3	5	4.76%

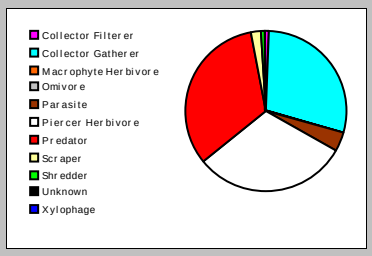


Dominant Taxa

Category	A	PRA
Haliplus	31	29.52%
Ceratopogoninae	24	22.86%
Hyalella	18	17.14%
Hygrotus	4	3.81%
Helobdella	4	3.81%
Copepoda	4	3.81%
Chaoboridae	3	2.86%
Helisoma	2	1.90%
Corynoneura	2	1.90%
Callibaetis	2	1.90%
Acari	2	1.90%
Pseudosmittia	1	0.95%
Paratanytarsus	1	0.95%
Hesperocorixa	1	0.95%
Ephydridae	1	0.95%

Functional Composition

Category	R	A	PRA
Predator	6	35	33.33%
Parasite	0	4	3.81%
Collector Gatherer	7	30	28.57%
Collector Filterer	1	1	0.95%
Macrophyte Herbivore			
Piercer Herbivore	2	32	30.48%
Xylophage			
Scraper	1	2	1.90%
Shredder	1	1	0.95%
Omivore			
Unknown			



Metric Values and Scores

Metric	Value	BIBI	MTP	MTV	MTM
Composition					
Taxa Richness	18	1	2		0
Non-Insect Percent	30.48%				
E Richness	1	1		0	
P Richness	0	1		0	
T Richness	0	1		0	
EPT Richness	1		0		0
EPT Percent	1.90%		0		0
Oligochaeta+Hirudinea Percent	4.76%				
Baetidae/Ephemeroptera	1.000				
Hydropsychidae/Trichoptera	0.000				
Dominance					
Dominant Taxon Percent	29.52%		3		2
Dominant Taxa (2) Percent	52.38%				
Dominant Taxa (3) Percent	69.52%	3			
Dominant Taxa (10) Percent	89.52%				
Diversity					
Shannon H (loge)	2.096				
Shannon H (log2)	3.024		3		
Margalef D	3.751				
Simpson D	0.181				
Evenness	0.092				
Function					
Predator Richness	6		3		
Predator Percent	33.33%	5			
Filterer Richness	1				
Filterer Percent	0.95%			3	
Collector Percent	29.52%		3		3
Scraper+Shredder Percent	2.86%		0		0
Scraper/Filterer	2.000				
Scraper/Scraper+Filterer	0.667				
Habit					
Burrower Richness	1				
Burrower Percent	23.81%				
Swimmer Richness	4				
Swimmer Percent	36.19%				
Clinger Richness	0	1			
Clinger Percent	0.00%				
Characteristics					
Cold Stenotherm Richness	0				
Cold Stenotherm Percent	0.00%				
Hemoglobin Bearer Richness	1				
Hemoglobin Bearer Percent	1.90%				
Air Breather Richness	1				
Air Breather Percent	3.81%				
Voltinism					
Univoltine Richness	6				
Semivoltine Richness	4	3			
Multivoltine Percent	13.33%		3		
Tolerance					
Sediment Tolerant Richness	0				
Sediment Tolerant Percent	0.00%				
Sediment Sensitive Richness	0				
Sediment Sensitive Percent	0.00%				
Metals Tolerance Index	3.529				
Pollution Sensitive Richness	0	1		0	
Pollution Tolerant Percent	33.33%	3		1	
Hilsenhoff Biotic Index	6.327		1		0
Intolerant Percent	0.00%				
Supertolerant Percent	29.52%				
CTQa	99.455				

Bioassessment Indices

BioIndex	Description	Score	Pct	Rating
BIBI	B-IBI (Karr et al.)	20	40.00%	
MTP	Montana DEQ Plains (Bukantis 1998)	18	60.00%	Slight
MTV	Montana Revised Valleys/Foothills (Bollman 1998)	4	22.22%	Moderate
MTM	Montana DEQ Mountains (Bukantis 1998)	5	23.81%	Moderate