MONTANA DEPARTMENT OF TRANSPORTATION
WETLAND MITIGATION MONITORING REPORT: YEAR 2009

Lonepine Wetland Mitigation Project
Flathead Indian Reservation, Montana

Prepared for:

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

Prepared by:

POST, BUCKLEY, SCHUH, AND JERNIGAN
820 North Montana Avenue, Suite A
Helena, MT 59601

December 2009

PBS&J Project No: 0B4308802.02.04

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1.0 INTRODUCTION

The Lonepine Wetland Mitigation Project was constructed to primarily mitigate for wetland impacts associated with the proposed Montana Department of Transportation (MDT) Lonepine North & East highway reconstruction project; any leftover wetland credits would be held in reserve and applied toward future MDT highway projects in the area. The project was constructed on property owned by MDT between the summer of 2007 and early summer of 2008 in Sanders County, Montana. It was simultaneously constructed with the re-construction of the Lower Dry Fork Reservoir dam. The goals of the project are to develop approximately 23.85 acres of US Army Corps of Engineers (COE) -approved wetland credit and 11.86 acres of Confederated Salish & Kootenai Tribes (CSKT) -approved wetland credit at this 80-acre site. This 2009 report presents the results of the second year of wetland monitoring at the Lonepine Wetland Mitigation Project site.

The site is located on the west edge of the Flathead Indian Reservation, approximately 1.5 miles west of Lonepine and immediately south of the Lower Dry Fork Reservoir dam, at approximately 2,840 feet above mean sea level (**Figure 1**). It can be found on the Lonepine U.S. Geologic Survey 7.5 minute topographic quadrangle in the NW ¼ of Section 3 in Township 22 North and Range 24 West (**Figure 1**).

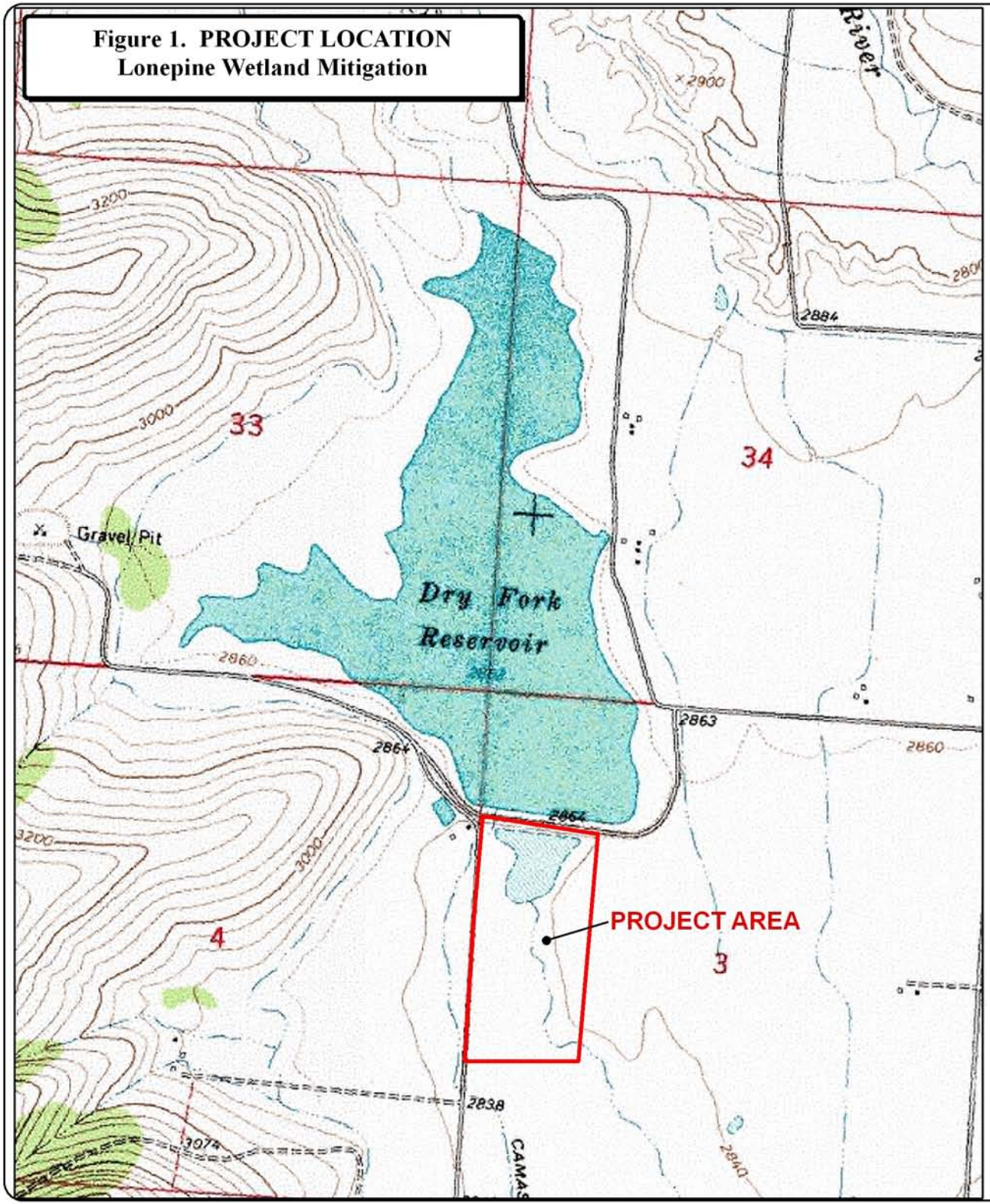
The primary target wetland class to be provided at the mitigation site is emergent, with aquatic bed and scrub-shrub (including non-wetland riparian) classes to be provided at a lesser extent. Primary target wetland functions include wildlife habitat; sediment / nutrient / toxicant removal; surface water storage; and production export / food chain support. The approximate monitoring boundary is illustrated on **Figures 2** and **3** (**Appendix A**) and on the plan sheet in **Appendix D**.

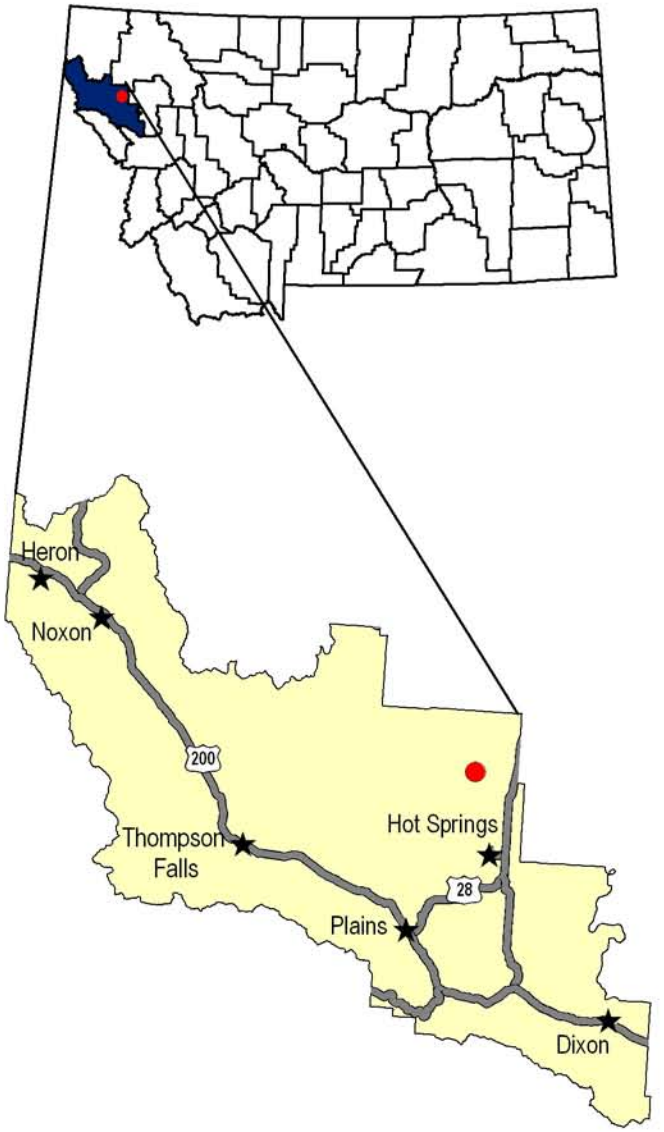
The project includes a series of five wetland cells that are hydrologically supplied by the Lower Dry Fork Reservoir via the Camas C Canal with some minimal contributions from precipitation. A general mitigation site layout is provided in **Appendix D**. The objectives of the project include the following:

- Maximize emergent wetland development, associated wildlife habitat, nutrient / toxicant removal functions, surface water storage functions, and production export / food chain support on the site by constructing several large interconnected cells that flood to a maximum depth of approximately 1 foot.
- Restore sinuosity and connectivity to ditched and straightened segments of Dry Fork Creek, including reactivation of a cutoff meander loop.
- Provide a riparian scrub-shrub component by revegetating restored Dry Fork Creek channel margins, and inter-cell watercourses, with riparian shrub species.
- Enhance and protect uplands and existing wetlands along Dry Fork Creek by removing grazing from the site, planting upland shrubs, prohibiting development, and fencing.
- Minimize operational maintenance and promote a self-sustaining system by placing permanent spillways at all cell outlets to control water elevations.

Crediting aspects of this project were coordinated with the COE and the CSKT Shoreline Protection Office (**Table 1**).

Figure 1. PROJECT LOCATION
Lonepine Wetland Mitigation





Project No: 0B4308801 Task: 02.04.02
Date: June 2008
Location:
Project Manager: J. Berglund
Drawn: R. Schreiner

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801 N. Last Chance Gulch, Suite 101
Helena, Montana 59601-3360

Table 1: ***Final Confederated Salish and Kootenai Tribes (CSKT) and US Army Corps of Engineers (COE) credit ratios for the Lonepine Wetland Mitigation Project.***

PROPOSED MITIGATION FEATURE	TYPE OF MITIGATION USING CSKT DEFINITIONS[1]	TYPE OF MITIGATION USING COE DEFINITIONS[2]	MITIGATION SITE ESTABLISHED PRIOR TO IMPACTS	
			CSKT Credit Ratio Credit Acreage[3]	COE Credit Ratio Credit Acreage[2]
Approximately 21.35 acres (ac) of new emergent wetland / open water at five shallow wetland cells and one excavation area.	Creation	Creation	1:3.04 ratio 7.02 acres credit	1:1 ratio 21.35 acres credit (OW credit limited to amount equaling 10% of total wetland area)
Approximately 0.30 ac at Dry Fork Creek stream channel and wetland/riparian fringe re-constructed through upland between the Camas C Canal and Wetland 1, and between Wetland 1 (ditched Dry Fork Creek segment) and Wetland 3 (historic meander channel).	Primary Restoration	Re-establishment	1:1.54 ratio 0.19 acre credit	1:1 ratio 0.30 acre credit
Approximately 0.04 ac of re-constructed Dry Fork Creek channel within Wetland 1 (ditched Dry Fork Creek segment).	Primary Restoration	Rehabilitation	1:1.54 ratio 0.03 acre credit	1:1.5 ratio 0.03 acre credit
Dry Fork Creek channel restoration plus restoration of hydrologic function at 0.26 ac Wetland 3 (historic meander channel).	Primary Restoration	Rehabilitation	1:1.54 ratio 0.17 acre credit	1:1.5 ratio 0.17 acre credit
Protection of and grazing removal at approximately 6.64 wetland acres that will remain on the project site following Lower Dry Fork Dam rehabilitation.	Secondary Restoration	Minor Rehabilitation	1:1.54 ratio 4.31 acres credit	1:5 ratio 1.33 acres credit
Approximately 0.43 ac of new riparian swales between wetland cells.	No Definition	No Definition	1:3.04 ratio 0.14 acre credit	1:4 ratio 0.11 acre credit
Approximately 4.45 ac of upland buffer between Wetland 1 and the farmed slope to the east of the project.	None (no planting proposed, thus, no CSKT credit)	Upland Buffer	None (no planting proposed, thus, no CSKT credit)	1:4 ratio on maximum 50-foot width (2.23 acres) 0.56 acre credit
		TOTAL	**11.86 acres**	**23.85 acres**

[1] From Price (1999), *Wetland Mitigation Guidelines for the Flathead Reservation.*
[2] From COE (2003), *Mitigation Ratios, Montana Regulatory Program.*
[3] From Price (2003), *Compensatory Wetland Crediting Example* and Price (1999).

The following performance standards are reflective of the primary project goals and objectives and were developed in conjunction with and approved by the Corps of Engineers:

Wetland Hydrology and Open Water Success will be achieved where wetland hydrology is present as per the technical guidelines in the 1987 COE Wetland Delineation Manual. Hydrologic success will also require that constructed channels be stable in wetlands that include channel reconstruction as described below.

Hydric Soil Success will be achieved where hydric soil conditions are present (per the most recent NRCS definitions for hydric soil) or appear to be forming, the soil is sufficiently stable to prevent erosion, and the soil is able to support plant cover. Since typical hydric soil indicators may require long periods to form, a lack of distinctive hydric soil features will not be considered a failure if hydrologic and vegetation success is achieved. Soils receiving gypsum treatment will be sampled yearly during drawdown in order to monitor the effectiveness of the experimental treatment in reducing baseline slickspot conditions (pH of 10.6; 357 meq/l sodium; SAR of 500; electrical conductivity of 23.1 mmhos/cm).

Hydrophytic Vegetation Success will be achieved in areas not receiving gypsum treatment where combined aerial cover of facultative or wetter species is $\geq$ 80% and noxious weeds do not exceed 10% cover. Hydrophytic vegetation success will be achieved in areas receiving gypsum treatment where combined aerial cover of facultative or wetter species is $\geq$ 50% and noxious weeds do not exceed 10% cover. Cattail basal coverage is not to exceed 50% in any cell except Cell #2.

Wetlands will be delineated as per the technical guidelines in the 1987 COE Wetland Delineation Manual. The following concept of "dominance", as defined in the 1987 Army COE wetland delineation manual, will be employed during future routine wetland determinations in created / restored wetlands: "*Subjectively determine the dominant species by estimating those having the largest relative basal area (woody overstory), greatest height (woody understory), greatest percentage of aerial cover (herbaceous understory), and/or greatest number of stems (woody vines).*"

Stream Channel Restoration Success will be evaluated in terms of revegetation success and bank stability success. Revegetation will be considered successful if noxious weeds do not exceed 10% cover, cuttings exhibit 50% survival after 3 years, and planted shrubs exhibit 75% survival after 5 years (or planted shrub densities are increased to accomplish the same projected net survival of individuals at a 50% survival rate over 5 years).

Bank stability success will be evaluated by identifying a reference reach along an adjacent, undisturbed portion of the channel below the restoration. The percentage of eroding channel and bed elevation will be evaluated for both restoration and reference channels. For this purpose "eroding bank" will be defined as any bank greater than two feet in length that is more than 50% bare mineral soil and has no roots, surface vegetation, or other stabilizing structure (e.g. rock, woody debris) to inhibit erosion. Bank stability success will be achieved when, following restoration, less than 25% of banks are unstable or the percent stability of the restored channel is within 5% of the reference reach. Vertical stability success will be achieved when, following

restoration, vertical movement of the new channel is no greater than 10% of vertical movement at the reference reach.

Intercell Swale Success will be evaluated in terms of revegetation success if wetlands do not develop. Revegetation will be considered successful if noxious weeds do not exceed 10% cover and planted shrubs exceed 75% survival after 5 years. If wetlands develop, success will be evaluated in terms of wetland hydrology, hydric soil, and hydrophytic vegetation success described above.

Secondary Restoration / Minor Rehabilitation Success will be achieved when the site is fenced and grazing is removed from existing wetlands.

Upland Buffer Success will be achieved when the site is fenced and noxious weeds do not exceed 10% cover within the buffer. Any area within the creditable buffer area disturbed by project construction must have at least 50% aerial cover of non-weed species by the end of the monitoring period.

2.0 METHODS

2.1 Monitoring Dates and Activities

The site was monitored on August 10, 2009 (mid-season visit). The mid-season visit was conducted to document vegetation, soil, and hydrologic conditions used to map wetlands. The majority of the information contained on the Wetland Mitigation Site Monitoring Form was collected at this time(**Appendix B**). Activities and information conducted or collected included: wetland delineation; wetland/open water boundary mapping; vegetation community mapping; vegetation transect monitoring; soils investigation; hydrology evaluation; bird and general wildlife use; photographing; macroinvertebrate sampling; functional assessment evaluation ; and planted woody vegetation inspection.

2.2 Hydrology

Hydrologic indicators were evaluated during the mid-season visit. Wetland hydrology indicators were recorded using procedures outlined in the Corps of Engineers Wetlands Delineation Manual (Environmental Laboratory 1987) and hydrology data were recorded on COE Routine Wetland Delineation Data Forms (**Appendix B**). Groundwater depths were documented at each sampling point if found within 18 inches of the ground surface; groundwater data was recorded onto the Routine Wetland Delineation Data Form(**Appendix B**). 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. All additional hydrologic data were recorded on to the Wetland Mitigation Site Monitoring Form (**Appendix B**).

Temperature data from the Lonepine weather station, which was monitored by the Western Regional Climate Center (WRCC) from 1918 to 1969, was used to estimate temperatures at the

project site. Precipitation data was unavailable at the Lonepine and Hot Springs weather stations.

2.3 Vegetation

General dominant species-based vegetation community types were delineated on an aerial photograph during the August 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**).

Two 10-foot wide belt transects were established **(Figure 2** in **Appendix A)**. Within the transect, percent cover was estimated, for each vegetative species in each vegetation community encountered, using the following values: + (<1%); 1 (1-5%); 2 (6-10%); 3 (11-20%); 4 (21-50%); and 5 (>50%).

The purpose of the transects was to evaluate changes over time, especially the establishment and increase of hydrophytic vegetation. Transect endpoints were recorded with a global positioning system (GPS) unit. Photos were taken the transect from both. A comprehensive plant species list for the site was compiled.

Several woody species were planted at this mitigation site. Observers recorded the number of live individuals for each species observed.

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 onto the COE Routine Wetland Delineation Data Form (**Appendix B**). Two soil samples were taken and analyzed for pH, electrical conductivity, calcium, magnesium, sodium and sodium absorption ration (SAR) in 2008 and this will be repeated in 2010 for comparative purposes. Soil sampling locations were mapped using a global positioning system (GPS).

2.5 Wetland Delineation

A wetland delineation of the mitigation site was conducted during the 2009 mid-season visit according to the 1987 COE of Engineers Wetland Delineation Manual. In July 2008, consultation with the COE (Steinle pers. comm.) confirmed that, where the 1987 manual was used to establish baseline wetland conditions at MDT wetland mitigation sites, it should continue to be applied at such sites for the duration of the monitoring period. Consequently, application of the new *Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region* (COE 2008) was not required or undertaken at this site in 2009.

Wetland and upland areas within the monitoring area were investigated for the presence of wetland hydrology, hydrophytic vegetation and hydric soils. The indicator status of vegetation was derived from the *National List of Plant Species that occur in Wetlands: Northwest (Region 9)* (Reed 1988). Information was recorded onto the COE Routine Wetland Delineation Data Forms (**Appendix B**). The wetland/upland boundary was delineated with a resource-grade GPS. The wetland/upland boundary in combination with the wetland/open water habitat boundary was used to calculate the wetland area that has developed within the monitoring area.

2.6 Fish and Wildlife

Fish, mammal, reptile, and amphibian species observations and indicators of their use (i.e, vocalizations, tracks, scat, burrows, eggshells, and bones) were recorded on the Wetland Mitigation Site Monitoring Form during the mid-season visit (**Appendix B**). These observations were recorded while conducting other required activities. Direct sampling methods (i.e., snap traps, live traps, and pitfall traps) were not implemented. A comprehensive species list for the entire site has been maintained.

2.7 Birds

Bird observations were also recorded during the mid-season visit. No formal census plots, spot mapping, point counts, or strip transects were conducted. Observations were recorded incidental to other monitoring activities and were categorized by species, activity code, and general habitat association. Bird observations were recorded on the **Bird Survey Field Data Sheet** (**Appendix B**).

2.8 Macroinvertebrates

Two macroinvertebrate samples were collected during the mid-season visit in Cells 2 and 4. The samples were collected and preserved according to the Macroinvertebrate Sampling Protocol (**Appendix F**). Laboratory analysis of the samples and reporting were conducted by Rhithron Associates, Inc. in Missoula, Montana (**Appendix F**). The sampling locations were mapped using a GPS.

2.9 Functional Assessment

Pre-construction wetland functional conditions were assessed in 2003 using the 1999 MDT Montana Wetland Assessment Method (MWAM). Functional assessment forms were completed in 2009 for the site within the monitoring area using the 2008 MDT Montana Wetland Assessment Method (Berglund and McEldowney 2008) (**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, macroinvertebrate sampling locations, and the vegetation transects (**Appendix C**). Each photograph point location was recorded with a GPS. All photographs were taken using a digital camera, and no optical zoom was used. A description

and compass bearing for each photograph was recorded on the wetland monitoring form. All figures in **Appendix A** are based on a July 1, 2009 aerial photograph.

2.11 GPS Data

During the 2009 monitoring season, data were collected with a resource-grade Magellan Mobile Mapper unit at the vegetation transect start and end locations, all photograph locations, wetland sample points, and aerial photograph reference points. Procedures used for GPS mapping and aerial photography referencing are included in **Appendix E.**

2.12 Maintenance Needs

Where encountered, current or potential future problems were documented and conveyed to MDT.

3.0 RESULTS

3.1 Hydrology

Water for the project is supplied primarily by the Lower Dry Fork Reservoir via the Camas C Canal. Dry Fork Creek and the Camas C Canal were flowing during the August monitoring visit.

According to the delineation manual, areas inundated or saturated to the surface for more than 12.5 percent of the growing season are wetlands, while areas inundated/saturated for 5 to 12.5 percent of the growing season are sometimes wetlands. Areas inundated/saturated for less than five percent of the growing season are non-wetlands. Five to 12.5 percent of this growing season equates to approximately seven to 18 days. Based on the available temperature data between 1918 and 1969 for Lonepine, there is a 50 percent probability that approximately 146 consecutive days will occur at above 28.5 degrees F (WRCC 2009). Consequently, a 146-day growing season is assumed for the project area. No current precipitation data were available for the Lonepine or Hot Springs weather stations (WRCC 2009).

Inundation was present to various extents at all wetland cells in August 2009, and appeared to have been present, in excess of the minimum seven days required to achieve wetland hydrology, at virtually all of the cells. No “designed” open water areas were mapped on the site. The intended design was to produce shallow, emergent wetlands. However, inundated areas with traces of vegetation were present in 2009. Water depths ranged from none to roughly 1.5 feet, with an average depth of approximately 0.75 feet. No groundwater monitoring wells are present. All constructed streambanks were stable and no eroding streambanks were observed.

3.2 Vegetation

Since 2008 85 plant species have been identified at the site (**Table 2** and **Monitoring Form** [**Appendix B**]). The majority of these species are herbaceous and were found within the five constructed wetland cells, remnant wetlands that exist along Dry Fork Creek, and upland areas.

Table 2: ***2008 to 2009 Lonepine Wetland Mitigation Site vegetation species list.***

Scientific Name	1988 Region 9 (Northwest) Wetland Indicator[1]	Scientific Name	1988 Region 9 (Northwest) Wetland Indicator[1]
Achillea millefolium	FACU	*Hordeum brachyantherum*	FACW
Agropyron cristatum	---	*Juncus balticus*	OBL
Agropyron dasystachyum	FACU-	*Kochia scoparia*	FAC
Agropyron repens	FACU	*Lactuca serriola*	FAC-
Agropyron smithii	FACU	*Lepidium densiflorum*	FAC-
Agropyron trachycaulum	FAC	*Lepidium perfoliatum*	FACU+
Agrostis alba	FACW	*Malva neglecta*	---
Alisma plantago-aquatica	OBL	*Matricaria perforata*	NI
Alopecurus pratensis	NI	*Medicago* spp.	---
Amelanchier alnifolia	FACU	*Melilotus alba*	FACU
Anthemis cotula	FACU	*Melilotus officinalis*	FACU
Artemisia frigida	---	*Phalaris arundinacea*	FACW
Bassia hyssopifolia	FACW	*Phleum pretense*	FACU
Beckmannia syzigachne	OBL	*Poa pratensis*	FACU+
Bromus inermis	---	*Polygonum amphibium*	OBL
Bromus tectorum	---	*Polygonum lapathifolium*	FACW+
Capsella bursa-pastoris	FAC-	*Polygonum* spp.	---
Cardaria chalapensis	---	*Populus trichocarpa*	FAC
Cardaria draba	---	*Populus deltoides*	FAC
Carex lanuginosa	OBL	*Potentilla fruticosa*	FAC-
Carex praegracilis	FACW	*Puccinellia cusickii*	---
Carex utriculata	OBL	*Ribes* spp.	---
Carex vulpinoidea	OBL	*Rosa* spp.	FACU
Centaurea maculosa	---	*Rumex crispus*	FACW
Chara spp.	OBL	*Salix alba*	FACW
Chenopodium album	FAC	*Salix amygdaloides*	FACW
Chrysothamnus nauseosus	---	*Salix bebbiana*	FACW
Cichorium intybus	---	*Salix exigua*	OBL
Cirsium arvense	FACU+	*Salix lutea*	OBL
Cirsium vulgare	FACU	*Sarcobatus vermiculatus*	FACU+
Crataegus columbiana	---	*Scirpus acutus*	OBL
Deschampsia cespitosa	FACW	*Scirpus americanus*	OBL
Descurainia sophia	---	*Scirpus maritimus*	OBL
Distichlis spicata	FAC+	*Scirpus microcarpus*	OBL
Eleocharis palustris	OBL	*Sisymbrium altissimum*	FACU-
Elymus varnensis	---	*Solidago* spp.	---
Festuca spp.	---	*Sparganium emersum*	OBL
Glyceria maxima	OBL	*Symphoricarpos* spp.	FACU
Glycyrrhiza lepidota	FAC+	*Thlaspi arvense*	NI
Grindelia squarrosa	FACU	*Tragopogon dubious*	---
Halogeton glomeratus	---	*Trifolium repens*	---
Hordeum jubatum	FAC+	*Typha latifolia*	OBL

[1] from Reed (1988):
OBL = Obligate Wetland – almost always occur in wetlands (probability >99%).
FACW = Facultative Wetland – usually occur in wetlands (probability 67-99%), but also occur in uplands.
FAC = Facultative – equally likely to occur in wetlands or uplands.
FACU = Facultative Upland – usually occur in uplands (probability 67-99%), but also occur in wetlands.
UPL = Obligate Upland - almost always occur in uplands (probability >99%) in the region specified.
NI = No Indicator - can occur in wetlands, but indicator status undetermined
--- = unlisted

Construction of the site was completed in June 2008, and by July 2008 very little of the site had re-vegetated. By July 2009 much of this area had vegetated.

A total of nine community types were documented at the site during 2009. Seven wetland types and two upland community types were identified and mapped at the mitigation site (**Figure 3** in **Appendix A**). The seven wetland community types were Type 1: *Agropyron*, Type 2: *Scirpus/Beckmannia*, Type 3: *Agropyron /Scirpus*, Type 4: *Agropyron/Hordeum*, Type 7: *Phalaris/Salix*, Type 8: *Typha/Scirpus/Carex*, and Type 9: *Phalaris/Glyceria*. The two upland community types were Type 5: *Agropyron/Kochia/Hordeum* and Type 6: *Kochia*. Plant species observed within each of these communities and their cover class were recorded onto the **Monitoring Form** (**Appendix B**).

Planned wetland creation areas (cells) were establishing in July of 2008 and many were dominated by what was conservatively identified as thickspike wheatgrass (*Agropyron dasystachyum*). However, slender wheatgrass (*Agropyon trachycaulum*) was also likely present. According to MDT, streambank wheatgrass was substituted for the prescribed thickspike wheatgrass in the upland seed mix because the latter species was unavailable. Slender wheatgrass, Nebraska sedge (*Carex nebrascensis*), and American sloughgrass (*Beckmannia syzigachne*) were substituted for alkaligrass (*Puccinellia airoides*), seaside arrowgrass (*Triglochin maritimum*), and Baltic rush (*Juncus balticus*) in the wetland seed mix. Nebraska sedge was substituted for Baltic rush in the streambank seed mix.

The upland communities differed from transitional wetland communities by having a distinctly different water regime and a prevalence of facultative (FAC), facultative-upland (FACU), and upland (UPL) plant species.

Vegetation community data were recorded from two 10-foot wide belt transects (**Monitoring Forms** in **Appendix B**). During the first year of monitoring in 2008, vegetation was in a state of transition. During 2009 monitoring, a similar hydrologic regime was observed, but the total number of hydrophytic plant species increased, the number of upland species decreased, and total vegetative cover increased (**Tables 3** and **4**; **Charts 1-4**). Upland species were still observed within the designed wetland cells, but with the addition of other hydrophytic vegetation. Upland species within these are expected to continue decreasing as the hydrologic regime is perpetuated.

Prescribed plant species that were to be installed as plugs in the cells were substituted during construction. The MDT approved substituting 10-cubic inch Baltic rush for 10 and 40 cubic inc Olney's bulrush (*Scirpus americanus*); the rush is unlikely to survive the designed inundation period. Due to the saline soil conditions, the beaked sedge (*Carex utriculata*) that was substituted for the Nebraska sedge (without MDT approval) may also not survive. Further, many plug installations were apparently performed incorrectly, with portions of some plugs protruding above the ground surface. Conversely, the hard-stem bulrush (*Scirpus acutus*) root mats that were salvaged and placed within Cell # 2 appeared to be establishing in 2009.

Table 3: ***2008 to 2009 Transect 1 data summary.***

Monitoring Year	2008	2009
Transect Length (feet)	150	150
# Vegetation Community Transitions along Transect	0	0
# Vegetation Communities along Transect	1	1
# Hydrophytic Vegetation Communities along Transect	0	1
Total Vegetative Species	2	5
Total Hydrophytic Species	2	5
Total Upland Species	0	0
Estimated % Total Vegetative Cover	1	75
% Transect Length Comprised of Hydrophytic Vegetation Communities	0	100
% Transect Length Comprised of Upland Vegetation Communities	0	0
% Transect Length Comprised of Unvegetated Open Water	100	0
% Transect Length Comprised of Bare Substrate	0	0

Table 4: ***2008 to2009 Transect 2 data summary.***

Monitoring Year	2008	2009
Transect Length (feet)	300	300
# Vegetation Community Transitions along Transect	2	2
# Vegetation Communities along Transect	3	3
# Hydrophytic Vegetation Communities along Transect	0	2
Total Vegetative Species	3	11
Total Hydrophytic Species	2	7
Total Upland Species	1	4
Estimated % Total Vegetative Cover	9	75
% Transect Length Comprised of Hydrophytic Vegetation Communities	0	93
% Transect Length Comprised of Upland Vegetation Communities	34	7
% Transect Length Comprised of Unvegetated Open Water	66	0
% Transect Length Comprised of Bare Substrate	0	0

Chart 1: ***Transect 1 maps showing vegetation types from the start to end of transect from 2008 to 2009.***

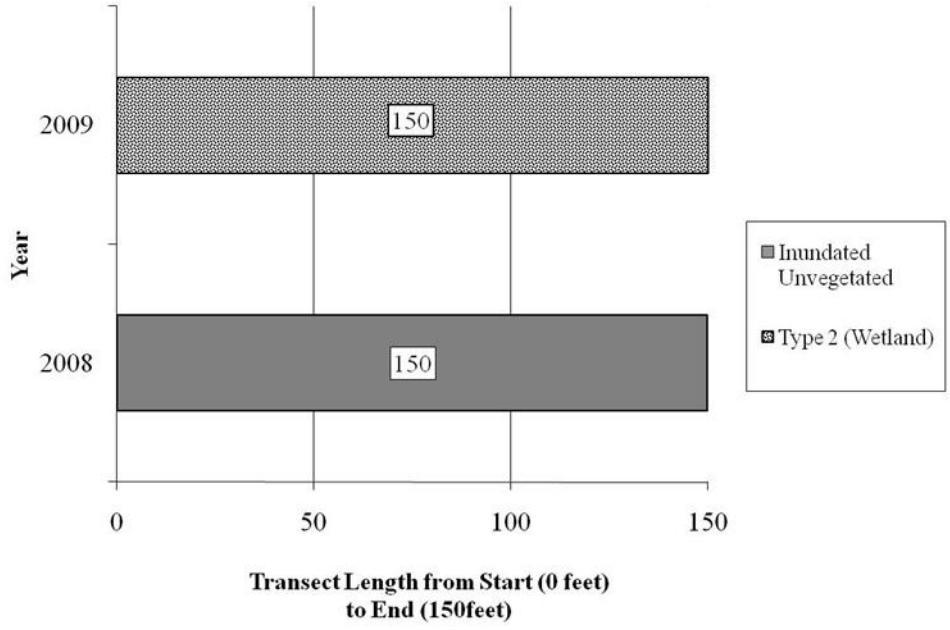


Chart 2: ***Length of vegetation communities within Transect 1 from 2008 to 2009.***

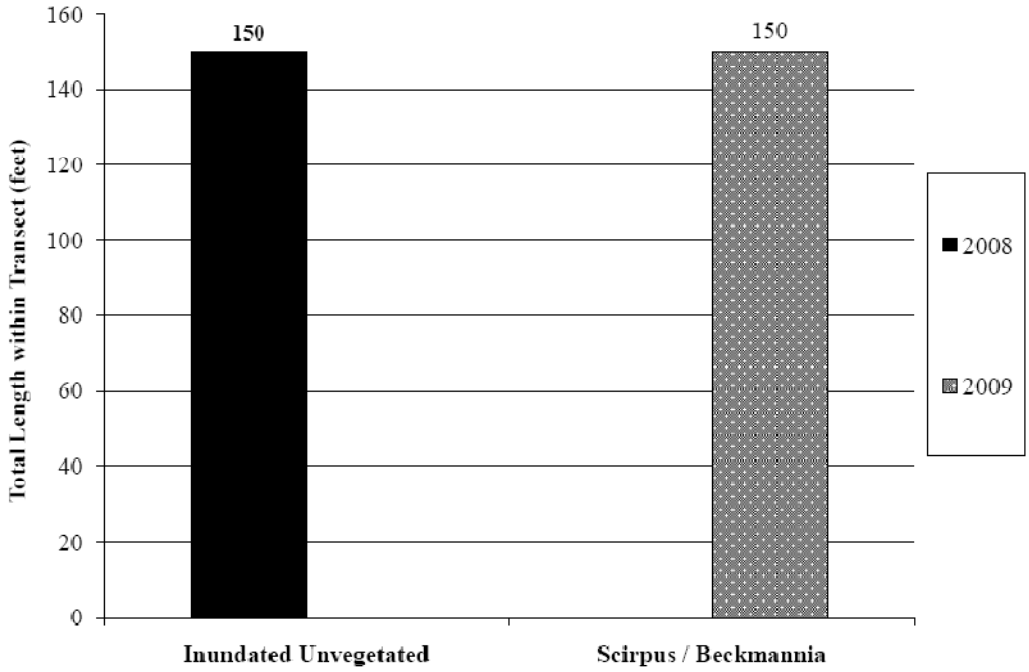


Chart 3: ***Transect 2 maps showing vegetation types from the start to end of transect from 2008 to 2009.***

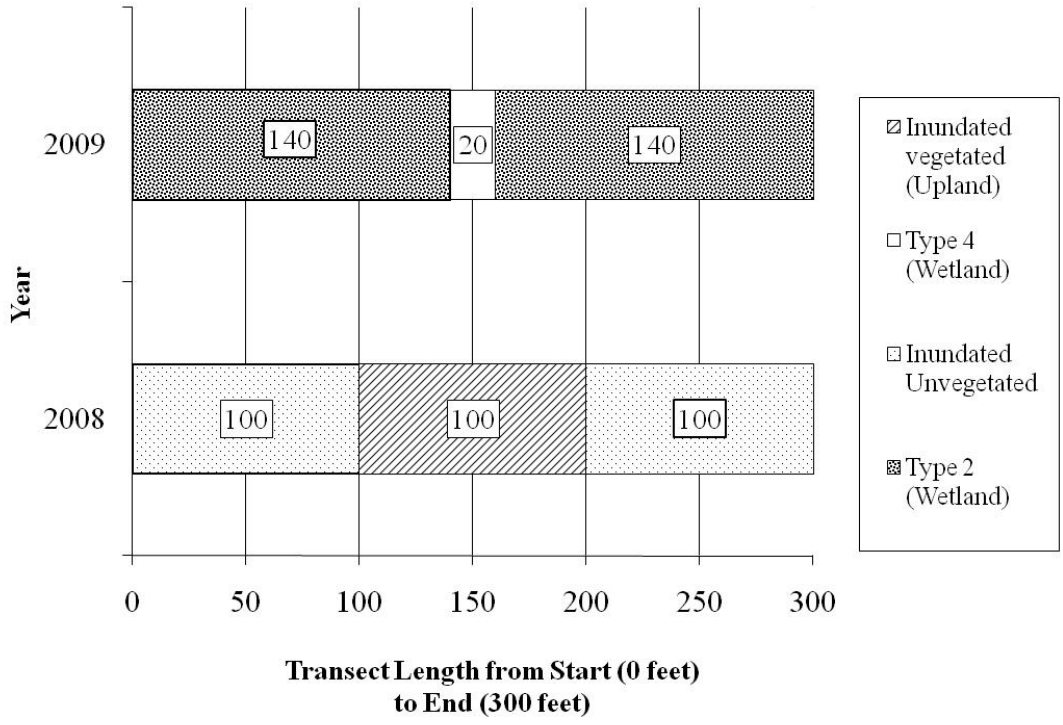
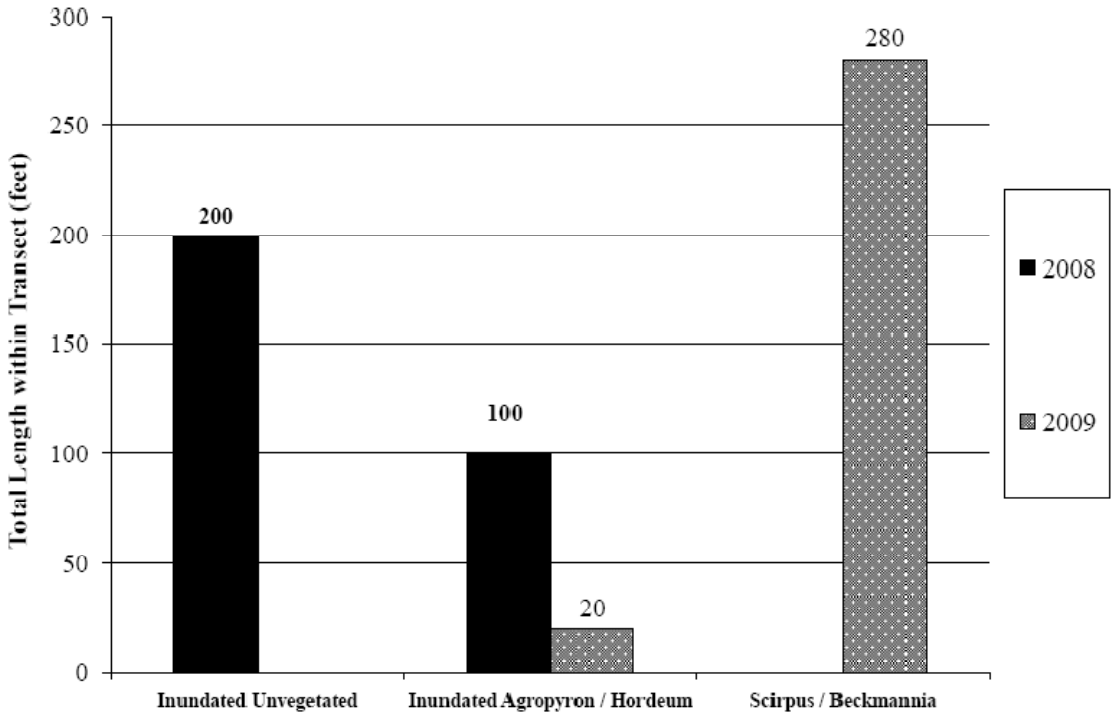


Chart 4: ***Length of vegetation communities within Transect 2 from 2008 to 2009.***



The original vegetation plan for this site called for 580 woody plantings (shrubs) and 500 willow sprigs (cuttings). A total of 285 woody plantings were identified onsite during 2009 and were mainly willow growing along Dry Fork Creek. Observed survival of planted woody vegetation was recorded in detail on the **Monitoring Form** (**Appendix B**) and were summarized (**Table 5**). During the 2008 monitoring, it was observed that root systems were exposed on many of the planted containerized shrubs, apparently due to soil displacement during watering, and likely resulted in the morality of many plants. Subsequent to monitoring, approximately 270 dead willow cuttings were replaced along Dry Fork Creek in November 2008. During the 2009 monitoring, woody plantings were only observed along the reconstructed banks of Dry Fork Creek.

Table 5: ***2009 observed survival of planted woody species at the Lonepine Wetland Mitigation Site.***

SHRUB SPECIES	NUMBER ALIVE
Ribes spp.	1
Salix amygdaloides	6
Salix bebbiana	2
Salix exigua	273
Salix lutea	3
TOTAL	**285**

3.3 Soils

The site was excavated and graded in spring/early summer 2008, which highly disturbed the soils throughout the site. Soils sampled in wetland areas were inundated and had textures of silty clay loam and clay loam (**COE Forms** in **Appendix B**). The most common matrix color was 10 YR 4/2 with no evidence of mottles (**COE Forms** in **Appendix B**).

Two soil samples (Cell 1 and Cell 2) were collected and analyzed for pH, electrical conductivity (EC), calcium, magnesium, sodium, and sodium adsorption ratio (SAR) in 2008. Results from the 2009 sampling were erroneous and therefore were not included in this report. Sampling will be repeated in 2010 for comparative purposes with the 2008 results.

3.4 Wetland Delineation

Wetland boundaries were delineated onto the 2009 aerial photographs (**Figure 3** in **Appendix A**). Approximately 7.1 acres of essentially pre-existing wetlands were delineated in 2009. An additional 21.74 acres of transitional or inundated communities developing wetland characteristics were delineated during 2009 (**Figure 3** in **Appendix A**). These transitional areas were inundated for the first time in June 2008, and are expected to further develop as emergent wetlands if consistent inundation is maintained.

3.5 Fish and Wildlife

Though only constructed in 2008, the developing wetland complex has created habitat for several wildlife species. During the spring of 2009, MDT wetland staff observed 15 bird species (**Table 6**). In August 2009 three mammal and four bird species were observed at the site (**Table 6**). The habitat value of the site is expected to increase as vegetation continues to establish and diversify.

Table 6: ***Fish and wildlife species observed at the Lonepine Wetland Mitigation Site from 2008 to 2009.***

FISH, AMPHIBIAN, and REPTILE none	
BIRD	
American White Pelican (*Pelecanus erythrorhynchos*)[1]	**Green-winged teal (*Anas crecca*)[2]**
Bald Eagle (*Haliaeetus leucocephalus*)[1,2]	**Killdeer (*Charadrius vociferous*) [1,2]**
Barn swallow (*Hirundo rustica*)[2]	Long-billed Curlew (*Numenius americanus*)1
Bank swallow (*Riparia riparia*)[2]	**Mallard (*Anas platyrhynchos*)[1,2]**
Blue-winged teal (*Anas discors*)[2]	**Magpie (*Pica hudsonia*)[2]**
Brown-headed Cowbird (*Molothrus ater*)[1]	**Northern Shoveler (*Anas clypeata*)[2]**
Canada Goose (*Branta canadensis*)[1]	**Pheasant (*Phasianus colchicus*)[2]**
Cinnamon teal (*Anas cyanoptera*)[2]	**Red-winged Blackbird (*Agelaius phoeniceus*)[1]**
Common nighthawk (*Chordeiles minor*)[2]	**Spotted sandpiper (*Actitis macularius*)[2]**
Great Blue Heron (*Ardea herodias*)[2]	**Wigeon (*Anas spp.*)[2]**
Greater Yellowlegs (*Tringa melanoleuca*)[2]	

Table 6 (continued): ***Fish and wildlife species observed at the Lonepine Wetland Mitigation Site from 2008 to 2009.***

MAMMAL	
Coyote (*Canis latrans*) Deer (*Odocoileus* sp.)	Voles (*Microtus* sp.)

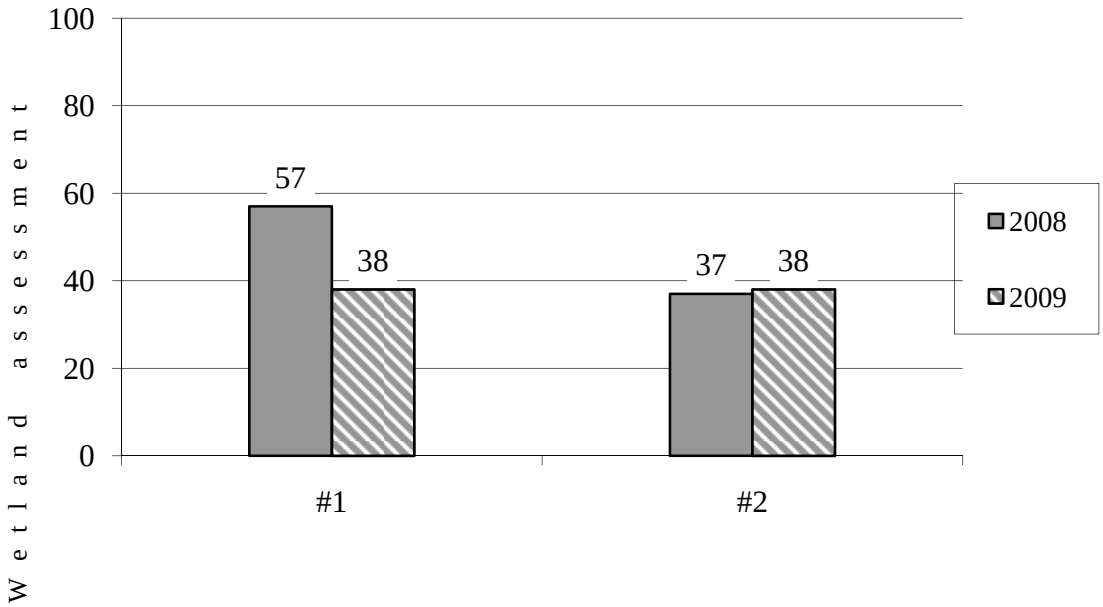
[1] Observed by PBS&J.
[2] Observed by MDT Wetland Staff.
Bolded species observed during 2009 monitoring year by either PBS&J or MDT.

3.6 Macroinvertebrates

Macroinvertebrates were sampled at Cell 2 and Cell 4 (**Figure 2** in **Appendix A**). The complete macroinvertebrate sampling results are provided in **Appendix F.** The results were summarized by Rhithron Associates, Inc in the italicized section (Bollman 2009). The results are typical of a newly constructed mitigation site.

> **Lonepine Sample #1 (Cell 2).** *Similar to conditions in 2008, the sample collected at this site in 2009 was strongly dominated by midge taxa. The most abundant of these,* Apedilum *sp., is a hemoglobin-bearing taxon, suggesting hypoxic sediments. Hypoxic sediments may be associated with warm water temperatures: the thermal preference of the assemblage was estimated at 16.0ºC. Two mayfly taxa were collected here, which may be an indication of good water quality. The functional complexity noted in 2008 was replaced by an overwhelming dominance by gatherers, with a few predator taxa also present. However, taxonomic diversity increased between the two years of study. The wetland bioassessment index indicated "sub-optimal" biotic conditions (**Chart 5**).*
>
> **Lonepine Sample #2 (Cell 4).** *The abundance of invertebrates collected in 2009 was much improved compared to 2008 at this site. The greater abundance, along with greater diversity, may be related to year-round inundation or improved water quality. The presence of cladocerans and the phantom midge* Chaoborus *sp. in 2009 suggests deep water. Emergent macrophytes, and hypoxic substrates are also implied by other taxonomic components of the assemblage. The mayfly* Callibaetis *sp. was common. This finding may be related to good water quality. While taxonomic diversity was relatively high, functional diversity was not: only predators and gatherers were well-represented. The thermal preference of the assemblage was calculated at 14.8ºC, and the bioassessment index indicated "sub-optimal" conditions (**Chart 5**).*

Chart 5: ***Macroinvertebrate bioassessment scores using the wetland index for the Lonepine Wetland Mitigation Site.***



3.7 Functional Assessment

Pre-construction (2003) conditions were assessed using the 1999 MDT Montana Wetland Assessment Method (MWAM) while post-construction conditions were assessed using the 2008 MDT MWAM. Only general trends in wetland functional development can be made between the 2003 and 2009 functional assessments.

The site was separated into two assessment areas (AAs): Dry Fork Creek and inter-connected Cells 1-5. The complete 2009 MWAM is included in **Appendix B**. The 2003 and 2009 functional assessment results were summarized (**Table 7**). Both AAs currently rate as Category III sites. Although differing functional assessment methods were applied pre- and post-project, the site as a whole has gained aquatic habitat acreage and gained 122 functional units. Prominent functions in 2009 included general wildlife habitat, surface water storage, sediment/nutrient/toxicant removal, and production export / food chain support.

Table 7: ***Summary of pre-project and 2009 wetland function/value ratings and functional points at the Lonepine Wetland Mitigation Site.***

Function and Value Parameters from the MDT Montana Wetland Assessment Method	Pre-Project Dry Fork Ck 2003[1]	Pre-Project Isolated Wetland Patches 2003[1]	Post-Project Dry Fork Ck 2009[2]	Post-Project Cells 1-5 2009[2]
Listed/Proposed T&E Species Habitat	Low (0.3)	Low (0.0)	Low (0.0)	Low (0.0)
MTNHP Species Habitat	Low (0.1)	Low (0.1)	Mod (0.6)	Mod (0.6)
General Wildlife Habitat	Low (0.3)	Low (0.1)	Mod (0.7)	Mod (0.7)
General Fish/Aquatic Habitat	Mod (0.4)	NA	Mod (0.4)	NA
Flood Attenuation	Mod (0.5)	NA	Mod (0.6)	NA
Short and Long Term Surface Water Storage	Mod (0.6)	Low (0.3)	Mod (0.6)	High (0.9)
Sediment/Nutrient/Toxicant Removal	Mod (0.7)	NA	Mod (0.7)	Mod 0.7
Sediment/Shoreline Stabilization	Mod (0.6)	NA	Mod (0.6)	Mod (0.6)
Production Export/ Food Chain Support	High (0.8)	Low (0.1)	High (0.8)	Mod (0.7)
Groundwater Discharge/Recharge	High (1.0)	High (1.0)	Mod (0.7)	Mod (0.4)
Uniqueness	Low (0.2)	Low (0.2)	Mod (0.4)	Mod (0.4)
Recreation/Education Potential	Low (0.1)	Low (0.1)	Mod (0.1)	High (0.15)
Actual Points / Possible Points	**5.0 / 12**	**1.9 / 8**	**6.2 / 11**	**5.15 / 9**
% of Possible Score Achieved	**47%**	**24%**	**56%**	**57%**
Overall Category	**III**	**IV**	**III**	**III**
Acreage of Assessed Aquatic Habitats within Easement (ac)	**6.87**[3]	**0.31**[3]	**7.64**	**21.23**
Functional Units (acreage x actual points) (fu)	**34.35**	**0.59**	**47.37**	**109.33**
Net Acreage Gain (ac)	NA		**21.69**	
Net Functional Unit Gain (fu)	NA		**121.76**	

[1] Assessed using the 1999 MDT Montana Wetland Assessment Method (MWAM).
[2] Assessed using the 2008 MDT MWAM. The completed forms are in **Appendix B**.
[3] Outside of the recently expanded Lower Dry Fork Dam footprint.

3.8 Photographs

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

3.9 Maintenance Needs/Recommendations

Several problems with inlet/outlet structures were identified in June 2008, and were for the most part repaired prior to site monitoring in July 2008. The exception to this was the Cell 5 outlet, which has since been repaired. Fencing was completed during the July 2008 limiting the access of livestock to the site. A fifth smooth wire was added to the existing four-strand fence in order to more effectively discourage use of the site by neighboring domestic goats. No livestock or their sign were present during the 2009 monitoring.

Erosion along the eastern edges of many of the wetland cells was observed and is relatively minor at this stage of the project, except for Cell 2 that had more extensive erosion. These areas need to be monitored in the future, specifically where the berms are relatively narrow between wetland cells. Until vegetation establishes along these edges, this may be a continuing issue.

MDT is investigating the possibility salvaging bulrushes from an adjacent wetland near the site and planting the bulrush along the eroding edges of the wetland cells to speed up vegetative growth, damper wave action, and reduce erosion.

Noxious weeds are present on the site. Canada thistle occurs, mainly in small scattered patches across the site, and should be controlled. Whitetop is present in a large patch in the southwest corner of the site and should also be controlled. Kochia is another weedy species occurring on the site, especially on the disturbed upland portions, but is not on the noxious weed list.

3.10 Current Credit Summary

Approximately 7.13 acres of essentially pre-existing wetland and 21.74 acres of transitional, inundated communities / areas that developed wetland characteristics (between 2008 and 2009) were delineated on the site in 2009. These transitional areas were inundated for the first time in June 2008, and have developed into emergent wetlands. Similarly, vegetation along the new Dry Fork Creek channel is developing and the streambanks are stable.

As construction was essentially completed in June 2008, and monitored in July 2008, the site had very little time to develop during the first monitoring season. As of 2009, the wetland cells had developed into emergent wetlands and are expected to continue to developing, given adequate hydrology. The CSKT and Corps will ultimately determine / authorize credit at the site. However, up to 11.93 CSKT and 23.83 Corps interim credit-acres have developed on the site in the absence of full ultimate performance standard application (**Table 8**). Performanance standards in 2009 are also presented (**Table 8).** Planted shrub survival was far below the target along the new Dry Fork channel at the dam face, and within intercell swales, and as such these areas were conservatively not included at this time in interim credit totals.

The pre-construction project site provided a total of 35 functional units within the monitoring area. As of 2009 the post-project site provides 157 functional units, for a conservative gain of approximately 122 functional units over pre-construction condition (**Table 7**).

Table 8: ***2009 Tribal (CSKT) and Corps of Engineers (COE) maximum interim credits at the Lonepine Wetland Mitigation Site.***

PROPOSED FEATURE	2009 DELINEATED ACRES	CSKT CREDIT RATIO 2009 INTERIM CALCULATED CREDIT	CSKT CREDIT TARGET	COE CREDIT RATIO 2009 INTERIM CALCULATED CREDIT[A]	COE CREDIT TARGET	2009 PERFORMANCE STANDARD COMMENTS
1) Wetland cells, wetland excavation, and designed intercell swales that have developed into wetlands	21.58	1:3.04 credit ratio 7.1 credit ac	7.02 credit ac	1:1 credit ratio (OW limited to 10% of wetlands) 21.58 credit ac	21.35 credit ac	Wetland Hydrology: Satisfied Hydric Soil: Satisfied Noxious Weed Cover: Satisfied Hydrophytic Veg Cover in Gypsum-Treated Areas: Satisfied Hydrophytic Veg Cover in Untreated Areas: Progress on target Cattail Cover: Satisfied
2) New Dry Fork channel and wetland fringe along dam face	0.16	1:1.54 credit ratio 0.10 credit ac (not included in total)	0.19 credit ac	1:1 credit ratio 0.16 credit ac (not included in total)	0.3 credit ac	Bank Stability: Satisfied Noxious Weed Cover: Satisfied Cutting Survival: Progress on target Shrub Survival: Below target
3) New Dry Fork Creek channel in pre-existing Wetland 1	0.04	1:1.54 credit ratio 0.03 credit ac	0.03 credit ac	1:1.5 credit ratio 0.03 credit ac	0.03 credit ac	Bank Stability: Satisfied
4) Dry Fork Creek meander re-activation	0.26	1:1.54 credit ratio 0.17 credit ac	0.17 credit ac	1:1.5 credit ratio 0.17 credit ac	0.17 credit ac	Bank Stability: Satisfied Noxious Weed Cover: Satisfied Cutting Survival: Progress on target
5) Protection / grazing removal at pre-existing wetlands	7.13	1:1.54 credit ratio 4.63 credit ac	4.31 credit ac	1:5 credit ratio 1.43 credit ac	1.33 credit ac	Fencing and Grazing Exclusion: Satisfied
6) Riparian intercell swales	0.24	1:3.04 credit ratio 0.08 credit ac (not included in total)	0.14 credit ac	1:4 credit ratio 0.06 credit ac (not included in total)	0.11 credit ac	Noxious Weed Cover: Satisfied Shrub Survival: Below target
7) Upland buffer	4.45	0 credit ac (no planting)	0.00 credit ac	1:4 credit ratio (on max. 50-ft width) 0.56 credit ac	1:4 credit ratio on max. 50-ft width (2.23 ac) 0.56 credit ac	Fencing: Satisfied Noxious Weed Cover: Satisfied Vegetation Cover: Satisfied
TOTAL		**11.93 ac[a]**	11.86 ac	**23.83 ac[a]**	23.85 ac	

[a] Maximum credits as of 2009. Features 2 and 6 not included in 2009 credit totals. Credits are subject to performance standard compliance following the monitoring period.

4.0 REFERENCES

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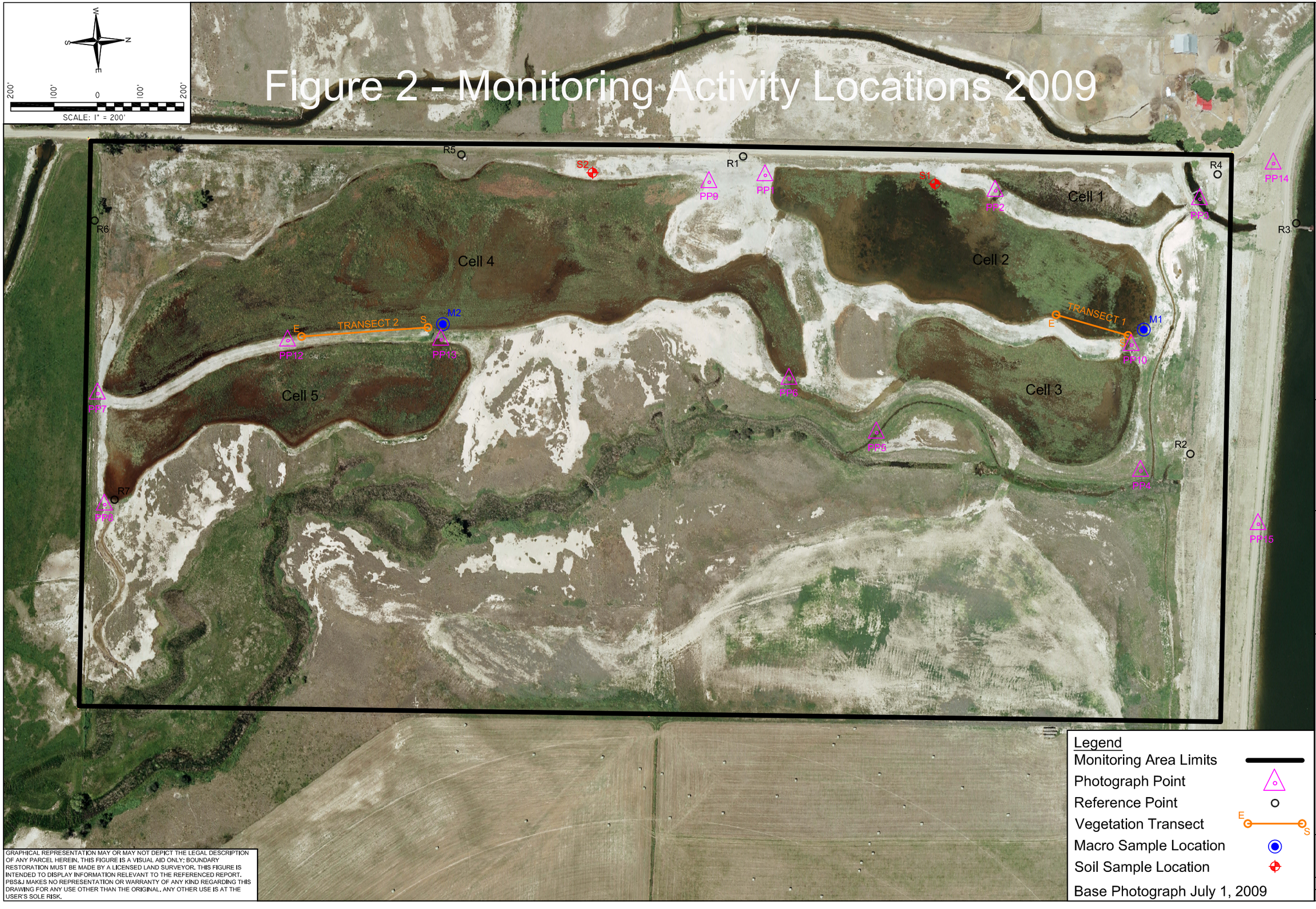
Appendix A

FIGURES 2 & 3

MDT Wetland Mitigation Monitoring
Lonepine Wetland Mitigation Project
Flathead Indian Reservation, Montana

Figure 2 - Monitoring Activity Locations 2009



GRAPHICAL REPRESENTATION MAY OR MAY NOT DEPICT THE LEGAL DESCRIPTION OF ANY PARCEL HEREIN. THIS FIGURE IS A VISUAL AID ONLY; BOUNDARY RESTORATION MUST BE MADE BY A LICENSED LAND SURVEYOR. THIS FIGURE IS INTENDED TO DISPLAY INFORMATION RELEVANT TO THE REFERENCED REPORT. PBS&J MAKES NO REPRESENTATION OR WARRANTY OF ANY KIND REGARDING THIS DRAWING FOR ANY USE OTHER THAN THE ORIGINAL. ANY OTHER USE IS AT THE USER'S SOLE RISK.

Legend

- Monitoring Area Limits
- Photograph Point
- Reference Point
- Vegetation Transect (E – S)
- Macro Sample Location
- Soil Sample Location

Base Photograph July 1, 2009

PROJECT NAME: MDT LONEPINE WETLAND MITIGATION

DRAWING TITLE: MONITORING ACTIVITY LOCATIONS 2009

DRAWN: JR | PROJ MGR: J. BERGLUND | CHECKED: GH | APPVD: JB

PROJ NO: 0B4308802 02.04 | LOCATION: LONEPINE, MT | SCALE: NOTED | FILE NAME: BASE 2009.dwg

1120 Cedar
Missoula, MT 59802

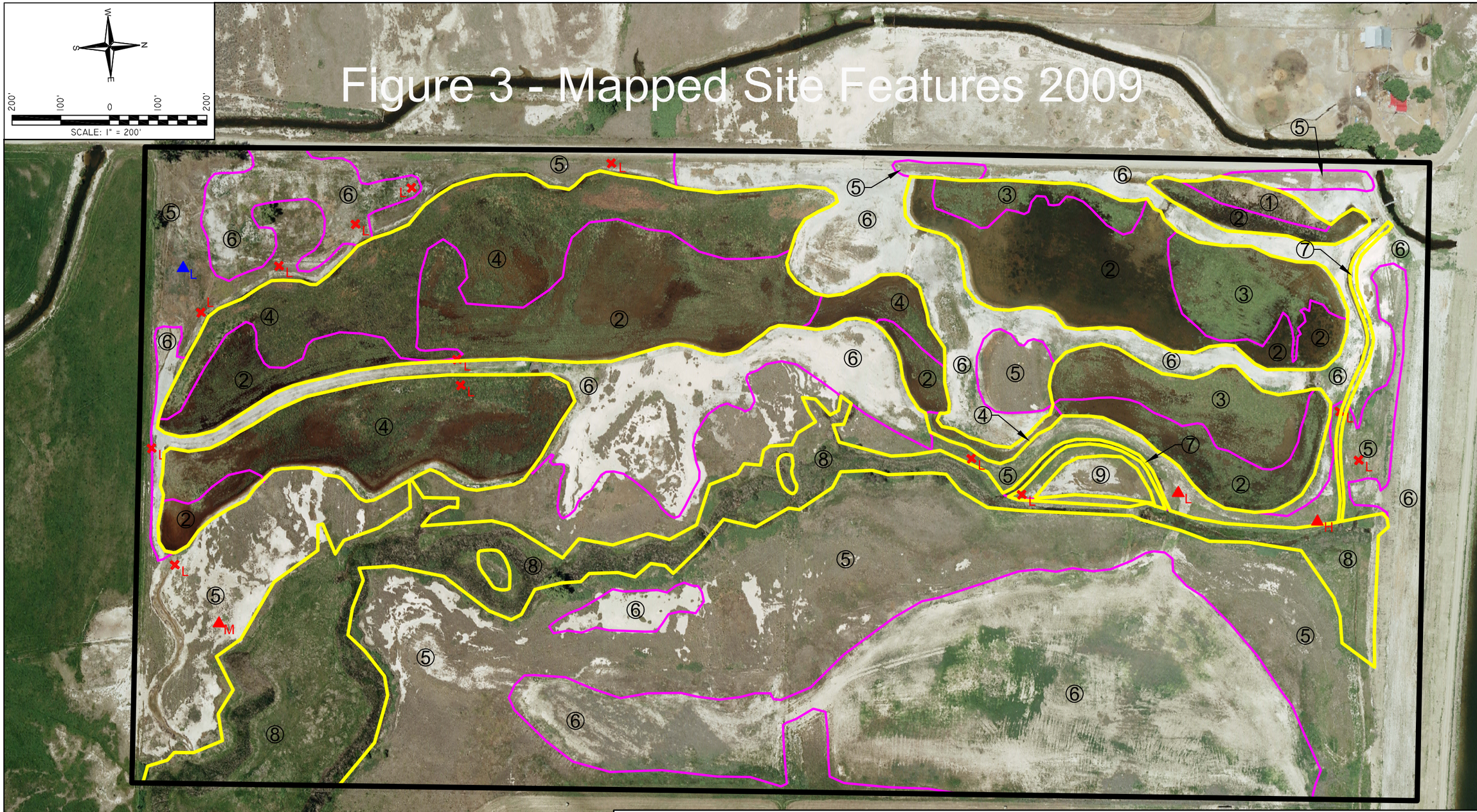
PBSJ

FIGURE 2 OF

REV -

Dec/10/2009

Figure 3 - Mapped Site Features 2009



Legend

Monitoring Area Limits

Wetland Boundary

Vegetation Community Boundary

Base Photograph July 1, 2009

Wetland Area

Pre-Existing Wetland	7.13 acres
Developing Wetland	21.74 acres

Noxious Weeds

Cirsium arvense

Cardaria draba

Infestation Size

✖ = < 0.1 acre

▲ = 0.1 to 1 acre

Cover Class

L = Low (1-5% cover)

M = Moderate (5-25% cover)

H = High (25-100% cover)

Vegetation Types

① Inundated Agropyron
② Inundated Scirpus/Beckmannia
③ Inundated Agropyron/Scirpus
④ Inundated Agropyron/Hordeum
⑤ Agropyron/Kochia/Hordeum
⑥ Kochia
⑦ Phalaris/Salix
⑧ Typha/Scirpus/Carex
⑨ Phalaris/Glyceria

PROJECT NAME
MDT LONEPINE WETLAND MITIGATION

DRAWING TITLE
MAPPED SITE FEATURES 2009

DRAWN: JR
PROJ MGR: J. BERGLUND
CHECKED: GH | APPVD: JB

PROJ NO: 0B4308802 02.04
LOCATION: LONEPINE, MT
SCALE: NOTED
FILE NAME: BASE 2009.dwg

1120 Cedar
Missoula, MT 59802
PBSJ

FIGURE
3 OF

REV -
Dec/10/2009

Appendix B

2009 WETLAND MITIGATION SITE MONITORING FORMS
2009 BIRD SURVEY FORM
2009 COE WETLAND DELINEATION FORMS
2009 FUNCTIONAL ASSESSMENT FORMS

MDT Wetland Mitigation Monitoring
Lonepine Wetland Mitigation Project
Flathead Indian Reservation, Montana

PBS&J / MDT WETLAND MITIGATION SITE MONITORING FORM

Project Name: **Lonepine Wetland Mitigation Site** Project Number: **0B4308802.02.04**
Assessment Date: **August 10, 2009** Person(s) conducting the assessment: **G. Howard**
Location: **Lonepine** MDT District: **Missoula** Milepost: _____
Legal Description: T **22N** R **24W** Section **3**
Weather Conditions: **clear sky** Time of Day: **10:00am to 4:00pm**
Initial Evaluation Date: **July 25, 2008** Monitoring Year: **2** # Visits in Year: **1**
Size of evaluation area: **80 acres** Land use surrounding wetland: **agriculture; reservoir**

HYDROLOGY

Surface Water Source: **Lower Dry Fork Reservoir via the Camas C Canal**
Inundation: **Present** Average Depth: **1 foot** Range of Depths: **0-1.5 feet**
Percent of assessment area under inundation: **30-40%**
Depth at emergent vegetation-open water boundary: **NA feet**
If assessment area is not inundated then are the soils saturated within 12 inches of surface: _
Other evidence of hydrology on the site (ex. – drift lines, erosion, stained vegetation, etc.):
drift lines and water marks

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:
Cells 1-5 were 90% inundated and dominated with emergent vegetation. Wetland development within the constructed cells significantly different than the first year monitoring with the development of emergent vegetation. Areas along the Dry Fork Creek planted with woody vegetation.

VEGETATION COMMUNITIES

Community Number: **1** Community Title (main spp): **Inundated Agropyron**

Dominant Species	% Cover	Dominant Species	% Cover
Agropyron dasystachyum	4 = 21-50%		
Scirpus maritimus	3 = 11-20%		
Chara spp.	3 = 11-20%		

Comments / Problems: **Inundated cell with a stand of thickspike wheatgrass with 80% cover.**

Community Number: **2** Community Title (main spp): **Scirpus / Beckmannia**

Dominant Species	% Cover	Dominant Species	% Cover
Scirpus acutus	2 = 6-10%	Eleocharis palustris	2 = 6-10%
Typha latifolia	3 = 11-20%	Chara spp.	3 = 11-20%
Agropyron dasystachyum	+ = < 1%		
Scirpus maritimus	3 = 11-20%		
Beckmannia syzigachne	4 = 21-50%		

Comments / Problems: **Inundated area with shallow waters and emergent vegetation dominated by bulrush and sloughgrass.**

Community Number: **3** Community Title (main spp): **Inundated Agropyron / Scirpus**

Dominant Species	% Cover	Dominant Species	% Cover
Agropyron dasystachyum	4 = 21-50%	Kochia scoparia	+ = < 1%
Scirpus acutus	1 = 1-5%	Matricaria perforata	+ = < 1%
Lepidium desiflorum	3 = 11-20%		
Alopecurus pratensis	1 = 1-5%		
Phleum pratense	+ = < 1%		
Cirsium arvense	+ = < 1%		

Comments / Problems: **Inundated with shallow waters and dominated by emergent vegetation.**

Community Number: **4** Community Title (main spp): **Inundated Agropyron / Hordeum**

Dominant Species	% Cover	Dominant Species	% Cover
Agropyron dasystachyum	4 = 21-50%	Agrostis alba	+ = < 1%
Typha latifolia	3 = 11-20%	Cirsium arvense	+ = < 1%
Scirpus maritimus	2 = 6-10%		
Alopecurus pratensis	1 = 1-5%		
Polygonum amphibium	1 = 1-5%		
Kochia scoparia	+ = < 1%		

Comments / Problems: **Inundated with shallow waters and dominated by emergent vegetation. Area considered wetlands.**

VEGETATION COMMUNITIES (continued)

Community Number: **5** Community Title (main spp): **Agropyron / Kochia / Hordeum**

Dominant Species	% Cover	Dominant Species	% Cover
Agropyron dasystachyum	4 = 21-50%	Anthemis cotula	+ = < 1%
Hordeum jubatum	1 = 1-5%	Agrostis alba	+ = < 1%
Lepidium desiflorum	1 = 1-5%	Rumex crispus	+ = < 1%
Alopecurus pratensis	+ = < 1%	Capsella bursa-pastoris	+ = < 1%
Polygonum amphibium	+ = < 1%	Bromus inermis	2 = 6-10%
Kochia scoparia	2 = 6-10%	Cichorium intybus	+ = < 1%
Cardaria draba	+ = < 1%		

Comments / Problems: **Area dominated by upland species.**

Community Number: **6** Community Title (main spp): **Vegetated Upland**

Dominant Species	% Cover	Dominant Species	% Cover
Agrostis alba	+ = < 1%	Alopecurus pratensis	1 = 1-5%
Kochis scoparia	4 = 21-50%	Carex nebrascensis	1 = 1-5%
Phleum pratense	+ = < 1%	Rumex crispus	+ = < 1%
Capsella bursa-pastoris	+ = < 1%	Dipsacus sylvestris	1 = 1-5%
Agropyron repens	+ = < 1%	Sonchus arvensis	2 = 6-10%
Bromus tectorum	+ = < 1%		

Comments / Problems: **Area dominated by upland species.**

Community Number: **7** Community Title (main spp): **Phalaris / Salix**

Dominant Species	% Cover	Dominant Species	% Cover
Salix exigua	1 = 1-5%	Phalaris arundinacea	3 = 11-20%
Salix spp.	1 = 1-5%		
Ribes spp.	1 = 1-5%		
Populus trichocarpa	+ = < 1%		
Amelanchier alnifolia	+ = < 1%		

Comments / Problems: **Planted woody species and emergent vegetation located along the reconstructed Dry Fork Creek.**

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

Dominant Species	% Cover	Dominant Species	% Cover
Phleum pratense	+ = < 1%	Typha latifolia	5 = > 50%
Agrostis alba	1 = 1-5%	Scirpus acutus	4 = 21-50%
Hordeum jubatum	2 = 6-10%	Alopecurus pratensis	2 = 6-10%
Juncus balticus	2 = 6-10%	Carex nebrascensis	2 = 6-10%
Sparganium spp.	1 = 1-5%		

Comments / Problems: **Remnant wetlands and Dry Fork Creek.**

VEGETATION COMMUNITIES (continued)

Community Number: 9 Community Title (main spp): **Phalaris / Glyceria**

Dominant Species	% Cover	Dominant Species	% Cover
Phalaris arundinacea	3 = 11-20%		
Glyceria spp.	3 = 11-20%		
Beckmannia syzigachne	+ = < 1%		
Agropyron dasystachyum	+ = < 1%		
Alopecurus pratensis	+ = < 1%		

Comments / Problems: **Area dominated by emergent wetlands.**

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)
Achillea millefolium	5	Halogeton glomeratus	8
Agropyron cristatum	6	Hordeum jubatum	4-5, 8
Agropyron dasystachyum	1-5	Hordeum brachyantherum	2
Agropryon repens	5-6	Juncus balticus	8
Agropyron smithii	5	Kochia scoparia	3-6
Agropyron trachycaulum	2, 4	Lactuca serriola	5,6
Agrostis alba	4-6, 8	Lepidium desiflorum	3-5
Alisma plantago-aquatica	2	Lepidium perfoliatum	6
Alopecurus pratensis	3-6, 8	Malva neglecta	5
Amelanchier alnifolia	7	Matricaria perforata	3
Anthemis cotula	5	Medicago spp.	5
Artemisia frigida	5,6	Melilotus officinalis	5
Beckmannia syzigachne	2,9	Phalaris arundinacea	7,8,9
Bromus inermis	5	Phleum pratense	3, 6, 8
Bromus tectorum	6	Poa pratensis	5
Capsella bursa-pastoris	5-6	Polygonum amphibium	4-5
Cardaria chalapensis	5	Polygonum lapathifolium	8
Cardia draba	5,6	Populus trichocarpa	7
Carex lanuginosa	8	Populus deltoides	6
Carex nebrascensis	6, 8	Potentilla fruticosa	2-4
Carex praegracilis	8	Puccinellia cusickii	8
Carex utricularia	8	Ribes spp.	7
Carex vulpinoidea	8	Rumex crispus	5-6
Centaurea maculosa	5	Salix alba	8
Chara spp.	1,2,3,4	Salix amygdaloides	7
Chenopodium album	5	Salix bebbiana	7
Chrysothamnus nauseosus	2, 4	Salix exigua	7
Cichorium intybus	5	Salix lutea	7
Cirsium arvense	3-4	Sarcobatus vermiculatus	5,6
Cirsium vulgare	5,6	Scirpus acutus	2, 3, 8
Crataegus columbiana	8	Scirpus maritimus	2,3
Deschampsia cespitosa	8	Scirpus microcarpus	2,3
Descurainia sophia	5	Sisymbrium altissimum	5
Distichlis spicata	8	Solidago spp.	2,3,7
Eleocharis palustris	2,3,8	Sparganium spp	5
Elymus varnensis	6	Symphoricarpos spp.	5
Festuca spp.	5,6	Thlaspi arvense	5
Glyceria maxima	8	Tragopogon dubois	5,6
Glycyrrhiza lepidota	8	Trifolium repens	5,6
Grindelia squarrosa	8	Typha latifolia	2, 8

Comments / Problems: Ten new species identified during 2009 monitoring including *Agropyron cristatum*, *Alisma plantago-aquatica*, *Beckmannia syzigachne*, *Chara* spp., *Cirsium vulgare*, *Hordeum brachyantherum*, *Salix amygdaloides*, *Scirpus maritimus*, *Sparganium* spp., and *Trifolium repens*.

PLANTED WOODY VEGETATION SURVIVAL

Plant Species	Number Originally Specified	Number of Live Plants Observed	Mortality Cause / Comment
Intercell Swales			
Amelanchier alnifolia	60	0	Number planted unknown. Heat stress.
Crataegus douglasii	45	0	Number planted unknown. Heat stress.
Rosa woodsii	45	0	Number planted unknown. Heat stress.
Total	150	0	
Upland Patches			
Chrysothamnus nauseosus	65	0	Number planted unknown. Heat stress.
Artemisia cana	65	0	Number planted unknown. Possibly substituted Potentilla fruiticosa. Heat stress.
Total	130	0	
Restored Stream Channel			
Ribes aureum	70	1	Number planted unknown. Heat stress.
Crataegus douglasii	60	0	Number planted unknown. Heat stress.
Populus trichocarpa	50	0	Number planted unknown. Heat stress.
Salix amygdaloides	60	6	Number planted unknown. Heat stress.
Salix lasiandra	60	0	Number planted unknown. Heat stress.
Salix exigua, bebbiana, lutea, boothii, geyeriana cuttings	500	278	273 EXI, 2 BEB, 3 LUT. Number planted unknown. Heat stress.
Total	800	285	Estimated survival of planted stock = 1%; cuttings = 57%

Comments / Problems: **Live woody vegetation was only observed along lower Dry Fork Creek during the 2009 monitoring.**

WILDLIFE

Birds

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

Mammals and Herptiles

Mammal and Herptile Species	Number Observed	Indirect Indication of Use			
		Tracks	Scat	Burrows	Other
Deer		☒	☐	☐	
Coyote		☒	☐	☐	
Voles		☐	☐	☒	
		☐	☐	☐	
		☐	☐	☐	
		☐	☐	☐	
		☐	☐	☐	
		☐	☐	☐	

Additional Activities Checklist:
Yes Macroinvertebrate Sampling (if required)

Comments / Problems: Two macroinvertebrate samples were collected in Cells 2 and 4.

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 (°)
1	1	View looking east.	90
1	2	View looking north.	0
2	3	View looking east.	90
3	4	View looking south.	180
4	5	View looking west.	270
5	6	View looking north.	0
6	7	View looking west.	270
7	8	View looking northwest.	315
8	9	View looking northwest.	315
8	10	View looking east.	90
9	11	View looking south.	180
10	12	View looking south.	180
12	13	View looking north.	0
13	14	View looking south.	180
14	15	View looking south.	180
15	16	View looking south.	180

Comments / Problems: **Several new photos points added during 2009.**

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: **Functional Assessment completed using a 2008 methods.**

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: _____

MDT WETLAND MONITORING – VEGETATION TRANSECT

Site: **Lonepine Wetland Mitigation Site** Date: **August 10, 2009** Examiner: **Greg Howard**
Transect Number: **1** Approximate Transect Length: **150 feet** Compass Direction from Start: **285˚** Note: _____

Vegetation Type A: **Type 2 - Scirpus / Beckmannia**	
Length of transect in this type: 150 feet	
Plant Species	**Cover**
Scirpus acutus	3 = 11-20%
Typha latifolia	1 = 1-5%
Beckmannia syzigachne	1 = 1-5%
Scirpus maritimus	1 = 1-5%
Aquatic vegetation	5 = > 50%
Total Vegetative Cover:	75%

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

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

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

MDT WETLAND MONITORING – VEGETATION TRANSECT

Site: **Lonepine Wetland Mitigation Site** Date: **August 10, 2009** Examiner: Greg Howard
Transect Number: **2** Approximate Transect Length: **300 feet** Compass Direction from Start: **260˚** Note: _____

Vegetation Type E: **Type 2 -** Scirpus / Beckmannia	
Length of transect in this type: 140 feet	
Plant Species	**Cover**
Agropyron trachycaulum	1 = 1-5%
Scirpus acutus	1 = 1-5%
Beckmannia syzigachne	4 = 21-50%
Scirpus maritimus	3 = 11-20%
Kochia scoparia	3 = 11-20%
Cirsium arvense	+ = < 1%
Agropyron dasystachyum	+ = < 1%
Total Vegetative Cover:	85%

Vegetation Type F: **Type 4 - Inundated Agropyron / Hordeum**	
Length of transect in this type: 20 feet	
Plant Species	**Cover**
Agropyron trachycaulum	5 = > 50%
Rumex crispus	+ = < 1%
Hordeum jubatum	+ = < 1%
Typha latifolia	+ = < 1%
Scirpus acutus	1 = 1-5%
Beckmannia syzigachne	1 = 1-5%
Total Vegetative Cover:	70%

Vegetation Type G: **Type 2 - Scirpus / Beckmannia**	
Length of transect in this type: 140 feet	
Plant Species	**Cover**
Beckmannia syzigachne	4 = 21-50%
Typha latifolia	3 = 11-20%
Alisma plantago-aquatica	+ = < 1%
Scirpus maritimus	2 = 6-10%
Scirpus acutus	+ = < 1%
Total Vegetative Cover:	70%

Vegetation Type H:	
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): **Cells 1, 2, 3, 4, and 5 are 90%.**

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: _____

BIRD SURVEY – FIELD DATA SHEET

Site: **Lonepine** Date: **8/10/09**
Survey Time: **10:00 am** to **3:30 pm**

Bird Species	#	Behavior	Habitat	Bird Species	#	Behavior	Habitat
Killdeer	10	F	MF UP				
Mallard	5	L	OW				
Brown-headed Cowbird	2	FO	UP MA				
Red-winged Blackbird	10	L	SS UP				

BEHAVIOR CODES
BP = One of a breeding pair
BD = Breeding display
F = Foraging
FO = Flyover
L = Loafing
N = Nesting

HABITAT CODES
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 shore

Weather: **Clear and warm.**

Notes: **Cells 1, 2, 3, 4 and 5 were 90% inundated.**

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

Project / Site: **Lonepine Wetland Mitigation Site**	Date: **August 10, 2009**
Applicant / Owner: **Montana Department of Transportation**	County: **Sanders**
Investigator: **Barry Dutton**	State: **Montana**

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: **Wetland - Herbaceous** Transect ID: **Cell 1** Plot ID: ____

VEGETATION

Dominant Species	Stratum	Indicator	Dominant Species	Stratum	Indicator
1. *Agropyron dasystachyum*	Herb	FACU-	11.		
2. *Scirpus spp.*	Herb	OBL	12.		
3. *Chara spp.*	Aquatic	OBL	13.		
4.			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-): **2** / **3** = **66**%			FAC Neutral: / = %		
Remarks: **Area becoming dominated by hydrophytic vegetation.**					

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 **NO** Saturated in Upper 12 Inches **YES** Water Marks **YES** Drift Lines **NO** Sediment Deposits **NO** Drainage Patterns in Wetland
Field Observations: Depth of Surface Water = **0-24** (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 **NO** FAC-Neutral Test **NO** Other (Explain in Remarks)
Remarks: **Cell 1 is 90% inundated with shallow waters. Shallow water is not deeper than 24 inches.**	

SOILS

Map Unit Name (Series and Phase): **Marklepass, Dry Fork, Whitearth**
Map Symbol: **5B, 112A, 12A** Drainage Class: **all are well drained** Mapped Hydric Inclusion? **Yes**
Taxonomy (Subgroup): **See below.** Field Observations confirm Mapped Type? **No**

Profile Description

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Color(s) (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-12	A	10 YR 4/2	/ /	N/A N/A	
		/	/ /	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
- **NO** 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
- **YES** Other (Explain in Remarks)

Remarks: **All soil types are mapped by the NRCS as "partially hydric". Inundated over 90% in Cell 1; therefore, soils meet NRCS hydric soils criteria #3, "Soils that are frequently ponded for long duration or very long duration during the growing season." Other hydric soil indicators have not developed. Marklepass: Fine, mixed, superactive, frigid Typic Natrixeralfs. Dry Fork: Coarse-silty, mixed, active, frigid Calcic Haploxerepts. Whitearth: fine, silty, mixed, superactive frigid Typic Natrixeralfs.**

WETLAND DETERMINATION

Hydrophytic Vegetation Present? **YES** Wetland Hydrology Present? **YES** Hydric Soils Present? **YES**	Is this Sampling Point within a Wetland? **YES**

Remarks: **Wetland characteristics developed. Wetland soil and hydrology present on 90% of cell due to inundation.**

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

Project / Site: **Lonepine Wetland Mitigation Site**	Date: **August 10, 2009**
Applicant / Owner: **Montana Department of Transportation**	County: **Sanders**
Investigator: **G. Howard**	State: **Montana**

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: **Wetland - Emergent** Transect ID: **Cell 2** Plot ID: ____

VEGETATION

Dominant Species	Stratum	Indicator	Dominant Species	Stratum	Indicator
1. *Scirpus acutus*	Herb	OBL	11.		
2. *Scirpus maritimus*	Herb	OBL	12.		
3. *Beckmannia syzigachne*	Herb	OBL	13.		
4. *Typha latifolia*	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: / = %		
Remarks: **Area dominated by hydrophytic vegetation.**					

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 **NO** Saturated in Upper 12 Inches **YES** Water Marks **YES** Drift Lines **NO** Sediment Deposits **NO** Drainage Patterns in Wetland
Field Observations: Depth of Surface Water = **0-24** (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 **NO** FAC-Neutral Test **NO** Other (Explain in Remarks)
Remarks: **Cell 2 is about 90% inundated. Shallow water is not greater than 24 inches deep.**	

SOILS

Map Unit Name (Series and Phase): **Marklepass, Dry Fork, Whitearth**
Map Symbol: **5B, 112A, 12A** Drainage Class: **all are well drained** Mapped Hydric Inclusion? **Yes**
Taxonomy (Subgroup): _____ Field Observations confirm Mapped Type? **No**

Profile Description

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Color(s) (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-12	A	10 YR 4/2	/ /	N/A N/A	Silty Clay Loam
		/	/ /	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
- **NO** 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
- **YES** Other (Explain in Remarks)

Remarks: **All soil types are mapped as "partially hydric". Inundated over 90% in Cell 2; therefore, soils meet NRCS hydric soils criteria #3, "Soils that are frequently ponded for long duration or very long duration during the growing season." Other hydric soil indicators have not developed. Marklepass: Fine, mixed, superactive, frigid Typic Natrixeralfs. Dry Fork: Coarse-silty, mixed, active, frigid Calcic Haploxerepts. Whitearth: fine, silty, mixed, superactive frigid Typic Natrixeralfs.**

WETLAND DETERMINATION

Hydrophytic Vegetation Present? **YES** Wetland Hydrology Present? **YES** Hydric Soils Present? **YES**	Is this Sampling Point within a Wetland? **YES**

Remarks: **Wetland characteristics developing. Wetland soils and hydrology present on 90% of cell due to inundation.**

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

Project / Site: **Lonepine Wetland Mitigation Site**	Date: **August 10, 2009**
Applicant / Owner: **Montana Department of Transportation**	County: **Sanders**
Investigator: **G. Howard**	State: **Montana**

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: **Wetland - Herbaceous** Transect ID: **Cell 3** Plot ID: ____

VEGETATION

Dominant Species	Stratum	Indicator	Dominant Species	Stratum	Indicator
1. *Scirpus maritimus*	Herb	OBL	11.		
2. *Beckmannia syzigachne*	Herb	OBL	12.		
3. *Scirpus acutus*	Herb	OBL	13.		
4. *Eleocharis palustris*	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: / = %		
Remarks: **Area dominated by hydrophytic vegetation.**					

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 **NO** Saturated in Upper 12 Inches **YES** Water Marks **YES** Drift Lines **NO** Sediment Deposits **NO** Drainage Patterns in Wetland
Field Observations: Depth of Surface Water = **0-24** (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 **NO** FAC-Neutral Test **NO** Other (Explain in Remarks)
Remarks: **Cell 3 is about 90% inundated. Shallow water is not greater than 24 inches deep.**	

SOILS

Map Unit Name (Series and Phase): **Marklepass, Dry Fork, Whitearth**
Map Symbol: **5B, 112A, 12A** Drainage Class: **all are well drained** Mapped Hydric Inclusion? **Yes**
Taxonomy (Subgroup): _____ Field Observations confirm Mapped Type? **No**

Profile Description

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Color(s) (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-12	A	10 YR 4/3	/ /	N/A N/A	
		/	/ /	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
- **NO** 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
- **YES** Other (Explain in Remarks)

Remarks: **All soil types are mapped as "partially hydric". Inundated over 90% in Cell 3; therefore, soils meet NRCS hydric soils criteria #3, "Soils that are frequently ponded for long duration or very long duration during the growing season." Other hydric soil indicators have not developed. Marklepass: Fine, mixed, superactive, frigid Typic Natrixeralfs. Dry Fork: Coarse-silty, mixed, active, frigid Calcic Haploxerepts. Whitearth: fine, silty, mixed, superactive frigid Typic Natrixeralfs.**

WETLAND DETERMINATION

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

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

Remarks: **Wetland characteristics developing. Wetland soils and hydrology present on 90% of cell due to inundation.**

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

Project / Site: **Lonepine Wetland Mitigation Site**	Date: **August 10, 2009**
Applicant / Owner: **Montana Department of Transportation**	County: **Sanders**
Investigator: **G. Howard**	State: **Montana**

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: **Wetland - Herbaceous** Transect ID: **Cell 4** Plot ID: ____

VEGETATION

Dominant Species	Stratum	Indicator	Dominant Species	Stratum	Indicator
1. *Agropyron dasystachyum*	Herb	FACU-	11.		
2. *Typha latifolia*	Herb	OBL	12.		
3. *Scirpus maritimus*	Herb	OBL	13.		
4. *Alopecurus pratensis*	Herb	FACW	14.		
5. *Polygonum amphibium*	Herb	OBL	15.		
6.			16.		
7.			17.		
8.			18.		
9.			19.		
10.			20.		
Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-): **4** / **5** = **80**%			FAC Neutral: / = %		
Remarks: **Area dominanted by hydrophytic species.**					

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 **NO** Saturated in Upper 12 Inches **YES** Water Marks **YES** Drift Lines **NO** Sediment Deposits **NO** Drainage Patterns in Wetland
Field Observations: Depth of Surface Water = **0-24** (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 **NO** FAC-Neutral Test **NO** Other (Explain in Remarks)
Remarks: **Cell 4 is about 90% inundated. Shallow water is not greater than 24 inches deep.**	

SOILS

Map Unit Name (Series and Phase): **Marklepass, Dry Fork, Whitearth**
Map Symbol: **5B, 112A, 12A** Drainage Class: **all are well drained** Mapped Hydric Inclusion? **Yes**
Taxonomy (Subgroup): _____ Field Observations confirm Mapped Type? **No**

Profile Description

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Color(s) (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-12	A	10 YR 4/2	/ /	N/A N/A	
		/	/ /	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
- **NO** 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
- **YES** Other (Explain in Remarks)

Remarks: **All soil types are mapped as "partially hydric". Inundated over 90% in Cell 4; therefore, soils meet NRCS hydric soils criteria #3, "Soils that are frequently ponded for long duration or very long duration during the growing season." Other hydric soil indicators have not developed. Marklepass: Fine, mixed, superactive, frigid Typic Natrixeralfs. Dry Fork: Coarse-silty, mixed, active, frigid Calcic Haploxerepts. Whitearth: fine, silty, mixed, superactive frigid Typic Natrixeralfs.**

WETLAND DETERMINATION

Hydrophytic Vegetation Present? **YES** Wetland Hydrology Present? **YES** Hydric Soils Present? **YES**	Is this Sampling Point within a Wetland? **YES**

Remarks: **Wetland characteristics developing. Wetland soils and hydrology present on 90% of cell due to inundation.**

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

Project / Site: **Lonepine Wetland Mitigation Site**	Date: **August 10, 2009**
Applicant / Owner: **Montana Department of Transportation**	County: **Sanders**
Investigator: **G. Howard**	State: **Montana**

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: **Wetland - Herbaceous** Transect ID: **Cell 5** Plot ID: ____

VEGETATION

Dominant Species	Stratum	Indicator	Dominant Species	Stratum	Indicator
1. *Agropyron dasystachyum*	Herb	FACU-	11.		
2. *Typha latifolia*	Herb	OBL	12.		
3. *Scirpus maritimus*	Herb	OBL	13.		
4. *Alopecurus pratensis*	Herb	FACW	14.		
5. *Polygonum amphibium*	Herb	OBL	15.		
6.			16.		
7.			17.		
8.			18.		
9.			19.		
10.			20.		
Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-): **4** / **5** = **80**%			FAC Neutral: / = %		
Remarks: **Area dominanted by hydrophytic vegetation.**					

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 **NO** Saturated in Upper 12 Inches **YES** Water Marks **YES** Drift Lines **NO** Sediment Deposits **NO** Drainage Patterns in Wetland
Field Observations: Depth of Surface Water = **0-12** (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 **NO** FAC-Neutral Test **NO** Other (Explain in Remarks)
Remarks: **Cell 5 is about 90% inundated. Shallow water is not greater than 24 inches deep.**	

SOILS

Map Unit Name (Series and Phase): **Marklepass, Dry Fork, Whitearth**
Map Symbol: **5B, 112A, 12A** Drainage Class: **all are well drained** Mapped Hydric Inclusion? **Yes**
Taxonomy (Subgroup): **See below.** Field Observations confirm Mapped Type? **No**

Profile Description

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Color(s) (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-12	A	10 YR 4/2	/ /	N/A N/A	
		/	/ /	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
- **NO** 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
- **YES** Other (Explain in Remarks)

Remarks: **All soil types are mapped as "partially hydric". Inundated over 90% in Cell 5; therefore, soils meet NRCS hydric soils criteria #3, "Soils that are frequently ponded for long duration or very long duration during the growing season." Marklepass: Fine, mixed, superactive, frigid Typic Natrixeralfs. Dry Fork: Coarse-silty, mixed, active, frigid Calcic Haploxerepts. Whitearth: fine, silty, mixed, superactive frigid Typic Natrixeralfs.**

WETLAND DETERMINATION

Hydrophytic Vegetation Present? **YES** Wetland Hydrology Present? **YES** Hydric Soils Present? **YES**	Is this Sampling Point within a Wetland? **YES**

Remarks: **Wetland characteristics developing with areas of emergent vegetation. Wetland soils and hydrology present on 100% of cell due to inundation.**

MDT MONTANA WETLAND ASSESSMENT FORM (revised March 2008)

1. Project Name: Lonepine Wetland Mitigation **2. MDT Project #:** STPX (45)33 **3. Control #:** 4729

3. Evaluation Date: 8/10/2009 **4. Evaluator(s):** G. Howard **5. Wetland/Site #(s):** Lonepine Mitigation Dry Fork Creek

6. Wetland Location(s): Township 22 N, Range 24 W, Section 3; Township ___N, Range ___E, Section _____

Approximate Stationing or Roadposts: East of Lonepine, below Lower Dry Fork Reservoir

Watershed: 3 - Lower Clark Fork **County:** _ _ Sanders _____

7. Evaluating Agency: MDT

Purpose of Evaluation:

- ☐ **Wetland potentially affected by MDT project**
- ☐ **Mitigation wetlands; pre-construction**
- ☒ **Mitigation wetlands; post-construction**
- ☐ **Other** _____

8. Wetland Size (acre): 7.64 (visually estimated)
_____ (measured, e.g. GPS)

9. Assessment Area (AA) Size (acre): _____ (visually estimated)
(see manual for determining AA) 7.64 (measured, e.g. GPS)

10. CLASSIFICATION OF WETLAND AND AQUATIC HABITATS IN AA (See manual for definitions.)

HGM Class (Brinson)	Class (Cowardin)	Modifier (Cowardin)	Water Regime	% OF AA
Riverine	Unconsolidated Bottom		Seasonal / Intermittent	40
Riverine	Emergent Wetland		Seasonal / Intermittent	55
Riverine	Scrub-Shrub Wetland		Seasonal / Intermittent	5

Comments: SS component very minor at this time

11. ESTIMATED RELATIVE ABUNDANCE (of similarly classified sites within the same Major Montana Watershed Basin; see manual.)
common

12. GENERAL CONDITION OF AA

i. Disturbance: Use matrix below to select the appropriate response; see manual for Montana listed noxious weed and aquatic nuisance vegetation species lists.

Conditions within AA	Predominant Conditions Adjacent to (within 500 feet of) AA		
	Managed in predominantly natural state; is not grazed, hayed, logged, or otherwise converted; does not contain roads or buildings; and noxious weed or ANVS cover is ≤15%.	Land not cultivated, but may be moderately grazed or hayed or selectively logged; or has been subject to minor clearing; contains few roads or buildings; noxious weed or ANVS cover is ≤30%.	Land cultivated or heavily grazed or logged; subject to substantial fill placement, grading, clearing, or hydrological alteration; high road or building density; or noxious weed or ANVS cover is >30%.
AA occurs and is managed in predominantly natural state; is not grazed, hayed, logged, or otherwise converted; does not contain roads or occupied buildings; and noxious weed or ANVS cover is ≤15%.	---	low disturbance	---
AA not cultivated, but may be moderately grazed or hayed or selectively logged; or has been subject to relatively minor clearing, fill placement, or hydrological alteration; contains few roads or buildings; noxious weed or ANVS cover is ≤30%.	---	---	---
AA cultivated or heavily grazed or logged; subject to relatively substantial fill placement, grading, clearing, or hydrological alteration; high road or building density; or noxious weed or ANVS cover is >30%.	---	---	---

Comments (types of disturbance, intensity, season, etc.)**:** Adjacent lands subject to livestock grazing and cultivation

ii. Prominent noxious, aquatic nuisance, and other exotic vegetation species: CIR ARV, CAR DRA present in small amounts, as is KOC SCO.

iii. Provide brief descriptive summary of AA and surrounding land use/habitat: AA includes pre-existing wetlands associated with Dry Fork Creek including the re-activated meander loop (SS area) (7.13 ac) and adjacent excavated wetlands (0.35 ac) and the new creek section along the dam face (0.16 ac).

13. STRUCTURAL DIVERSITY (Based on number of "Cowardin" ***vegetated*** classes present [do not include unvegetated classes]; see #10 above.)

Existing # of "Cowardin" Vegetated Classes in AA	Initial Rating	Is current management preventing (passive) existence of additional vegetated classes?		Modified Rating
≥3 (or 2 if one is forested) classes	---	NA	NA	NA
2 (or 1 if forested) classes	mod	NA	NA	NA
1 class, but not a monoculture	---	←NO	YES→	---
1 class, monoculture (1 species comprises ≥90% of total cover)	---	NA	NA	NA

Comments: SS component is very minor at this time - species sprigged in 2008.

Wetland/Site #(s): Lonepine Wetland Dry Fork Creek

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

i. AA is Documented (D) or Suspected (S) to contain: Check box based on definitions in manual.

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

ii. Rating: Based on the strongest habitat chosen in 14A(i) above, select the corresponding functional point and rating.

Highest Habitat Level	Doc/Primary	Sus/Primary	Doc/Secondary	Sus/Secondary	Doc/Incidental	Sus/Incidental	None
Functional Point/Rating	---	---	---	---	---	---	0L

Sources for documented use (e.g. observations, records): _____

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

i. AA is Documented (D) or Suspected (S) to contain: Check box based on definitions in manual.

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

ii. Rating: Based on the strongest habitat chosen in 14A(i) above, select the corresponding functional point and rating.

Highest Habitat Level	Doc/Primary	Sus/Primary	Doc/Secondary	Sus/Secondary	Doc/Incidental	Sus/Incidental	None
S1 Species Functional Point/Rating	---	---	---	---	---	---	---
S2 and S3 Species Functional Point/Rating	---	---	.6M	---	---	---	---

Sources for documented use (e.g. observations, records): Nest on Lower DF Reservoir; observed foraging at mitigation site 2008 and 2009.

14C. GENERAL WILDLIFE HABITAT RATING

i. Evidence of Overall Wildlife Use in the AA: Check substantial, moderate, or low based on supporting evidence.

☐ ***Substantial:*** Based on any of the following [check].
- ☐ 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
- ☐ interview with local biologist with knowledge of the AA

☐ ***Minimal:*** Based on any of the following [check].
- ☐ few or no wildlife observations during peak use periods
- ☐ little to no wildlife sign
- ☐ sparse adjacent upland food sources
- ☐ interview with local biologist with knowledge of AA

☒ ***Moderate:*** Based on any of the following [check].
- ☒ 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
- ☐ interview with local biologist with knowledge of the AA

ii. Wildlife Habitat Features: Working from top to bottom, check appropriate AA attributes in matrix to arrive at rating. Structural diversity is from #13. For class cover to be considered evenly distributed, the most and least prevalent **vegetated** classes must be within 20% of each other in terms of their percent composition of the AA (see #10). Abbreviations for surface water durations are as follows: P/P = permanent/perennial; S/I = seasonal/intermittent; T/E = temporary/ephemeral; and A = absent [see manual for further definitions of these terms].

Structural Diversity (see #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 #12i)	---	---	---	---	---	---	---	---	---	---	---	---	---	H	---	---	---	---	---	---
☐ **Moderate Disturbance** at AA (see #12i)	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
☐ **High Disturbance** at AA (see #12i)	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

iii. Rating: Use the conclusions from i and ii above and the matrix below to select the functional point and rating.

Evidence of Wildlife Use (i)	**Wildlife Habitat Features Rating (ii)**			
	☐ **Exceptional**	☒ **High**	☐ **Moderate**	☐ **Low**
☐ **Substantial**	---	---	---	---
☒ **Moderate**	---	.7M	---	---
☐ **Minimal**	---	---	---	---

Comments: Use expected to increase as nearby created wetlands develop.

Wetland/Site #(s): Lonepine Wetland Dry Fork Creek

14D. GENERAL FISH HABITAT ☐ **NA** (proceed to 14E)

If the AA is not used by fish, fish use is not restorable due to habitat constraints, or is not desired from a management perspective [such as fish entrapped in a canal], then check the NA box and proceed to 14E.

Assess this function if the AA is used by fish or the existing situation is "correctable" such that the AA could be used by fish [i.e., fish use is precluded by perched culvert or other barrier].

Type of Fishery: ☐ Cold Water (**CW**) ☒ Warm Water (**WW**) **Use the CW or WW guidelines in the manual to complete the matrix.**

i. Habitat Quality and Known / Suspected Fish Species in AA: Use matrix to select the functional point and rating.

Duration of Surface Water in AA	☐ **Permanent / Perennial**						☒ **Seasonal / Intermittent**						☐ **Temporary / Ephemeral**					
Aquatic Hiding / Resting / Escape Cover	☐ **Optimal**		☐ **Adequate**		☐ **Poor**		☐ **Optimal**		☒ **Adequate**		☐ **Poor**		☐ **Optimal**		☐ **Adequate**		☐ **Poor**	
Thermal Cover: optimal / suboptimal	**O**	**S**	**O**	**S**	**O**	**S**	**O**	**S**	**O**	**S**	**O**	**S**	**O**	**S**	**O**	**S**	**O**	**S**
FWP Tier I fish species	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
FWP Tier II or **Native Game** fish species	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
FWP Tier III or **Introduced Game** fish	---	---	---	---	---	---	---	---	.5M	---	---	---	---	---	---	---	---	---
FWP Non-Game Tier IV or **No** fish species	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Sources used for identifying fish spp. potentially found in AA: Northern Pike known to occasionally use DFC - CSKT Fisheries

ii. Modified Rating: NOTE: Modified score cannot exceed 1.0 or be less than 0.1.

a) Is fish use of the AA significantly reduced by a culvert, dike, or other man-made structure or activity, ***or*** *is the waterbody included on the current final MDEQ list of waterbodies in need of TMDL development with listed "Probable Impaired Uses" including cold or warm water fishery or aquatic life support,* ***or*** *do aquatic nuisance plant or animal species (see* ***Appendix E****) occur in fish habitat?* ☒ **YES**, reduce score in **i** by 0.1 = 0.40 or ☐ **N0**

b) Does the AA contain a documented spawning area or other critical habitat feature (i.e., sanctuary pool, upwelling area; specify in comments) for native fish or introduced game fish? ☐ **YES**, add to score in **i** or **iia** 0.1 = __ or ☒ **N0**

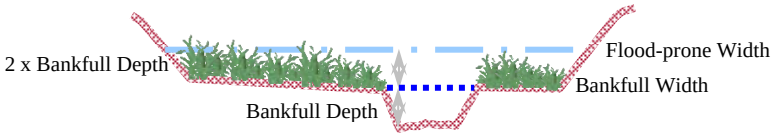
iii. Final Score and Rating: .4M **Comments:** Dam precludes natural migration / use.

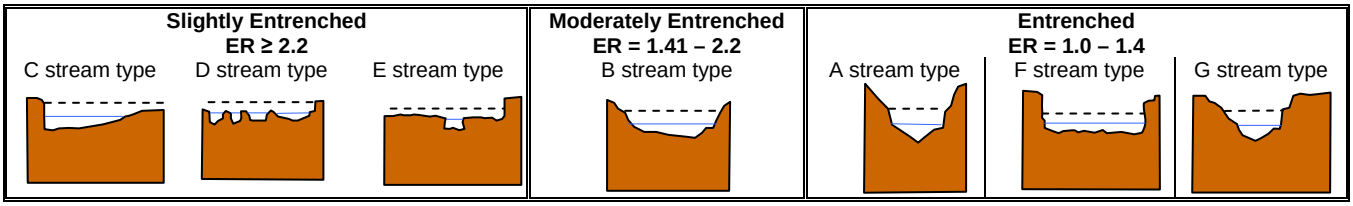
14E. FLOOD ATTENUATION ☐ **NA** (proceed to 14F)

Applies only to wetlands that are subject to flooding via in-channel or overbank flow.
If wetlands in AA are not flooded from in-channel or overbank flow, check the NA box and proceed to 14F.

Entrenchment Ratio (ER) Estimation (see manual for additional guidance). Entrenchment ratio = (flood-prone width) / (bankfull width).
Flood-prone width = estimated horizontal projection of where 2 X maximum bankfull depth elevation intersects the floodplain on each side of the stream.

_____ / _____ = _____
flood prone width / bankfull width = entrenchment ratio





i. Rating: Working from top to bottom, use the matrix below to select the functional point and rating.

Estimated or Calculated Entrenchment (Rosgen 1994, 1996)	☒ Slightly Entrenched C, D, E stream types			☐ Moderately Entrenched B stream type			☐ Entrenched A, F, G stream types		
Percent of Flooded Wetland Classified as Forested and/or Scrub/Shrub	☐ 75%	☐ 25-75%	☒ <25%	☐ 75%	☐ 25-75%	☐ <25%	☐ 75%	☐ 25-75%	☐ <25%
AA contains **no outlet or restricted outlet**	---	---	.6M	---	---	---	---	---	---
AA contains **unrestricted outlet**	---	---	---	---	---	---	---	---	---

ii. Are ≥10 acres of wetland in the AA subject to flooding AND are man-made features which may be significantly damaged by floods located within 0.5 mile downstream of the AA? ☐ YES ☒ NO **Comments:** Creek is sourced by LDF Reservoir.

Wetland/Site #(s): Lonepine Wetland Dry Fork Creek

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 the NA box and proceed to 14G.

i. Rating: Working from top to bottom, use the matrix below to select the functional point and rating. Abbreviations for surface water durations are as follows: P/P = permanent/perennial; S/I = seasonal/intermittent; and T/E = temporary/ephemeral [see manual for further definitions of these terms].

Estimated Maximum Acre Feet of Water Contained in Wetlands within the AA that are Subject to Periodic Flooding or Ponding	☐ **>5 acre feet**			☒ **1.1 to 5 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**	---	---	---	---	.6M	---	---	---	---
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 wetland with potential to receive 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 the NA box and proceed to 14H.

i. Rating: Working from top to bottom, use the matrix below to select the functional point and rating.

Sediment, Nutrient, and Toxicant Input Levels within AA	**AA receives or surrounding land use has potential to deliver sediments, nutrients, or compounds at levels such that other functions are not substantially impaired. Minor sedimentation, sources of nutrients or toxicants, or signs of eutrophication present.**				**Waterbody is 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 / Ponding in AA	☐ **Yes**	☐ **No**	☒ **Yes**	☐ **No**	☐ **Yes**	☐ **No**	☐ **Yes**	☐ **No**
AA contains **no or restricted outlet**	---	---	.7M	---	---	---	---	---
AA contains **unrestricted outlet**	---	---	---	---	---	---	---	---

Comments: _____

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

Applies only if AA occurs on or within the banks of a river, stream, or other natural or man-made drainage, or on the shoreline of a standing water body which is subject to wave action.
If 14H does not apply, check the NA box and proceed to 14I.

% Cover of Wetland Streambank or Shoreline by Species with Stability Ratings of ≥6 (see Appendix F).	**Duration of Surface Water Adjacent to Rooted Vegetation**		
	☐ **Permanent / Perennial**	☒ **Seasonal / Intermittent**	☐ **Temporary / Ephemeral**
☐ **≥ 65%**	---	---	---
☒ **35-64%**	---	.6M	---
☐ **< 35%**	---	---	---

Comments: _____

14I. PRODUCTION EXPORT / FOOD CHAIN SUPPORT

i. Level of Biological Activity: Synthesis of wildlife and fish habitat rates (select).

General Fish Habitat Rating (14Diii)	**General Wildlife Habitat Rating (14Ciii)**		
	☐ **E/H**	☒ **M**	☐ **L**
☐ **E/H**	---	---	---
☒ **M**	---	M	---
☐ **L**	---	---	---
☐ **NA**	---	---	---

ii. Rating: Working from top to bottom, use the matrix below to select the functional point and rating. Factor A = acreage of vegetated wetland component in the AA; Factor B = level of biological activity rating from above (14Ii); Factor C = whether or not the AA contains a surface or subsurface outlet; the final three rows pertain to the duration of surface water in the AA, where P/P, S/I, and T/E were previously defined, and A = "absent" [see manual for further definitions of these terms].

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	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**
P/P	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
S/I	---	---	.7M	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
T/E/A	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Wetland/Site #(s): Lonepine Wetland Dry Fork Creek

14I. PRODUCTION EXPORT / FOOD CHAIN SUPPORT (continued)

iii. Modified Rating: Note: Modified score cannot exceed 1.0 or be less than 0.1.

Vegetated Upland Buffer: Area with ≥ 30% plant cover, ≤ 15% noxious weed or ANVS cover, AND that is not subjected to periodic mechanical mowing or clearing (unless for weed control).
Is there an average ≥ 50-foot wide vegetated upland buffer around ≥ 75% of the AA's perimeter? ☒ **YES**, add 0.1 to score in **ii** = 0.80 ☐ **NO**

iv. Final Score and Rating: .8H **Comments:** _____

14J. GROUNDWATER DISCHARGE / RECHARGE
Check the appropriate indicators in i and ii below.

i. Discharge Indicators
- ☐ The AA is a slope wetland.
- ☐ Springs or seeps 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.
- ☐ Shallow water table and the site is saturated to the surface.
- ☒ Other: Occurs below major dam

ii. Recharge Indicators
- ☐ Permeable substrate present without underlying impeding layer.
- ☐ Wetland contains inlet but no outlet.
- ☐ Stream is a known 'losing' stream. Discharge volume decreases.
- ☐ Other: _____

iii. Rating: Use the information from i and ii above and the table below to select the functional point and rating.

Criteria	Duration of Saturation at AA Wetlands ***FROM GROUNDWATER DISCHARGE*** or ***WITH WATER THAT IS RECHARGING THE GROUNDWATER SYSTEM*** ☐ P/P	☒ S/I	☐ T	☐ None
☒ **Groundwater Discharge or Recharge**	---	.7M	---	---
☐ **Insufficient Data/Information**	---			

Comments: Occurs at base of dam and likely receives seepage.

14K. UNIQUENESS

i. Rating: Working from top to bottom, use the matrix below to select the functional point and rating.

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 (#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 ☐ NA (proceed to Overall Summary and Rating page)
Affords 'bonus' points if AA provides a recreational or educational opportunity.

i. Is the AA a known or potential recreational or educational site? ☒ **YES**, go to ii. ☐ **NO**, check the NA box.

ii. Check categories that apply to the AA: ☒ Educational/Scientific Study ☒ Consumptive Recreational ☒ Non-consumptive recreational
☐ Other: _____

iii. Rating: Use the matrix below to select the functional point and rating.

Known or Potential Recreational or Educational Area	Known	Potential
Public ownership or public easement with general public access (no permission required)	---	---
Private ownership with general public access (no permission required)	---	.1M
Private or public ownership without general public access, or requiring permission for public access	---	---

Comments: _____

15. GENERAL SITE NOTES: Hunting, Birdwatching

Wetland/Site #(s): Lonepine Wetland Dry Fork Creek

Function & Value Variables	Rating – Actual Functional Points	Possible Functional Points	Functional Units: Actual Points x Estimated AA Acreage	Indicate the Four Most Prominent Functions with an Asterisk
A. Listed / Proposed T&E Species Habitat	low 0.00	1.00		
B. MT Natural Heritage Program Species Habitat	mod 0.60	1.00		
C. General Wildlife Habitat	mod 0.70	1.00		
D. General Fish Habitat	mod 0.40	1.00		
E. Flood Attenuation	mod 0.60	1.00		
F. Short and Long Term Surface Water Storage	mod 0.60	1.00		
G. Sediment / Nutrient / Toxicant Removal	mod 0.70	1.00		
H. Sediment / Shoreline Stabilization	mod 0.60	1.00		
I. Production Export / Food Chain Support	high 0.80	1.00		
J. Groundwater Discharge / Recharge	mod 0.70	1.00		
K. Uniqueness	mod 0.40	1.00		
L. Recreation / Education Potential (bonus point)	mod 0.10			
Total Points	**6.2**	**11**	**Total Functional Units**	
Percent of Possible Score 56% (round to nearest whole number)				

Category I Wetland: (must satisfy **one** of the following criteria; otherwise go 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 possible score > 80% (round to nearest whole #).

Category II Wetland: (Criteria for Category I not satisfied **and** meets any **one** of the following criteria; otherwise go to Category IV)
- ☐ Score of 1 functional point for MT Natural Heritage Program Species Habitat; **or**
- ☐ Score of .9 or 1 functional point for General Wildlife Habitat; **or**
- ☐ Score of .9 or 1 functional point for General Fish 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 possible score > 65% (round to nearest whole #).

☒ **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 go to Category III)
- ☐ "Low" rating for Uniqueness; **and**
- ☐ Vegetated wetland component < 1 acre (do not include upland vegetated buffer); **and**
- ☐ Percent of possible score < 35% (round to nearest whole #).

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

☐ **I** ☐ **II** ☒ **III** ☐ **IV**

MDT MONTANA WETLAND ASSESSMENT FORM (revised March 2008)

1. Project Name: Lonepine Wetland Mitigation **2. MDT Project #:** STPX (45)33 **3. Control #:** 4729

3. Evaluation Date: 8/10/2009 **4. Evaluator(s):** G. Howard **5. Wetland/Site #(s):** Lonepine Mitigation - Cells1-5

6. Wetland Location(s): Township 22 N, Range 24 W, Section 3; Township ___N, Range ___E, Section _____

Approximate Stationing or Roadposts: East of Lonepine, below Lower Dry Fork Reservoir

Watershed: 3 - Lower Clark Fork **County:** _ _ Sanders _____

7. Evaluating Agency: MDT

Purpose of Evaluation:

- ☐ **Wetland potentially affected by MDT project**
- ☐ **Mitigation wetlands; pre-construction**
- ☒ **Mitigation wetlands; post-construction**
- ☐ **Other** _____

8. Wetland Size (acre): _____ (visually estimated)
21.23 (measured, e.g. GPS)

9. Assessment Area (AA) Size (acre): _____ (visually estimated)
(see manual for determining AA) 21.23 (measured, e.g. GPS)

10. CLASSIFICATION OF WETLAND AND AQUATIC HABITATS IN AA (See manual for definitions.)

HGM Class (Brinson)	Class (Cowardin)	Modifier (Cowardin)	Water Regime	% OF AA
Depressional	Unconsolidated Bottom	Impounded	Seasonal / Intermittent	20
Depressional	Emergent Wetland	Impounded	Seasonal / Intermittent	60
Depressional	Aquatic Bed	Impounded	Seasonal / Intermittent	20

Comments: AA dominated by emergent wetlands.

11. ESTIMATED RELATIVE ABUNDANCE (of similarly classified sites within the same Major Montana Watershed Basin; see manual.)
common

12. GENERAL CONDITION OF AA

i. Disturbance: Use matrix below to select the appropriate response; see manual for Montana listed noxious weed and aquatic nuisance vegetation species lists.

Conditions within AA	Predominant Conditions Adjacent to (within 500 feet of) AA		
	Managed in predominantly natural state; is not grazed, hayed, logged, or otherwise converted; does not contain roads or buildings; and noxious weed or ANVS cover is ≤15%.	Land not cultivated, but may be moderately grazed or hayed or selectively logged; or has been subject to minor clearing; contains few roads or buildings; noxious weed or ANVS cover is ≤30%.	Land cultivated or heavily grazed or logged; subject to substantial fill placement, grading, clearing, or hydrological alteration; high road or building density; or noxious weed or ANVS cover is >30%.
AA occurs and is managed in predominantly natural state; is not grazed, hayed, logged, or otherwise converted; does not contain roads or occupied buildings; and noxious weed or ANVS cover is ≤15%.	---	low disturbance	---
AA not cultivated, but may be moderately grazed or hayed or selectively logged; or has been subject to relatively minor clearing, fill placement, or hydrological alteration; contains few roads or buildings; noxious weed or ANVS cover is ≤30%.	---	---	---
AA cultivated or heavily grazed or logged; subject to relatively substantial fill placement, grading, clearing, or hydrological alteration; high road or building density; or noxious weed or ANVS cover is >30%.	---	---	---

Comments (types of disturbance, intensity, season, etc.)**:** Adjacent lands subject to livestock grazing and cultivation

ii. Prominent noxious, aquatic nuisance, and other exotic vegetation species: Cirsium arvense, Centaurea maculosa, Cardia draba and Kochia scoparia.

iii. Provide brief descriptive summary of AA and surrounding land use/habitat: AA includes five cells that have shallow surface water inundation dominated by emergent vegetation.

13. STRUCTURAL DIVERSITY (Based on number of "Cowardin" ***vegetated*** classes present [do not include unvegetated classes]; see #10 above.)

Existing # of "Cowardin" Vegetated Classes in AA	Initial Rating	Is current management preventing (passive) existence of additional vegetated classes?		Modified Rating
≥3 (or 2 if one is forested) classes	---	NA	NA	NA
2 (or 1 if forested) classes	mod	NA	NA	NA
1 class, but not a monoculture	---	←NO	YES→	---
1 class, monoculture (1 species comprises ≥90% of total cover)	---	NA	NA	NA

Comments: Wetland vegetation component includes emergent and aquatic bed.

Wetland/Site #(s): Lonepine Wetland Cells 1-5

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

i. AA is Documented (D) or Suspected (S) to contain: Check box based on definitions in manual.

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

ii. Rating: Based on the strongest habitat chosen in 14A(i) above, select the corresponding functional point and rating.

Highest Habitat Level	Doc/Primary	Sus/Primary	Doc/Secondary	Sus/Secondary	Doc/Incidental	Sus/Incidental	None
Functional Point/Rating	---	---	---	---	---	---	0L

Sources for documented use (e.g. observations, records): _____

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

i. AA is Documented (D) or Suspected (S) to contain: Check box based on definitions in manual.

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

ii. Rating: Based on the strongest habitat chosen in 14A(i) above, select the corresponding functional point and rating.

Highest Habitat Level	Doc/Primary	Sus/Primary	Doc/Secondary	Sus/Secondary	Doc/Incidental	Sus/Incidental	None
S1 Species Functional Point/Rating	---	---	---	---	---	---	---
S2 and S3 Species Functional Point/Rating	---	---	.6M	---	---	---	---

Sources for documented use (e.g. observations, records): Nest on Lower DF Reservoir; observed foraging at mitigation site 2008 and 2009.

14C. GENERAL WILDLIFE HABITAT RATING

i. Evidence of Overall Wildlife Use in the AA: Check substantial, moderate, or low based on supporting evidence.

☐ ***Substantial:*** Based on any of the following [check].
- ☐ 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
- ☐ interview with local biologist with knowledge of the AA

☐ ***Minimal:*** Based on any of the following [check].
- ☐ few or no wildlife observations during peak use periods
- ☐ little to no wildlife sign
- ☐ sparse adjacent upland food sources
- ☐ interview with local biologist with knowledge of AA

☒ ***Moderate:*** Based on any of the following [check].
- ☒ 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
- ☐ interview with local biologist with knowledge of the AA

ii. Wildlife Habitat Features: Working from top to bottom, check appropriate AA attributes in matrix to arrive at rating. Structural diversity is from #13. For class cover to be considered evenly distributed, the most and least prevalent **vegetated** classes must be within 20% of each other in terms of their percent composition of the AA (see #10). Abbreviations for surface water durations are as follows: P/P = permanent/perennial; S/I = seasonal/intermittent; T/E = temporary/ephemeral; and A = absent [see manual for further definitions of these terms].

Structural Diversity (see #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 #12i)	---	---	---	---	---	---	---	---	---	H	---	---	---	---	---	---	---	---	---	---
☐ **Moderate Disturbance** at AA (see #12i)	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
☐ **High Disturbance** at AA (see #12i)	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

iii. Rating: Use the conclusions from i and ii above and the matrix below to select the functional point and rating.

Evidence of Wildlife Use (i)	**Wildlife Habitat Features Rating (ii)**			
	☐ **Exceptional**	☒ **High**	☐ **Moderate**	☐ **Low**
☐ **Substantial**	---	---	---	---
☒ **Moderate**	---	.7M	---	---
☐ **Minimal**	---	---	---	---

Comments: Use expected to increase as created wetlands develop.

Wetland/Site #(s): Lonepine Wetland Cells 1-5

14D. GENERAL FISH HABITAT ☒ **NA** (proceed to 14E)

If the AA is not used by fish, fish use is not restorable due to habitat constraints, or is not desired from a management perspective [such as fish entrapped in a canal], then check the NA box and proceed to 14E.

Assess this function if the AA is used by fish or the existing situation is "correctable" such that the AA could be used by fish [i.e., fish use is precluded by perched culvert or other barrier].

Type of Fishery: ☐ Cold Water (**CW**) ☐ Warm Water (**WW**) **Use the CW or WW guidelines in the manual to complete the matrix.**

i. Habitat Quality and Known / Suspected Fish Species in AA: Use matrix to select the functional point and rating.

Duration of Surface Water in AA	☐ **Permanent / Perennial**						☐ **Seasonal / Intermittent**						☐ **Temporary / Ephemeral**					
Aquatic Hiding / Resting / Escape Cover	☐ **Optimal**		☐ **Adequate**		☐ **Poor**		☐ **Optimal**		☐ **Adequate**		☐ **Poor**		☐ **Optimal**		☐ **Adequate**		☐ **Poor**	
Thermal Cover: optimal / suboptimal	**O**	**S**	**O**	**S**	**O**	**S**	**O**	**S**	**O**	**S**	**O**	**S**	**O**	**S**	**O**	**S**	**O**	**S**
FWP Tier I fish species	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
FWP Tier II or **Native Game** fish species	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
FWP Tier III or **Introduced Game** fish	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
FWP Non-Game Tier IV or **No** fish species	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Sources used for identifying fish spp. potentially found in AA: _____

ii. Modified Rating: NOTE: Modified score cannot exceed 1.0 or be less than 0.1.

a) Is fish use of the AA significantly reduced by a culvert, dike, or other man-made structure or activity, ***or*** *is the waterbody included on the current final MDEQ list of waterbodies in need of TMDL development with listed "Probable Impaired Uses" including cold or warm water fishery or aquatic life support,* ***or*** *do aquatic nuisance plant or animal species (see* ***Appendix E****) occur in fish habitat?* ☐ **YES**, reduce score in **i** by 0.1 = __ or ☐ **N0**

b) Does the AA contain a documented spawning area or other critical habitat feature (i.e., sanctuary pool, upwelling area; specify in comments) for native fish or introduced game fish? ☐ **YES**, add to score in **i** or **iia** 0.1 = __ or ☐ **N0**

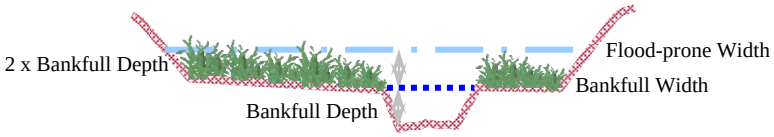
iii. Final Score and Rating: _ **Comments:** Fish use / habitat not intended to result from cell creation.

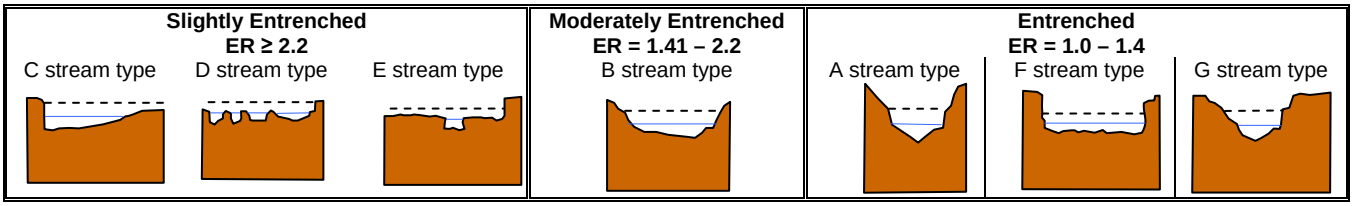
14E. FLOOD ATTENUATION ☒ **NA** (proceed to 14F)

Applies only to wetlands that are subject to flooding via in-channel or overbank flow.
If wetlands in AA are not flooded from in-channel or overbank flow, check the NA box and proceed to 14F.

Entrenchment Ratio (ER) Estimation (see manual for additional guidance). Entrenchment ratio = (flood-prone width) / (bankfull width).
Flood-prone width = estimated horizontal projection of where 2 X maximum bankfull depth elevation intersects the floodplain on each side of the stream.

_____ / _____ = _____
flood prone width / bankfull width = entrenchment ratio





i. Rating: Working from top to bottom, use the matrix below to select the functional point and rating.

Estimated or Calculated Entrenchment (Rosgen 1994, 1996)	☐ Slightly Entrenched C, D, E stream types			☐ Moderately Entrenched B stream type			☐ Entrenched A, F, G stream types		
Percent of Flooded Wetland Classified as Forested and/or Scrub/Shrub	☐ 75%	☐ 25-75%	☐ <25%	☐ 75%	☐ 25-75%	☐ <25%	☐ 75%	☐ 25-75%	☐ <25%
AA contains **no outlet or restricted outlet**	---	---	---	---	---	---	---	---	---
AA contains **unrestricted outlet**	---	---	---	---	---	---	---	---	---

ii. Are ≥10 acres of wetland in the AA subject to flooding AND are man-made features which may be significantly damaged by floods located within 0.5 mile downstream of the AA? ☐ YES ☐ NO **Comments:** _____

Wetland/Site #(s): Lonepine Wetland Cels 1-5

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 the NA box and proceed to 14G.

i. Rating: Working from top to bottom, use the matrix below to select the functional point and rating. Abbreviations for surface water durations are as follows: P/P = permanent/perennial; S/I = seasonal/intermittent; and T/E = temporary/ephemeral [see manual for further definitions of these terms].

Estimated Maximum Acre Feet of Water Contained in Wetlands within the AA that are Subject to Periodic Flooding or Ponding	☒ **>5 acre feet**			☐ **1.1 to 5 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**	---	.9H	---	---	---	---	---	---	---
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 wetland with potential to receive 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 the NA box and proceed to 14H.

i. Rating: Working from top to bottom, use the matrix below to select the functional point and rating.

Sediment, Nutrient, and Toxicant Input Levels within AA	**AA receives or surrounding land use has potential to deliver sediments, nutrients, or compounds at levels such that other functions are not substantially impaired. Minor sedimentation, sources of nutrients or toxicants, or signs of eutrophication present.**				**Waterbody is 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 / Ponding in AA	☐ **Yes**	☐ **No**	☒ **Yes**	☐ **No**	☐ **Yes**	☐ **No**	☐ **Yes**	☐ **No**
AA contains **no or restricted outlet**	---	---	.7M	---	---	---	---	---
AA contains **unrestricted outlet**	---	---	---	---	---	---	---	---

Comments: _____

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

Applies only if AA occurs on or within the banks of a river, stream, or other natural or man-made drainage, or on the shoreline of a standing water body which is subject to wave action.
If 14H does not apply, check the NA box and proceed to 14I.

% Cover of Wetland Streambank or Shoreline by Species with Stability Ratings of ≥6 (see Appendix F).	**Duration of Surface Water Adjacent to Rooted Vegetation**		
	☐ **Permanent / Perennial**	☒ **Seasonal / Intermittent**	☐ **Temporary / Ephemeral**
☐ **≥ 65%**	---	---	---
☒ **35-64%**	---	.6M	---
☐ **< 35%**	---	---	---

Comments: Subject to wave action

14I. PRODUCTION EXPORT / FOOD CHAIN SUPPORT

i. Level of Biological Activity: Synthesis of wildlife and fish habitat rates (select).

General Fish Habitat Rating (14Diii)	**General Wildlife Habitat Rating (14Ciii)**		
	☐ **E/H**	☒ **M**	☐ **L**
☐ **E/H**	---	---	---
☐ **M**	---	---	---
☐ **L**	---	---	---
☒ **NA**	---	M	---

ii. Rating: Working from top to bottom, use the matrix below to select the functional point and rating. Factor A = acreage of vegetated wetland component in the AA; Factor B = level of biological activity rating from above (14Ii); Factor C = whether or not the AA contains a surface or subsurface outlet; the final three rows pertain to the duration of surface water in the AA, where P/P, S/I, and T/E were previously defined, and A = "absent" [see manual for further definitions of these terms].

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	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**
P/P	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
S/I	---	---	.7M	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
T/E/A	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Wetland/Site #(s): Lonepine Wetland Cells 1-5

14I. PRODUCTION EXPORT / FOOD CHAIN SUPPORT (continued)

iii. Modified Rating: Note: Modified score cannot exceed 1.0 or be less than 0.1.

Vegetated Upland Buffer: Area with ≥ 30% plant cover, ≤ 15% noxious weed or ANVS cover, AND that is not subjected to periodic mechanical mowing or clearing (unless for weed control).
Is there an average ≥ 50-foot wide vegetated upland buffer around ≥ 75% of the AA's perimeter? ☐ **YES**, add 0.1 to score in **ii** = ___ ☒ **NO**

iv. Final Score and Rating: .7M **Comments:** _____

14J. GROUNDWATER DISCHARGE / RECHARGE
Check the appropriate indicators in i and ii below.

i. Discharge Indicators
- ☐ The AA is a slope wetland.
- ☐ Springs or seeps 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.
- ☐ Shallow water table and the site is saturated to the surface.
- ☒ Other: Occurs at toe of dam

ii. Recharge Indicators
- ☐ Permeable substrate present without underlying impeding layer.
- ☐ Wetland contains inlet but no outlet.
- ☐ Stream is a known 'losing' stream. Discharge volume decreases.
- ☐ Other: _____

iii. Rating: Use the information from i and ii above and the table below to select the functional point and rating.

Criteria	Duration of Saturation at AA Wetlands ***FROM GROUNDWATER DISCHARGE*** or ***WITH WATER THAT IS RECHARGING THE GROUNDWATER SYSTEM***			
	☐ **P/P**	☐ **S/I**	☒ **T**	☐ **None**
☒ **Groundwater Discharge or Recharge**	---	---	.4M	---
☐ **Insufficient Data/Information**	---			

Comments: _____

14K. UNIQUENESS

i. Rating: Working from top to bottom, use the matrix below to select the functional point and rating.

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 (#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 ☐ NA (proceed to Overall Summary and Rating page)
Affords 'bonus' points if AA provides a recreational or educational opportunity.

i. Is the AA a known or potential recreational or educational site? ☒ **YES**, go to ii. ☐ **NO**, check the NA box.

ii. Check categories that apply to the AA: ☒ Educational/Scientific Study ☒ Consumptive Recreational ☒Non-consumptive recreational
☐ Other: _____

iii. Rating: Use the matrix below to select the functional point and rating.

Known or Potential Recreational or Educational Area	**Known**	**Potential**
Public ownership or public easement with general public access (no permission required)	---	---
Private ownership with general public access (no permission required)	.15H	---
Private or public ownership without general public access, or requiring permission for public access	---	---

Comments: Hunting, Birdwatching (known)

15. GENERAL SITE NOTES: _____

Wetland/Site #(s): Lonepine Wetland Cells 1-5

Function & Value Variables	Rating – Actual Functional Points	Possible Functional Points	Functional Units: Actual Points x Estimated AA Acreage	Indicate the Four Most Prominent Functions with an Asterisk
A. Listed / Proposed T&E Species Habitat	low 0.00	1.00		
B. MT Natural Heritage Program Species Habitat	mod 0.60	1.00		
C. General Wildlife Habitat	mod 0.70	1.00		
D. General Fish Habitat	NA	NA		
E. Flood Attenuation	NA	NA		
F. Short and Long Term Surface Water Storage	high 0.90	1.00		
G. Sediment / Nutrient / Toxicant Removal	mod 0.70	1.00		
H. Sediment / Shoreline Stabilization	mod 0.60	1.00		
I. Production Export / Food Chain Support	mod 0.70	1.00		
J. Groundwater Discharge / Recharge	mod 0.40	1.00		
K. Uniqueness	mod 0.40	1.00		
L. Recreation / Education Potential (bonus point)	high 0.15			
Total Points	**5.15**	**9**	**Total Functional Units**	
Percent of Possible Score 57% (round to nearest whole number)				

Category I Wetland: (must satisfy **one** of the following criteria; otherwise go 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 possible score > 80% (round to nearest whole #).

Category II Wetland: (Criteria for Category I not satisfied **and** meets any **one** of the following criteria; otherwise go to Category IV)
- ☐ Score of 1 functional point for MT Natural Heritage Program Species Habitat; **or**
- ☐ Score of .9 or 1 functional point for General Wildlife Habitat; **or**
- ☐ Score of .9 or 1 functional point for General Fish 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 possible score > 65% (round to nearest whole #).

☒ **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 go to Category III)
- ☐ "Low" rating for Uniqueness; **and**
- ☐ Vegetated wetland component < 1 acre (do not include upland vegetated buffer); **and**
- ☐ Percent of possible score < 35% (round to nearest whole #).

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

☐ **I** ☐ **II** ☒ **III** ☐ **IV**

ENERGY LABORATORIES, INC. * 1120 S 27th St * PO Box 30916 * Billings, MT 59107-0916
Toll Free 800.735.4489 * 406.252.6325 * FAX 406.252.6069 * eli@energylab.com *

LABORATORY ANALYTICAL REPORT

Client: PBS and J
Project: Lonepine
Lab ID: B09112099-001
Client Sample ID: SS1

Report Date: 12/03/09
Collection Date: 08/10/09 14:00
DateReceived: 11/25/09
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
SATURATED PASTE							
pH, sat. paste	9.60	s.u.		0.10		ASAM10-3.2	12/02/09 08:38 / srm
Conductivity, sat. paste	47.7	mmhos/cm		0.01		ASA10-3	12/02/09 08:38 / srm
Calcium, sat. paste	0.62	meq/L		0.05		SW6010B	12/02/09 14:44 / tao
Magnesium, sat. paste	0.23	meq/L		0.08		SW6010B	12/02/09 14:44 / tao
Sodium, sat. paste	924	meq/L	D	0.6		SW6010B	12/02/09 14:44 / tao
Sodium Adsorption Ratio (SAR)	1410	unitless		0.01		Calculation	12/03/09 09:27 / srm

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
D - RL increased due to sample matrix interference.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

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LABORATORY ANALYTICAL REPORT

Client: PBS and J
Project: Lonepine
Lab ID: B09112099-002
Client Sample ID: SS2

Report Date: 12/03/09
Collection Date: 08/10/09 15:00
DateReceived: 11/25/09
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
SATURATED PASTE							
pH, sat. paste	9.80	s.u.		0.10		ASAM10-3.2	12/02/09 08:38 / srm
Conductivity, sat. paste	23.8	mmhos/cm		0.01		ASA10-3	12/02/09 08:38 / srm
Calcium, sat. paste	3.21	meq/L		0.05		SW6010B	12/02/09 14:52 / tao
Magnesium, sat. paste	0.22	meq/L		0.08		SW6010B	12/02/09 14:52 / tao
Sodium, sat. paste	342	meq/L	D	0.3		SW6010B	12/02/09 14:52 / tao
Sodium Adsorption Ratio (SAR)	261	unitless		0.01		Calculation	12/03/09 09:27 / srm

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
D - RL increased due to sample matrix interference.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

Appendix C

2009 REPRESENTATIVE PHOTOGRAPHS

MDT Wetland Mitigation Monitoring
Lonepine Wetland Mitigation Project
Flathead Indian Reservation, Montana

LONEPINE WETLAND MITIGATION SITE 2009

Photo Point 1: View facing east looking across Cell dominated by emergent vegetation.

Photo Point 1: View facing north looking across the west side of the mitigation site near Cell 2. Shallow waters dominated by emergent and aquatic vegetation.

Photo Point 2: View facing north at Cell 2 and overflow channel from Cell 1 to 2..

Photo Point 3: View facing south along the northwest corner of the mitigation site. Cell 1 is located to right, and restored Dry Fork Creek to left.

Photo Point 4: View facing west and southwest looking across Cell 3 and to the right side of the view is Dry Fork Creek.

Photo Point 5: View facing north looking along the Dry Fork Creek. Creek margins planted with woody species.

Photo Point 6: View facing west across the northern areas of Cell 4 dominated by emergent vegetation.

Photo Point 7: View facing northwest across the southeast corner of Cell 4.

Photo Point 8: View facing northwest across Cell 5 with shallow standing water.

Photo Point 8: View facing east along the outlet channel of Cell 5.

Photo Point 14. View facing south across the mitigation site. Picture taken from dam wall.

Photo Point 15. View facing south across the mitigation site. Picture view is split with uplands on the left side of the photo and wetland areas and creek on the right side of the photo. Picture taken from along the dam wall.

Photo Point 10. View looking south along Transect 1. Cell 2 to right of the view.

Photo Point 12. View looking north along the start of Transect 2. Cell 4 on photo left side of photo.

Photo Point 13. View looking south along the end of Transect 2. Cell 4 on photo right side of photo.

Appendix D

PLAN SHEET

MDT Wetland Mitigation Monitoring
Lonepine Wetland Mitigation Project
Flathead Indian Reservation, Montana

STATE	PROJECT NUMBER	SHEET NO.
MONTANA	STPX 45(33)	8

LONEPINE WETLAND MITIGATION

PROPOSED DAM OUTLET WORKS & CANAL MODIFICATIONS

POT 10+00.00

POT 18+06.35

NEW FENCE AROUND WELL

CONTROL LINE

NEW GATE

N 0° 28' 16" W

NEW FENCE

Proposed Wetland Cell 4

Proposed Wetland Cell 1

Proposed Wetland Cell 2

Proposed Wetland Cell 3

Proposed Wetland Cell 5

OUTLET 2a

OUTLET 1

OUTLET 2b

OUTLET 3

OUTLET 4

OUTLET 5

INLET 1

INLET 4

WETLAND 2

WETLAND 3

WETLAND 4

IRRIGATION TURNOUT STRUCTURES INVERT ELEV. 864.40 [2 835.96ft] (CELL 1) 863.83 [2 834.09ft] (CHANNEL 3)

44+85.41 END CHANNEL 3

REMOVE FENCE

TEMPORARY FENCE

DO NOT DISTURB

31+04.44 END CHANNEL 2

30+08.47 BEG. CHANNEL 2

CHANNEL 2

WETLAND 1

CREEK

DRY FORK

40+12.00 BEG. CHANNEL 3

Proposed Wetland Excavation A

CHANNEL PLUG

CHANNEL 3

21+51.02 END CHANNEL 1

CHANNEL 1

20+00.00 BEG. CHANNEL 1

OFFSITE WETLAND 1

DAM SAFETY PROJECT LIMIT OF CONSTRUCTION

DAM SAFETY PROJECT BUFFER ZONE

27 m

15 m

LEGEND

- EXISTING WETLANDS
- PERMITTED WETLAND IMPACTS
- PROPOSED WETLAND CELLS
- PROPOSED UPLAND BUFFER
- PROPOSED CHANNEL CENTERLINE
- PROPOSED BERM
- NEW FENCE

SCALE 1:1200

0 60M 120M

SITE PLAN

MONTANA DEPARTMENT OF TRANSPORTATION

MONTANA CADD

WGM GROUP, INC.

LAND & WATER CONSULTING

A Division Of: PBS

w:\projects\020606\design rd\4129rdwld202.dgn
7/28/2006
2:21:28 PM
3 WGM Group Inc.
2

Appendix E

GPS PROTOCOL

MDT Wetland Mitigation Monitoring
Lonepine Wetland Mitigation Project
Flathead Indian Reservation, Montana

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 Trimble GEO III GPS unit was also used for some sites in 2007.

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 and 2008 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

2009 MACROINVERTEBRATE SAMPLING PROTOCOL AND DATA

MDT Wetland Mitigation Monitoring
Lonepine Wetland Mitigation Project
Flathead Indian Reservation, 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 – 2009

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

INTRODUCTION

This report summarizes data generated from eight years of mitigated wetland monitoring from sites throughout the State of Montana. A total of 229 invertebrate samples have been collected over the study period. Table 1 lists the currently monitored sites at which aquatic invertebrates were collected in 2009, and summarizes the sampling history of each.

METHODS

Sampling and Sample Processing

Aquatic invertebrate samples were collected at mitigated wetland sites in the summer months of 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, and 2009 by personnel of PBS&J. Sampling procedures were based on the protocols developed by the Montana Department of Environmental Quality (MDEQ) 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.

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 for this report. 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, “good” 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 good, 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 between 2001 and 2007. Data from a total of 167 sites were used to develop criteria.

Six 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 2008, the lotic sites were Camp Creek (2 sites), Cloud Ranch stream, Jack Creek – McKee Spring, and Jocko Spring Creek (2 sites). 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 (MVFP index: 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 bioassessment index used in this report may not be universally applicable to all wetland types, and in particular, to constructed wetlands. Scores and impairment classifications derived from the index may not be valid indications of impairment or non-impairment. In addition, 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 (Hilsenhoff Biotic Index [HBI] 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 2009 samples are given in Tables 4a-4c and 5. Thermal preference of invertebrate assemblages was calculated using 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 are 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 sites sampled in 2009 are included. An asterisk indicates lotic sites.

Site identifier	2002	2003	2004	2005	2006	2007	2008	2009
Camp Creek MS-1*	+	+	+	+	+	+	+	+
Camp Creek MS-2*					+	+	+	+
Cloud Ranch Pond			+	+	+	+	+	+
Cloud Ranch Stream (Big Timber)*			+			+	+	+
Jack Creek – McKee Spring Creek*					+	+	+	+
Jack Creek – pond			+	+	+	+	+	+
Rock Creek Ranch				+	+	+	+	+
Wagner Marsh				+	+	+	+	+
Alkali Lake 1					+	+	+	+
West Fork of Charley Creek						+	+	+
Little Muddy Creek						+	+	+
Selkirk Ranch						+	+	+
Jocko Spring Creek MS1							+	+
Jocko Spring Creek MS2							+	+
Sportsman's Campground Site #1							+	+
Sportsman's Campground Site #2							+	+
Sportsman's Campground Site #3							+	+
Lonepine #1							+	+
Lonepine #2							+	+

Table 2. Aquatic invertebrate metrics employed for wetland (lentic) invertebrate assemblages in the MDT mitigated wetlands study, 2001 – 2009.

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 sections of individual monitoring reports. Summary tables for lentic (4a – 4c) and lotic (5) sites and project specific taxa listing(s) and metrics report(s) are provided on the following pages.)

Table 4a. Metric values and scores for wetland (lentic) sites in the MDT mitigated wetland study – 2009 sampling.

METRIC	Cloud Ranch Pond	Jack Creek Pond	Rock Creek Ranch	Wagner Marsh	Alkali Lake	West Fork of Charley Creek	Little Muddy Creek
Total taxa	15	11	20	18	17	7	18
POET	2	0	2	3	1	0	1
Chironomidae taxa	6	3	3	5	10	2	6
Crustacea + Mollusca	0	5	6	7	1	1	6
% Chironomidae	14.47%	66.67%	43.75%	16.07%	61.00%	2.73%	42.40%
Orthocladiinae/Chir	45.45%	20.00%	57.14%	22.22%	52.46%	0.00%	86.79%
%Amphipoda	0.00%	3.33%	0.00%	1.79%	0.00%	91.82%	4.80%
%Crustacea + %Mollusca	0.00%	23.33%	32.14%	34.82%	1.00%	91.82%	34.40%
HBI	6.026666	9	7.045045	7.981652	6	7.90909	7.448
%Dominant taxon	40.79%	53.33%	23.21%	23.21%	30.00%	91.82%	36.00%
%Collector-Gatherers	21.05%	73.33%	61.61%	43.75%	51.00%	91.82%	37.60%
%Filterers	0.00%	0.00%	7.14%	4.46%	0.00%	0.00%	4.80%
Total taxa	3	1	3	3	3	1	3
POET	1	1	1	3	1	1	1
Chironomidae taxa	3	3	3	3	5	1	3
Crustacea + Mollusca	1	3	5	5	1	1	5
% Chironomidae	5	1	1	5	1	5	1
Orthocladiinae/Chir	5	3	5	3	5	1	5
%Amphipoda	5	5	5	5	5	1	3
%Crustacea + %Mollusca	5	5	5	3	5	1	3
HBI	5	1	3	1	5	1	3
%Dominant taxon	3	1	5	5	5	1	3
%Collector-Gatherers	1	3	3	1	3	5	1
%Filterers	3	3	1	3	3	3	3
Total score	**40**	**30**	**40**	**40**	**42**	**22**	**34**
Percent of maximum score	**66.67%**	**50.00%**	**66.67%**	**66.67%**	**70.00%**	**36.67%**	**56.67%**
Impairment classification	**optimal**	**sub-optimal**	**optimal**	**optimal**	**optimal**	**poor**	**sub-optimal**

Table 4b. Metric values and scores for wetland (lentic) sites in the MDT mitigated wetland study – 2009 sampling.

METRIC	Selkirk Ranch	Sportsman's Campground Site #1	Sportsman's Campground Site #2	Sportsman's Campground Site #3	Lonepine #1	Lonepine #2
Total taxa	17	19	11	23	22	19
POET	1	1	0	2	2	3
Chironomidae taxa	6	10	8	11	11	8
Crustacea + Mollusca	6	4	2	4	4	2
% Chironomidae	27.27%	38.46%	90.00%	41.82%	67.83%	25.86%
Orthocladiinae/Chir	43.33%	37.50%	3.33%	23.91%	7.69%	16.67%
%Amphipoda	5.45%	25.96%	2.00%	4.55%	0.00%	0.00%
%Crustacea + %Mollusca	62.73%	51.92%	5.00%	50.00%	6.96%	18.10%
HBI	8.245455	6.942309	6.9	7.345455	7.196427	7.191304
%Dominant taxon	30.00%	24.04%	45.00%	27.27%	51.30%	15.52%
%Collector-Gatherers	57.27%	50.00%	91.00%	83.64%	86.09%	63.79%
%Filterers	3.64%	25.96%	18.00%	29.09%	1.74%	6.03%
Total taxa	3	3	1	5	5	3
POET	1	1	1	1	1	3
Chironomidae taxa	3	5	5	5	5	5
Crustacea + Mollusca	5	3	1	3	3	1
% Chironomidae	3	3	1	1	1	3
Orthocladiinae/Chir	3	3	1	3	1	1
%Amphipoda	3	1	5	3	5	5
%Crustacea + %Mollusca	3	3	5	3	5	5
HBI	1	3	3	3	3	3
%Dominant taxon	5	5	3	5	1	5
%Collector-Gatherers	3	3	5	5	5	3
%Filterers	3	1	1	1	3	1
Total score	**36**	**34**	**32**	**38**	**38**	**38**
Percent of maximum score	**60.00%**	**56.67%**	**53.33%**	**63.33%**	**63.33%**	**63.33%**
Impairment classification	**sub-optimal**	**sub-optimal**	**sub-optimal**	**sub-optimal**	**sub-optimal**	**sub-optimal**

Table 5. Metric values and scores for stream (lotic) sites in the MDT mitigated wetland study – 2009 sampling.

METRIC	Camp Creek MS-1	Camp Creek MS-2	Cloud Ranch Stream	Jack Creek McKee	Jocko Spring Creek MS-1	Jocko Spring Creek MS-2
E Richness	2	4	1	1	2	1
P Richness	1	0	0	0	0	0
T Richness	2	4	4	1	3	2
Pollution Sensitive Richness	1	1	0	0	1	0
Filterer Percent	11.88%	22.02%	18.18%	25.23%	27.36%	10.91%
Pollution Tolerant Percent	13.86%	12.84%	15.15%	8.41%	12.26%	32.73%
E Richness	1	2	0	0	1	0
P Richness	1	0	0	0	0	0
T Richness	1	2	2	0	2	1
Pollution Sensitive Richness	1	1	0	0	1	0
Filterer Percent	1	1	1	0	0	1
Pollution Tolerant Percent	1	1	1	2	1	1
Total score	**6**	**7**	**4**	**2**	**5**	**3**
Percent of maximum score	**33.33%**	**38.89%**	**22.22%**	**11.11%**	**27.78%**	**16.67%**
Impairment classification	**moderate**	**moderate**	**moderate**	**severe**	**moderate**	**severe**

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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: MDT09PBSJ
RAI No.: MDT09PBSJ015

RAI No.: MDT09PBSJ015 **Sta. Name:** MDT Lonepine # 1
Client ID:
Date Coll.: 8/10/2009 **No. Jars:** 1 **STORET ID:**

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Non-Insect							
Cladocera	2	1.74%	Yes	Unknown		8	CF
Ostracoda	4	3.48%	Yes	Unknown		8	CG
Naididae							
Nais sp.	12	10.43%	Yes	Unknown		8	CG
Physidae							
Physa sp.	1	0.87%	Yes	Unknown		8	SC
Planorbidae							
Gyraulus sp.	1	0.87%	Yes	Unknown		8	SC
Ephemeroptera							
Baetidae							
Callibaetis sp.	5	4.35%	Yes	Larva		9	CG
Caenidae							
Caenis sp.	3	2.61%	Yes	Larva		7	CG
Heteroptera							
Corixidae							
Corixidae	1	0.87%	Yes	Larva		10	PH
Notonectidae							
Notonecta sp.	4	3.48%	Yes	Adult		5	PR
Coleoptera							
Dytiscidae							
Dytiscidae	2	1.74%	Yes	Larva		5	PR
Diptera							
Dolichopodidae							
Dolichopodidae	2	1.74%	Yes	Larva		4	PR
Chironomidae							
Chironomidae							
Ablabesmyia sp.	2	1.74%	Yes	Larva		8	CG
Apedilum sp.	59	51.30%	Yes	Larva		11	CG
Cladotanytarsus sp.	2	1.74%	Yes	Larva		7	CG
Cricotopus (Cricotopus) sp.	1	0.87%	Yes	Larva		7	SH
Cricotopus (Isocladius) sp.	2	1.74%	Yes	Larva		7	SH
Cryptotendipes sp.	1	0.87%	Yes	Larva		6	CG
Micropsectra sp.	2	1.74%	Yes	Larva		4	CG
Orthocladius sp.	2	1.74%	Yes	Larva		6	CG
Parachironomus sp.	2	1.74%	Yes	Larva		10	PR
Paratanytarsus sp.	4	3.48%	Yes	Larva		6	CG
Psectrocladius sp.	1	0.87%	Yes	Larva		8	CG
Sample Count	**115**						

Metrics Report

Project ID: MDT09PBSJ
RAI No.: MDT09PBSJ015
Sta. Name: MDT Lonepine # 1
Client ID:
STORET ID:
Coll. Date: 8/10/2009

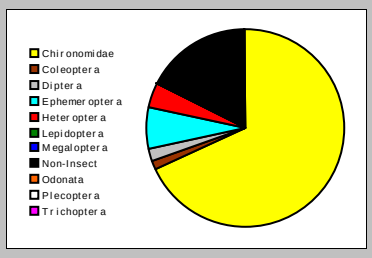
Abundance Measures

Sample Count: 115
Sample Abundance: 575.00 20.00% of sample used

Coll. Procedure:
Sample Notes:

Taxonomic Composition

Category	R	A	PRA
Non-Insect	5	20	17.39%
Odonata			
Ephemeroptera	2	8	6.96%
Plecoptera			
Heteroptera	2	5	4.35%
Megaloptera			
Trichoptera			
Lepidoptera			
Coleoptera	1	2	1.74%
Diptera	1	2	1.74%
Chironomidae	11	78	67.83%

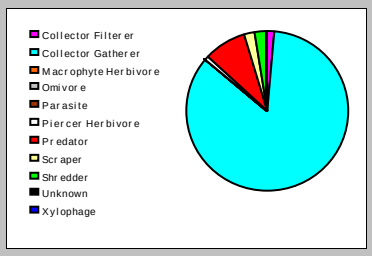


Dominant Taxa

Category	A	PRA
Apedilum	59	51.30%
Nais	12	10.43%
Callibaetis	5	4.35%
Paratanytarsus	4	3.48%
Ostracoda	4	3.48%
Notonecta	4	3.48%
Caenis	3	2.61%
Parachironomus	2	1.74%
Orthocladius	2	1.74%
Micropsectra	2	1.74%
Dytiscidae	2	1.74%
Dolichopodidae	2	1.74%
Cricotopus (Isocladius)	2	1.74%
Cladotanytarsus	2	1.74%
Cladocera	2	1.74%

Functional Composition

Category	R	A	PRA
Predator	4	10	8.70%
Parasite			
Collector Gatherer	12	97	84.35%
Collector Filterer	1	2	1.74%
Macrophyte Herbivore			
Piercer Herbivore	1	1	0.87%
Xylophage			
Scraper	2	2	1.74%
Shredder	2	3	2.61%
Omivore			
Unknown			

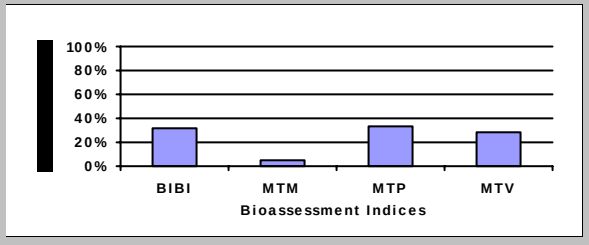


Metric Values and Scores

Metric	Value	BIBI	MTP	MTV	MTM
Composition					
Taxa Richness	22	3	2		1
Non-Insect Percent	17.39%				
E Richness	2	1		1	
P Richness	0	1		0	
T Richness	0	1		0	
EPT Richness	2		0		0
EPT Percent	6.96%		0		0
Oligochaeta+Hirudinea Percent	10.43%				
Baetidae/Ephemeroptera	0.625				
Hydropsychidae/Trichoptera	0.000				
Dominance					
Dominant Taxon Percent	51.30%		1		0
Dominant Taxa (2) Percent	61.74%				
Dominant Taxa (3) Percent	66.09%	3			
Dominant Taxa (10) Percent	84.35%				
Diversity					
Shannon H (loge)	2.042				
Shannon H (log2)	2.946		2		
Margalef D	4.426				
Simpson D	0.277				
Evenness	0.076				
Function					
Predator Richness	4		2		
Predator Percent	8.70%	1			
Filterer Richness	1				
Filterer Percent	1.74%			3	
Collector Percent	86.09%		1		0
Scraper+Shredder Percent	4.35%		1		0
Scraper/Filterer	1.000				
Scraper/Scraper+Filterer	0.500				
Habit					
Burrower Richness	0				
Burrower Percent	0.00%				
Swimmer Richness	3				
Swimmer Percent	8.70%				
Clinger Richness	2	1			
Clinger Percent	2.61%				
Characteristics					
Cold Stenotherm Richness	0				
Cold Stenotherm Percent	0.00%				
Hemoglobin Bearer Richness	6				
Hemoglobin Bearer Percent	60.00%				
Air Breather Richness	2				
Air Breather Percent	3.48%				
Voltinism					
Univoltine Richness	7				
Semivoltine Richness	1	1			
Multivoltine Percent	77.39%		1		
Tolerance					
Sediment Tolerant Richness	1				
Sediment Tolerant Percent	0.87%				
Sediment Sensitive Richness	0				
Sediment Sensitive Percent	0.00%				
Metals Tolerance Index	3.000				
Pollution Sensitive Richness	0	1		0	
Pollution Tolerant Percent	19.13%	3		1	
Hilsenhoff Biotic Index	7.196		0		0
Intolerant Percent	0.00%				
Supertolerant Percent	26.96%				
CTQa	100.800				

Bioassessment Indices

BioIndex	Description	Score	Pct	Rating
BIBI	B-IBI (Karr et al.)	16	32.00%	
MTP	Montana DEQ Plains (Bukantis 1998)	10	33.33%	Moderate
MTV	Montana Revised Valleys/Foothills (Bollman 1998)	5	27.78%	Moderate
MTM	Montana DEQ Mountains (Bukantis 1998)	1	4.76%	Severe



Taxa Listing

Project ID: MDT09PBSJ
RAI No.: MDT09PBSJ016

RAI No.: MDT09PBSJ016 **Sta. Name:** MDT Lonepine # 2
Client ID:
Date Coll.: 8/10/2009 **No. Jars:** 1 **STORET ID:**

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Non-Insect							
Cladocera	7	6.03%	Yes	Unknown		8	CF
Ostracoda	14	12.07%	Yes	Unknown		8	CG
Odonata							
Coenagrionidae							
Coenagrionidae	4	3.45%	Yes	Larva	Early Instar	7	PR
Libellulidae							
Libellulidae	4	3.45%	Yes	Larva	Early Instar	9	PR
Ephemeroptera							
Baetidae							
Callibaetis sp.	18	15.52%	Yes	Larva		9	CG
Heteroptera							
Notonectidae							
Notonecta sp.	8	6.90%	Yes	Adult		5	PR
Coleoptera							
Dytiscidae							
Dytiscidae	3	2.59%	Yes	Larva		5	PR
Hydrophilidae							
Hydrophilidae	1	0.86%	Yes	Larva		5	PR
Diptera							
Ceratopogonidae							
Ceratopogoninae	6	5.17%	Yes	Larva		6	PR
Chaoboridae							
Chaoborus sp.	16	13.79%	Yes	Larva		7	PR
Culicidae							
Culicidae	5	4.31%	Yes	Pupa		10	CG
Chironomidae							
Chironomidae							
Ablabesmyia sp.	1	0.86%	Yes	Larva		8	CG
Acricotopus sp.	1	0.86%	Yes	Larva		10	CG
Apedilum sp.	1	0.86%	Yes	Larva		11	CG
Corynoneura sp.	1	0.86%	Yes	Larva		7	CG
Micropsectra sp.	5	4.31%	Yes	Larva		4	CG
Paratanytarsus sp.	18	15.52%	Yes	Larva		6	CG
Psectrocladius sp.	2	1.72%	Yes	Larva		8	CG
Pseudosmittia sp.	1	0.86%	Yes	Larva		6	CG
Sample Count	**116**						

Metrics Report

Project ID: MDT09PBSJ
RAI No.: MDT09PBSJ016
Sta. Name: MDT Lonepine # 2
Client ID:
STORET ID:
Coll. Date: 8/10/2009

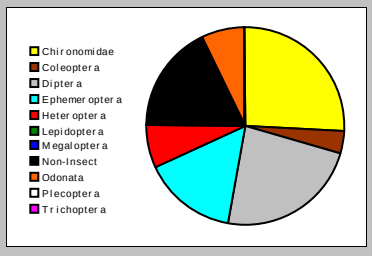
Abundance Measures

Sample Count: 116
Sample Abundance: 1,740.00 6.67% of sample used

Coll. Procedure:
Sample Notes:

Taxonomic Composition

Category	R	A	PRA
Non-Insect	2	21	18.10%
Odonata	2	8	6.90%
Ephemeroptera	1	18	15.52%
Plecoptera			
Heteroptera	1	8	6.90%
Megaloptera			
Trichoptera			
Lepidoptera			
Coleoptera	2	4	3.45%
Diptera	3	27	23.28%
Chironomidae	8	30	25.86%

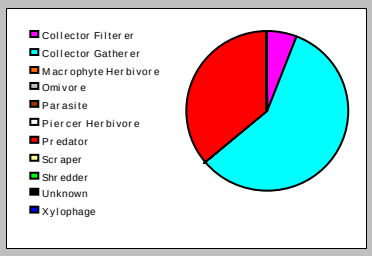


Dominant Taxa

Category	A	PRA
Paratanytarsus	18	15.52%
Callibaetis	18	15.52%
Chaoborus	16	13.79%
Ostracoda	14	12.07%
Notonecta	8	6.90%
Cladocera	7	6.03%
Ceratopogoninae	6	5.17%
Micropsectra	5	4.31%
Culicidae	5	4.31%
Libellulidae	4	3.45%
Coenagrionidae	4	3.45%
Dytiscidae	3	2.59%
Psectrocladius	2	1.72%
Corynoneura	1	0.86%
Apedilum	1	0.86%

Functional Composition

Category	R	A	PRA
Predator	7	42	36.21%
Parasite			
Collector Gatherer	11	67	57.76%
Collector Filterer	1	7	6.03%
Macrophyte Herbivore			
Piercer Herbivore			
Xylophage			
Scraper			
Shredder			
Omivore			
Unknown			



Metric Values and Scores

Metric	Value	BIBI	MTP	MTV	MTM
Composition					
Taxa Richness	19	1	2		1
Non-Insect Percent	18.10%				
E Richness	1	1		0	
P Richness	0	1		0	
T Richness	0	1		0	
EPT Richness	1		0		0
EPT Percent	15.52%		1		0
Oligochaeta+Hirudinea Percent					
Baetidae/Ephemeroptera	1.000				
Hydropsychidae/Trichoptera	0.000				
Dominance					
Dominant Taxon Percent	15.52%		3		3
Dominant Taxa (2) Percent	31.03%				
Dominant Taxa (3) Percent	44.83%	5			
Dominant Taxa (10) Percent	87.07%				
Diversity					
Shannon H (loge)	2.527				
Shannon H (log2)	3.646		3		
Margalef D	3.787				
Simpson D	0.093				
Evenness	0.073				
Function					
Predator Richness	7		3		
Predator Percent	36.21%	5			
Filterer Richness	1				
Filterer Percent	6.03%			2	
Collector Percent	63.79%		2		2
Scraper+Shredder Percent	0.00%		0		0
Scraper/Filterer	0.000				
Scraper/Scraper+Filterer	0.000				
Habit					
Burrower Richness	1				
Burrower Percent	5.17%				
Swimmer Richness	2				
Swimmer Percent	22.41%				
Clinger Richness	0	1			
Clinger Percent	0.00%				
Characteristics					
Cold Stenotherm Richness	0				
Cold Stenotherm Percent	0.00%				
Hemoglobin Bearer Richness	3				
Hemoglobin Bearer Percent	8.62%				
Air Breather Richness	3				
Air Breather Percent	7.76%				
Voltinism					
Univoltine Richness	5				
Semivoltine Richness	3	3			
Multivoltine Percent	59.48%		2		
Tolerance					
Sediment Tolerant Richness	0				
Sediment Tolerant Percent	0.00%				
Sediment Sensitive Richness	0				
Sediment Sensitive Percent	0.00%				
Metals Tolerance Index	2.394				
Pollution Sensitive Richness	0	1		0	
Pollution Tolerant Percent	31.90%	3		1	
Hilsenhoff Biotic Index	7.191		0		0
Intolerant Percent	0.00%				
Supertolerant Percent	44.83%				
CTQa	99.692				

Bioassessment Indices

BioIndex	Description	Score	Pct	Rating
BIBI	B-IBI (Karr et al.)	22	44.00%	
MTP	Montana DEQ Plains (Bukantis 1998)	16	53.33%	Moderate
MTV	Montana Revised Valleys/Foothills (Bollman 1998)	3	16.67%	Severe
MTM	Montana DEQ Mountains (Bukantis 1998)	6	28.57%	Moderate