MONTANA DEPARTMENT OF TRANSPORTATION
WETLAND MITIGATION MONITORING REPORT: YEAR 2014

US Highway 93 Onsite:
Peterson Property
Lake County, Montana



Prepared for:

MONTANA MDT DEPARTMENT OF TRANSPORTATION

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December 2014

MONTANA DEPARTMENT OF TRANSPORTATION (MDT)

WETLAND MITIGATION MONITORING REPORT:

YEAR 2014

US Highway 93 Onsite:
Peterson Property
Constructed: 2007

MDT Project Numbers:
NH 5-2 (120) 20 (Bouchard, Jocko Spring Creek)
NH 5-2 (122) 31 (Mission Creek, Peterson)
NH-PLH 5-2 (142) 51 (Mud Creek)

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CCI Project No: MDT.006

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Cover: Looking East across the Peterson Wetland Mitigation Site.

1. INTRODUCTION

The US Highway 93, 2014 Wetland Mitigation Monitoring Report documents the sixth year of monitoring at the Peterson property. Five US Hwy 93 on-site wetland mitigation sites (Jocko Spring Creek, Mission Creek, Bouchard, Peterson, and Mud Creek) were developed in cooperation with the permitting and natural resources staff from the Confederated Salish and Kootenai Tribes of the Flathead Nation (CSKT) to mitigate for wetland impacts associated with eight segments of the US 93 Evaro to Polson highway reconstruction project by the Montana Department of Transportation (MDT). Monitoring was concluded at the Bouchard and Mud Creek mitigation sites in 2013. These sites were part of stream and wetland mitigation associated with improvements to US Hwy 93 North. The 2009 US 93 Wetland Mitigation Monitoring Report included monitoring results for the Jocko Spring Creek and Mission Creek mitigation sites. These sites were excluded from US 93 monitoring activities in 2010 after the US Army Corps of Engineers (USACE) and the CSKT Shoreline Protection Program acknowledged that the sites had met the required mitigation goals and objectives (MDT 2010).

The remaining wetland mitigation site, US 93 Peterson, is located in Lake County within Watershed 3 - Lower Clark Fork, north of Arlee, Montana, near milepost 35 (Figure 1). Figures 2 and 3 (Appendix A) show the monitoring activity locations and mapped site features, respectively. Appendix B contains the MDT Wetland Mitigation Site Monitoring Form, the USACE Routine Wetland Determination Data Forms (Environmental Laboratory 1987), and the 2008 MDT Montana Wetland Assessment Forms. Appendix C contains photographs of the project area and Appendix D includes the project plan sheets. Appendix E provides an explanation for the crediting scheme approved for the MDT Evaro – Polson US 93 project.

1.1. Impacts and Mitigation

Wetland impacts for the US 93 Evaro to Polson Highway reconstruction project were identified in a wetland mitigation plan prepared by Herrera Environmental Consultants. The impact totals for this report were based on information included in the 2004 mitigation plan, the 2007 monitoring report, and additional clarification from MDT. The 2004 wetland mitigation plan provided wetland mitigation concepts, identified wetland community types targeted for establishment, and calculated the wetland mitigation credits expected to be obtained from each site. The mitigation plan also specified the total acres of impacts predicted for project segments 4, 6, and 7. These acres were separated into impact totals based on the Confederated Salish and Kootenai Tribes (CSKT) and USACE regulated wetlands. Mitigation crediting systems vary between the two agencies and are described in more detail in following paragraphs.

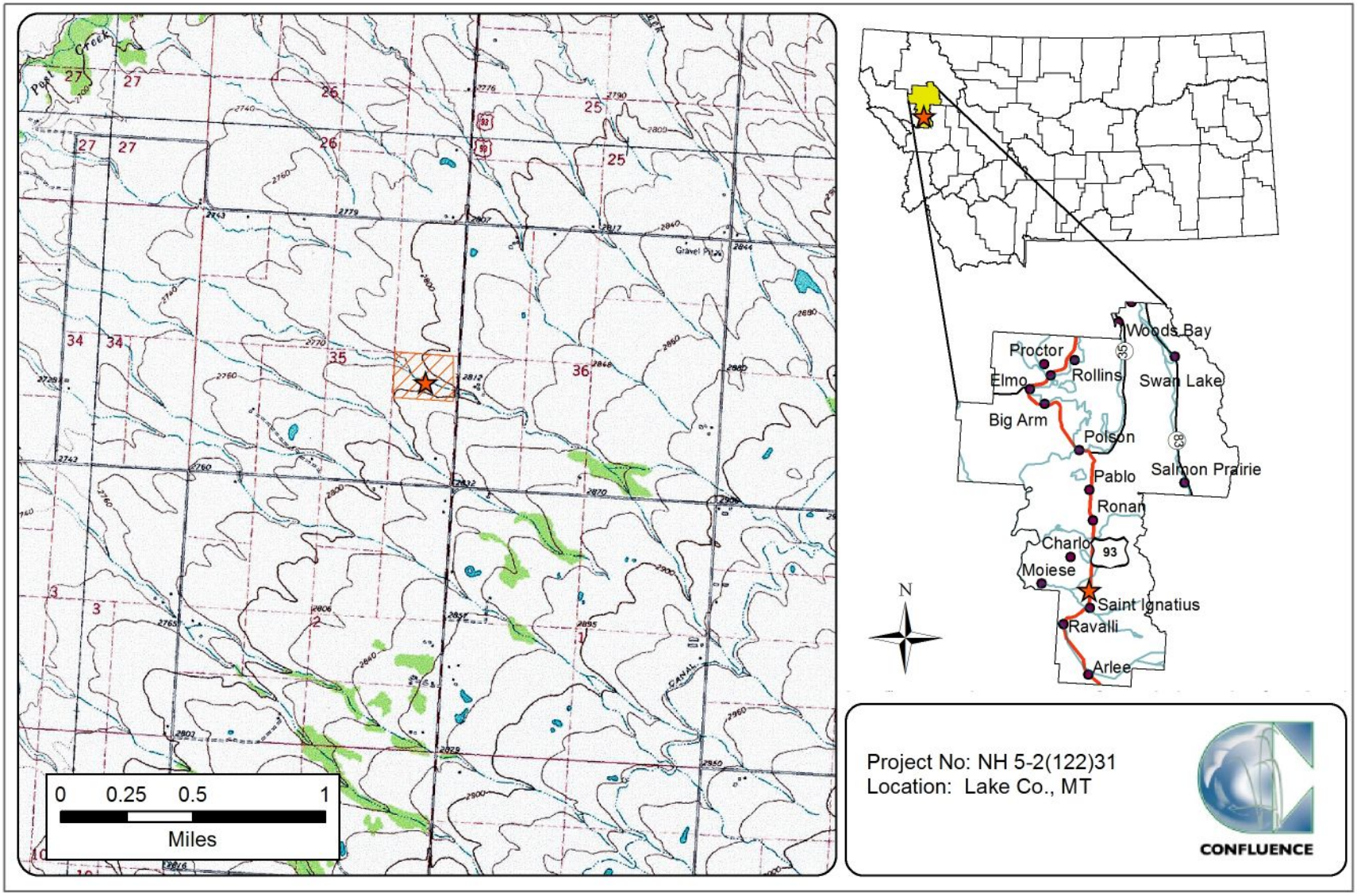


Figure 1. Project location of US 93 Peterson Wetland Mitigation Site.

The CSKT regulated wetlands were to mitigate for 20.70 acres of impacts and the USACE regulated wetlands were to mitigate for 18.32 acres of impacts. Table 1 shows the acreage of wetlands impacted within the three project segments. Table 2 lists each project segment, wetland mitigation site, mitigation type, and expected CSKT and USACE wetland mitigation credits. The expected credits are discussed in more detail in the Current Credit Summary section. Although the Jocko Spring Creek, Mission Creek, Mud Creek, and Bouchard sites were included in the original mitigation credit determination, the sites have since met the success criteria as acknowledged by the USACE and CSKT Shoreline Protection Program and/or guidance from MDT and are no longer monitored.

Table 1. Wetland impacts for project segments 4, 6, and 7 at the US 93 Evaro to Polson Highway Reconstruction Project.

PROJECT NAME, LOCATION, AND NUMBER	WETLAND IMPACTS (acre)	
	CSKT Regulated Wetlands	USACE Regulated Wetlands
Project 4 White Coyote Road - South of Ravalli MDT Project Number NH 5-2(110)20, CN 0744	3.64	2.53
Project 6 Medicine Tree (Old US 93) - Red Horn Road MDT Project Number NH 5-2(112)31, CN Q744	11.32	10.05
Project 7 Spring Creek Road to Minesinger Trail MDT Project Number NH 5-2(113)48, CN H744	5.74	5.74
TOTAL	**20.70**	**18.32**

Table 2. Wetland mitigation for project segments 4, 6, and 7 at the US 93 Evaro to Polson Highway Reconstruction Project.

Project	Wetland Mitigation Site	Expected CSKT Wetland Mitigation Credits[1,2,3]		Expected USACE Wetland Mitigation Credits[1,2,3]	
		Mitigation Type	Acre	Mitigation Type	Acre
Project 4 White Coyote Road South of Ravalli	Bouchard	Creation	1.54	Creation	5.16
		Primary Restoration	1.58	Re-establishment	2.94
		Secondary Restoration	10.23	Rehabilitation	4.05
		Project Total	**13.35**	**Project Total**	**12.15**
	Jocko Spring Creek	Primary Restoration	1.17	Creation	2.17
		Secondary Restoration	0.32	Restoration Enhancement	0.59[4] 0.01
		Project Total	**1.49**	**Project Total**	**2.77**
Project 6 Medicine Tree (Old US 93) Red Horn Road	Mission	Primary Restoration	0.22	Re-establishment	0.15
		Project Total	**0.22**	**Project Total**	**0.15**
	Peterson	Creation	0.64	Creation	2.14
		Secondary Restoration	0.67	Rehabilitation	0.25
		Project Total	**1.31**	**Project Total**	**2.39**
Project 7 Spring Creek Road to Minesinger Trail	Mud Creek	Creation	0.49	Creation	1.63
		Secondary Restoration	0.28	Rehabilitation	0.15
		Project Total	**0.77[4]**	**Project Total**	**1.78[4]**

[1]Onsite Wetland Mitigation Plan, US 93 Evaro to Polson.
[2]Personal communication with MDT.
[3]Corrected from values presented in the 2007 US 93 mitigation monitoring report; revised figures are based on the site plan.
[4]Erroneous values for the Mud Creek site in pre-2013 monitoring reports have been corrected in this report based on surveyed acreages.

The CSKT crediting approach is based on the *CKST Wetlands Conservation Plan* (Parker 2002) that determines the final credit acres based on an equation that calculates a weighted ratio for restoration based on two variables, mitigation types and impacted wetland classes. The CSKT uses the following mitigation types to determine ratios: preservation, restoration (primary or secondary), enhancement, and creation. The varying mitigation types have a range of ratios that are applied when calculating the final crediting ratios. Table 3 lists the credit ratios per targeted mitigation type developed by CSKT for the highway reconstruction project. Appendix E – CSKT Mitigation Ratios from Wetland Conservation Plan (Parker 2002) contains specific details on how the ratios were calculated.

Table 3. Mitigation credit ratios for CSKT per targeted mitigation types.

TARGETED MITIGATION TYPE	CREDIT RATIO[1]
Creation	3.36:1
Primary restoration	1.86:1
Secondary restoration	1.86:1

[1]From MDT Wetland Mitigation Monitoring Report: Year 2007.

The USACE crediting approach for the US 93 Onsite project is based on a crediting system developed by Herrera Environmental Consultants and approved by the USACE. Mitigation crediting systems and current credits are discussed for each individual mitigation site under the respective Current Credit Summary sections.

1.2. Mitigation Sites

The US Highway 93 project originally included five on-site wetland mitigation sites located on the Flathead Indian Reservation and managed by the CSKT. The Corps and CSKT released the Jocko Spring Creek and Mission Creek sites from the requirement for additional monitoring in 2010 once the mitigation goals and objectives had been achieved. Monitoring at the Bouchard and Mud Creek sites was concluded in 2013. The following section provides a general discussion of monitoring at the remaining wetland mitigation site, the Peterson Property. The discussion includes location, site topography, mitigation objectives, and targeted wetland community goals.

The 25-acre Peterson mitigation site is situated in the Project 6 segment of US Highway 93 approximately three miles north of St. Ignatius and west of the highway. The site is located southwest of Milepost 36 in Section 2 of Township 16 North and Range 20 West. The Peterson site consists of a riparian and wetland corridor associated with an unnamed perennial tributary to Post Creek, dominated by herbaceous and woody vegetation. An unnamed perennial tributary to Post Creek provides the site hydrology. The monitoring area boundary is illustrated in Figure 2 of Appendix A. Site plans are included in Appendix D.

Mitigation objectives included the following:

- Constructing impoundments using twelve log crib structures and earthen berms;
- Excavating an oxbow basin along the outer fringe of existing wetland boundaries; and
- Planting shrubs and herbaceous plugs within the oxbow basin, wetland fringe, and log crib structures.

The targeted wetland types were scrub-shrub and emergent vegetation classes, encompassing thin-leaf alder (*Alnus incana*), red osier dogwood (*Cornus alba*), Nebraska sedge (*Carex nebrascensis*), and Baltic rush (*Juncus balticus*) communities. Revegetation was completed in October 2006.

Created wetlands within the project corridor were to meet the three parameter criteria for hydrology, vegetation, and soils established for wetland determination as outlined in the 1987 *Corps of Engineers Wetland Delineation Manual for the Determination of Wetlands* (Environmental Laboratory 1987).

2. METHODS

Peterson was monitored on August 6, 2014. Information contained on the Mitigation Monitoring Form and Wetland Determination Data Forms was entered into an electronic tablet during the field investigation (Appendix B). Monitoring activity locations Peterson were mapped with a global positioning system (GPS) as illustrated on Figure 3 (Appendix A). Information collected included a wetland delineation, vegetation community mapping, vegetation transect monitoring, soil and hydrology data, bird and wildlife use documentation, photographic documentation, functional assessments, planted woody species monitoring, and a non-engineering examination of the infrastructure established within the mitigation project area.

2.1. Hydrology

The presence of hydrological indicators as outlined on the Wetland Determination Data Forms was assessed at two data points within the Peterson site. Hydrologic indicators were evaluated according to features observed during the site visit. The data were recorded on the electronic Wetland Determination Data Forms (Appendix B). Hydrologic assessments allow evaluation of mitigation goals addressing inundation and saturation requirements.

Technical criteria for wetland hydrology guidelines have been established as “permanent or periodic inundation, or soil saturation within 12 inches of the ground surface for a significant period (12.5 percent of the growing season) during the growing season” (USACE 2010). Systems with continuous inundation or saturation for greater than 12.5 percent of the growing season are classified as jurisdictional wetlands. The growing season is defined for purposes of this report as the number of days when there is a 50 percent probability that the minimum daily temperature is greater than or equal to 28 degrees Fahrenheit

(Environmental Laboratory 1987). Temperature data from the meteorological station at Saint Ignatius weather station, Montana (247286), report a median (5 years in 10) growing season length of 120 days. Areas defined as wetlands would require 15 days of inundation or saturation within 12 inches of the ground surface to meet the hydrology criteria. Soil pits excavated during the wetland delineation were used to evaluate groundwater levels within 18 inches of the ground surface. The data were recorded on the Wetland Determination Data Forms (Appendix B).

Soil pits excavated during the wetland delineation were used to evaluate groundwater levels within 18 inches of the ground surface. The data were recorded electronically on the Wetland Determination Data Form (Appendix B). No groundwater monitoring wells were present at Peterson.

2.2. Vegetation

The boundaries of general dominant species-based vegetation communities were determined in the field during the active growing season and subsequently delineated on the 2014 aerial photograph. The percent cover of dominant species within a community type was estimated and recorded using the following values: 0 (less than 1 percent), 1 (1 to 5 percent), 2 (6 to 10 percent), 3 (11 to 20 percent), 4 (21 to 50 percent), and 5 (greater than 50 percent) (Appendix B). Community types were named based on the predominant vegetation species that characterized each mapped polygon (Appendix A).

Temporal changes in vegetation were evaluated through annual assessments of static belt transects. Vegetation composition was assessed and recorded along two vegetation belt transects (T-1 and T-2) approximately 10 feet wide and 144 and 325 feet long, respectively (Figure 2, Appendix A). The transect location was recorded with a resource-grade GPS unit. Spatial changes in the dominant vegetation communities were documented along the stationed transect. The percent cover of each vegetation species within transects was estimated using the same values and cover ranges listed for the vegetation community data (Appendix B). Photographs were taken at the endpoints of each transect during the monitoring event (Appendix C).

The Montana State Noxious Weed List (September 2010), prepared by the Montana Department of Agriculture, was used to categorize weeds identified within the site. The location of noxious weeds was noted in the field during the investigation and mapped on the 2014 aerial photos (Figures 3, Appendix A). The noxious weed species identified are color-coded. The weed locations are denoted with the symbol "**x**", "▲", or "■", representing 0.0 to 0.1 acres, 0.1 to 1.0 acres, or greater than 1.0 acre in extent, respectively. The letters T, L, M, or H represent cover classes, standing for less than 1 percent, 1 to 5 percent, 6 to 25 percent, and 26 to 100 percent, respectively.

2.3. Soil

Soil information was obtained from the *Soil Survey for Lake County* and *in situ* soil descriptions (NRCS 2010). Soil cores were excavated using a hand auger and evaluated according to procedures outlined in the USACE 1987 Wetland Manual and the 2010 Western Mountains, Valleys, Coast Regional Supplement. A description of the soil profile, including hydric indicators when present, was recorded on the Wetland Determination Data Form for each profile (Appendix B).

2.4. Wetland Delineation

Waters of the US including special aquatic sites and jurisdictional wetlands were delineated throughout the project area in accordance with criteria established in the 1987 Wetland Manual and the Western Mountains, Valleys, Coast Regional Supplement (USACE 2010). The technical criteria for hydrophytic vegetation, hydric soil, and wetland hydrology described in the 1987 Wetland Manual must be satisfied to delineate a representative area as a wetland. The name and indicator status of plant species was derived from the 2014 National Wetland Plant List (NWPL) (Lichvar *et al*., 2014). A Routine Level-2 on-site Determination Method (Environmental Laboratory 1987) was used to delineate jurisdictional wetlands within the project boundaries. The information was recorded electronically on the Wetland Determination Data Form (Appendix B).

The wetland boundary was determined in the field based on changes in plant communities and/or hydrology, and changes in soil characteristics. Topographic relief boundaries within the project area were also examined and cross referenced with soil and vegetation communities as supportive information for this delineation. Vegetation composition, soil characteristics, and hydrology were assessed at likely wetland and adjacent upland locations. If all three parameters met the criteria, the area was designated as wetland and mapped by vegetation community type. If any one of the parameters did not exhibit positive wetland indicators, the area was determined to be upland unless the site was classified as an atypical situation, potential problem area, or special aquatic site, i.e., mudflat. The wetland boundary was GPS surveyed and identified on the 2014 aerial photograph. Wetland areas were calculated using geographic information (GIS) methods.

2.5. Wildlife

Observations of use of mammal, reptile, amphibian, and bird species were recorded on the Mitigation Monitoring form during the site visit. Indirect use indicators, including tracks, scat, burrow, eggshells, skins, and bones, were also recorded. These signs were recorded while traversing the site for other required activities. Direct sampling methods, such as snap traps, live traps, and pitfall traps, were not used. A comprehensive list of wildlife species observed on the site annually has been compiled.

2.6. Functional Assessment

The 1999 MDT Montana Wetland Assessment Method (MWAM) (Berglund 1999) was used to complete functional assessments at the site since the onset of

monitoring. The assessment method provides an objective means of assigning wetlands an overall rating and a means of assessing mitigation success based on wetland functions. Functions are self-sustaining properties of a wetland ecosystem that exist in the absence of society and relate to ecological significance without regard to subjective human values (Berglund 1999). Field data for this assessment were collected during the site visit. One Wetland Assessment Form was completed for the Peterson assessment area (AA) and is provided in Appendix B.

2.7. Photo Documentation

Monitoring at photo points provided supplemental information documenting wetland and upland conditions, site trends, current land uses surrounding the site, and the status of the vegetation transects. Photographs were taken at established photo points throughout the mitigation site during the site visit (Appendix C). Photo point locations were recorded with a resource-grade GPS unit (Figure 2, Appendix A).

2.8. GPS Data

Site features and survey points were collected with a resource-grade Thales Pro Mark III GPS unit during the 2014 monitoring season. Points were collected using WAAS-enabled differential correction satellites, typically improving resolution to sub-meter accuracy. The collected data were then transferred to a personal computer, subsequently exported into GIS, and drawn in Montana State Plane Single Zone NAD 83 meters. Site features and survey points that were mapped included fence boundaries, photographic points, transect endpoints, wetland boundaries, and wetland data points.

2.9. Maintenance Needs

Log cribs, engineered structures, fencing, and other features were examined during the site visit for obvious signs of breaching, damage, or other problems. This was a cursory examination and not an engineering-level structural inspection.

3. RESULTS

3.1. Hydrology

The average total annual precipitation recorded at the Missoula 2NE weather station, Montana (245735), from October 1966 to December 2012 was 17.10 inches (WRCC 2013). Total monthly precipitation from January to August recorded at this station was 12.03 inches (long-term average), 13.01 inches (2010), 13.63 inches (2011), 11.1 inches (2012), and 6.3 inches (2013). The Missoula 2NE station did not record data for 2014. The Missoula 2WNW station located nearby was used to provide supplemental precipitation data for this site. The data reported 19.19 inches total precipitation from January to August for 2014. The cumulative precipitation from January through August for the region was above average in 2010, 2011, and 2014 with below-average precipitation recorded in 2012 and 2013.

The main source of hydrology at the Peterson site comes from an unnamed perennial tributary of Post Creek. The mitigation site is located within a one-quarter mile long wetland corridor aligned east to west that follows the topographic gradient towards Post Creek. The project is exposed to seasonal flooding during spring runoff, seasonal high groundwater, and sustained flows during summer from irrigation return. Twelve log crib structures, built to simulate natural beaver dams, were installed to impound water behind the structures. Each crib structure was designed to allow surface water to flow over the structure. The mitigation site exhibited inundation of varying depths behind the impoundments during monitoring. Approximately five of the twelve cribs were not impounding water and appeared to allow water to flow through the structure in 2014. The MDT temporarily repaired several of these structures in 2010.

Approximately 10 percent of the project area was inundated in 2014. Surface water depths ranged from 0.0 to 3.0 feet with an average depth of approximately 0.5 feet. The water depth at the emergent vegetation and open water boundary was approximately 1.0 foot.

Two data points, P-1u and P-1w were assessed to determine the upland and wetland boundaries (Wetland Data Forms, Appendix B). Data point P-1w was located within the riparian corridor and met the wetland criteria. The wetland data point exhibited surface water to a depth of one inch, a high water table to the ground surface, and saturation to the ground surface. Data point P-1u, located upslope of P-1w, did not show evidence of wetland hydrology.

3.2. Vegetation

A comprehensive list of 73 species identified on the Peterson site has been compiled from 2009 to 2014 and is presented in Table 4. Four community types, two wetland and two upland, were identified and mapped at the mitigation site in 2014 (Figure 3, Appendix A). The community types are wetland Type 2 – *Phalaris arundinacea*, upland Type 7 – *Elymus repens* /*Poa pratensis*, wetland Type 8 – *Typha latifolia/Phalaris arundinacea,* and upland Type 10 – *Elymus repens/Sisymbrium altissimum*. The species composition is detailed by community type on the Monitoring Form (Appendix B) and is discussed below.

Wetland Type 2 – *Phalaris arundinacea* was identified on 1.42 acres at the north and east ends of the stream corridor. The species were dominated by reed canary grass, with less than 10 percent of spurless touch-me-not (*Impatiens ecalcarata*), Fuller's teasel (*Dipsacus fullonum*), hard-stem club-rush (*Schoenoplectus acutus*), climbing night shade (*Solanum dulcamara*), Baltic rush, and fowl bluegrass (*Poa palutris*) and 15 additional species. This community was increased by 1.1 acres in 2014 due to the integration of community 9 – *Nasturtium officinale/Carex nebrascensis* and wetland community 4 – *Carex nebrascensis/Poa palustris* into this wetland community. Wetland Type 4 had been located along the west end of the wetland corridor in 2013. Wetland Type 9 –*Nasturtium officinale/Carex nebrascensis* had been identified in the northwest corner of the mitigation site in 2013.

Table 4. Vegetation species identified from 2008 to 2011, 2013, and 2014 at the CSKT Peterson Wetland Mitigation Site.

Scientific Name	Common Name	Region 9 Wetland Indicator[1]
Agropyron cristatum	Crested Wheatgrass	NL
Alnus incana	Speckled Alder	FACW
Asparagus officinalis	Asparagus	FACU
Bromus arvensis	Field Brome	UPL
Bromus inermis	Smooth Brome	FAC
Bromus tectorum	Cheatgrass	NL
Cardaria draba	Whitetop	UPL
Carex nebrascensis	Nebraska Sedge	OBL
Carex stipata	Stalk-Grain Sedge	OBL
Carex utriculata	Northwest Territory Sedge	OBL
Carex vesicaria	Lesser Bladder Sedge	OBL
Cirsium arvense	Canadian Thistle	FAC
Cirsium vulgare	Bull Thistle	FACU
Cynoglossum officincale	Gypsy-Flower	FACU
Dactylis glomerata	Orchard Grass	FACU
Descurainia sophia	Herb Sophia	NL
Dianthus spp.	Pink	NL
Dipsacus fullonum	**Fuller's Teasel**	**FAC**
Eleocharis palustris	Common Spike-Rush	OBL
Elodea spp.	Waterweed	NL
Elymus repens	Creeping Wild Rye	FAC
Epilobium ciliatum	Fringed Willowherb	FACW
Festuca arundinacea	Tall fescue	NL
Festuca spp.	Fescue	NL
Geum macrophyllum	Large-Leaf Avens	FAC
Glyceria grandis	American Manna Grass	OBL
Impatiens ecalcarata	Spurless Touch-Me-Not	FACW
Iris pseudacorus	Pale-Yellow Iris	OBL
Juncus balticus	Baltic Rush	FACW
Juncus ensifolius	Dagger-Leaf Rush	FACW
Juncus sp.	Rush	NL
Juncus tenuis	Lesser Poverty Rush	FAC
Kochia scoparia	Mexican Kochia	NL
Lactuca serriola	Prickly Lettuce	FACU
Lemna minor	Common Duckweed	OBL
Lepidium campestre	Field Pepper-grass	NL
Lepidium perfoliatum	Clasping Pepperwort	FACU
Leucanthemum vulgare	Ox-Eye Daisy	FACU

[1] 2014 NWPL (Lichvar et al., 2014)

New species identified in 2014 are **bolded**.

Table 4. (Continued). Vegetation species identified from 2008 to 2011, 2013, and 2014 at the CSKT Peterson Wetland Mitigation Site.

Scientific Name	Common Name	Region 9 Wetland Indicator[1]
Malva neglecta	Dwarf Cheeseweed	NL
Medicago sativa	Alfalfa	UPL
Melilotus officinalis	Yellow Sweet-Clover	FACU
Mentha arvensis	American Wild Mint	FACW
Nasturtium officinale	Watercress	OBL
Nepeta cataria	Catnip	FACU
Oenanthe spp.	Waterdropwort	NL
Persicaria amphibia	Water Smartweed	OBL
Phalaris arundinacea	Reed Canary Grass	FACW
Plantago lanceolata	English Plantain	FACU
Poa palustris	Fowl Blue Grass	FAC
Poa pratensis	Kentucky Blue Grass	FAC
Poa sp.	Bluegrass	NL
Persicaria amphibia	Water Smartweed	OBL
Polygonum bistortoides	American Bistort	FACW
Potentilla recta	Sulphur Cinquefoil	NL
Potentilla sp.	**Cinquefoil**	**NL**
Rosa woodsii	Woods' Rose	FACU
Rumex crispus	Curly Dock	FAC
Salix bebbiana	Gray Willow	FACW
Salix drummondiana	Drummond's Willow	FACW
Salix sp.	**Willow**	**NL**
Schoenoplectus acutus	Hard-Stem Club-Rush	OBL
Scirpus microcarpus	Red-Tinge Bulrush	OBL
Sisymbrium altissimum	Tall Hedge-Mustard	FACU
Solanum dulcamara	Climbing Nightshade	FAC
Sonchus arvensis	Field Sow-Thistle	FACU
Suaeda calceoliformis	Paiuteweed	FACW
Thlaspi arvense	Field Pennycress	UPL
Tragopogon dubius	Meadow Goat's-beard	NL
Trifolium pratense	Red Clover	FACU
Trifolium sp.	Clover	NL
Typha latifolia	Broad-Leaf Cat-Tail	OBL
Verbascum blattaria	White Moth Mullein	UPL
Verbascum thapsus	Great Mullein	FACU

[1] 2014 NWPL (Lichvar et al., 2014)

New species identified in 2014 are **bolded**.

Upland Type 7 – *Elymus repens/ Poa pratensis*, the largest community, dominated 20.57 acres on the upland terraces north and south of the creek corridor. Dominant vegetation consisted of creeping wild rye (*Elymus repens*), Kentucky bluegrass (*Poa pratensis*), smooth brome (*Bromus inermis*), Fuller's teasel, and 20 additional species.

Wetland Type 8 – *Typha latifolia/Phalaris arundinacea* was located on 1.67 acres that defined a majority of the riparian corridor associated with the unnamed perennial tributary. Broad-leaf cat-tail and reed canary grass dominated the community in 2014. Speckled alder, Northwest Territory sedge (*Carex utriculata*), fringed willow-herb (*Epilobium ciliatum*), and twenty-three additional species each contributed less than five percent of the total vegetation cover within the wetland community.

Upland Type 10 – *Elymus repens/Sisymbrium altissimum* replaced upland Type 6 – *Sisymbrium altissimum* in 2013. The species dominance shifted following weed control activities. This 1.36-acre community was identified in the northeast corner of the site. The community was dominated by creeping wild rye with minor amounts of tall tumble mustard (*Sisymbrium altissimum*), smooth brome, and bull thistle (*Cirsium vulgare*).

Vegetation results for Transect 1 are detailed on the Monitoring Form (Appendix B) and summarized in Table 5 and Charts 1 and 2. Photographs of the transect end points are shown in Appendix C.

Upland community Type 7 and wetland Type 8 dominated Transect 1 in 2013 and 2014 (Chart 1). The community structure changed slightly in 2011 from the upland Type 1 and wetland Type 3 seen from 2008 to 2010. Approximately 70.8 percent of the transect was dominated by hydrophytic species in 2014, the same as in 2013. This transect has shown an increasing trend in wetland habitat development since 2010.

Table 5. CSKT Peterson Transect 1 data summary for 2008 to 2011, 2013, and 2014.

Monitoring Year	2008	2009	2010	2011	2013	2014
Transect Length (feet)	144	144	144	144	144	144
Vegetation Community Transitions along Transect	3	3	2	2	2	2
Vegetation Communities along Transect	2	2	2	2	2	2
Hydrophytic Vegetation Communities along Transect	1	1	1	1	1	1
Total Vegetative Species	19	24	25	16	17	19
Total Hydrophytic Species	9	14	13	10	13	15
Total Upland Species	10	10	12	6	4	4
Estimated % Total Vegetative Cover	100	87	90	95	95	95
Estimated % Unvegetated	0	13	10	5	5	5
% Transect Length Comprising Hydrophytic Vegetation Communities	45	45	45.1	55.6	70.8	70.8
% Transect Length Comprising Upland Vegetation Communities	55	55	54.9	44.4	29.2	29.2
% Transect Length Comprising Unvegetated Open Water	0	0	0	0	0	0
% Transect Length Comprising Mudflat	0	0	0	0	0	0

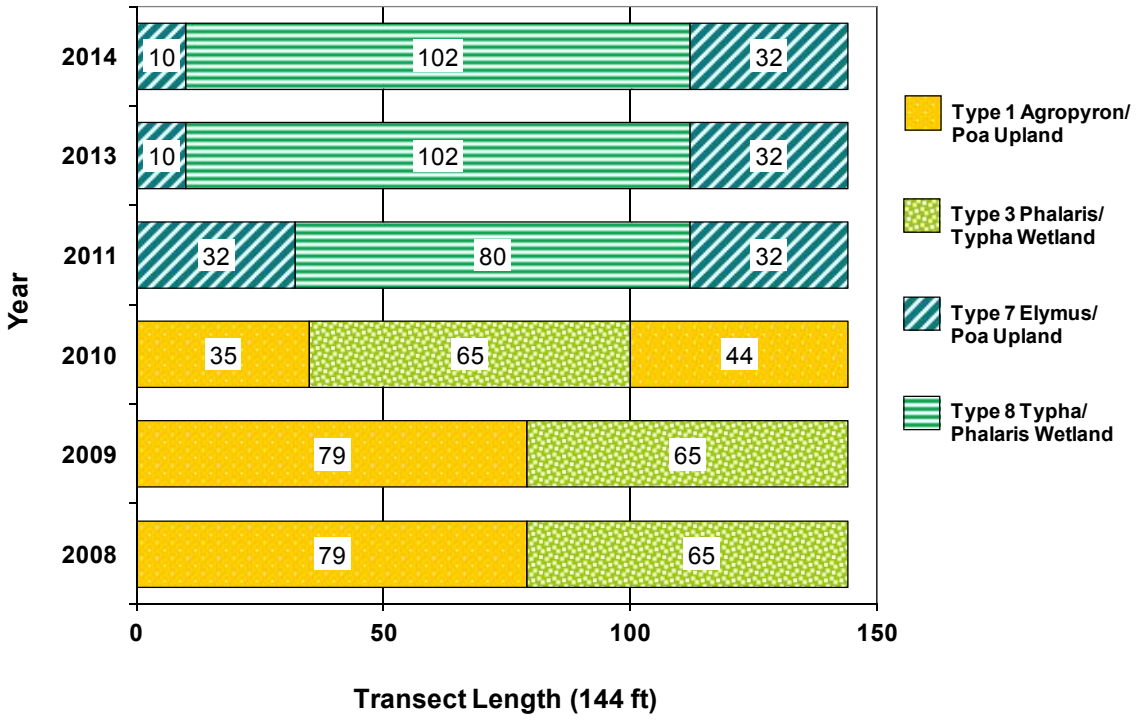


Chart 1. CSKT Peterson Transect 1 maps showing vegetation types from transect start (0 feet) to finish (144 feet) from 2008 to 2011, 2013, and 2014.

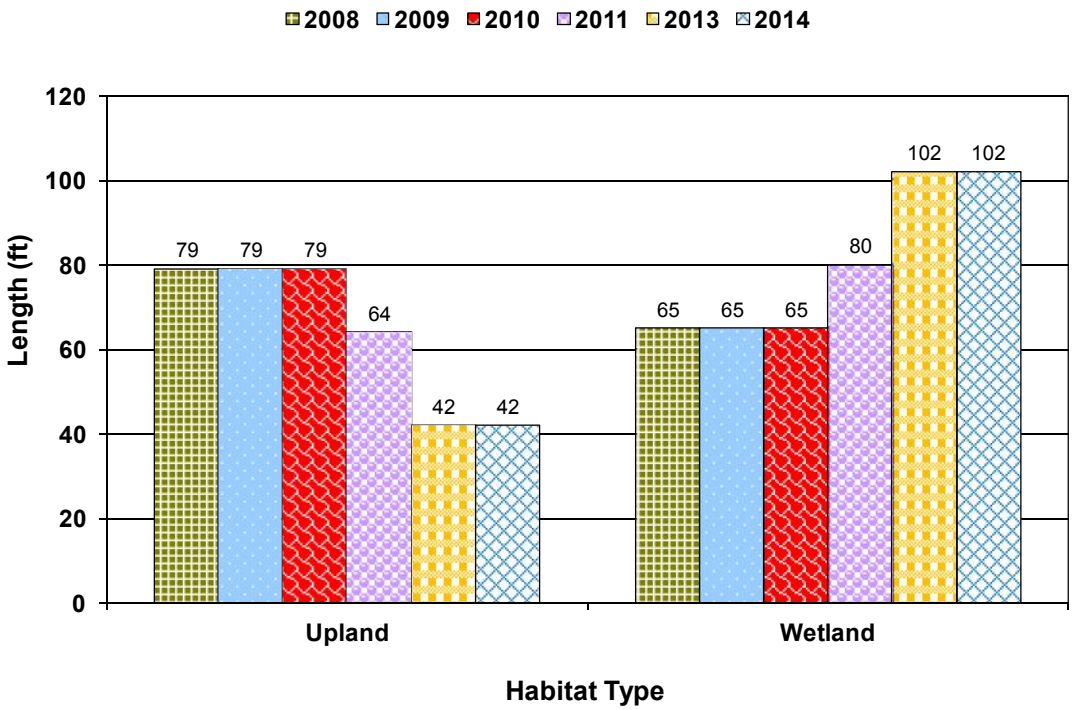


Chart 2. Length of vegetation habitats within CSKT Peterson Transect 1 from 2008 to 2011, 2013, and 2014.

Two community types were present along Transect 2 in 2014 and included wetland community Type 8 and upland community Type 7 (Table 6, Charts 3 and 4). Wetland Type 4 *Carex/Poa* was replaced by Type 8 between 2013 and 2014 as broad-leaf cat-tail and reed canarygrass increased dominance through this 30-foot interval. Approximately 54.8 percent of the transect was dominated by hydrophytic species in 2013 and 2014, a 16 percent decrease since 2011 and an over 35 percent decrease since 2010 (Table 20, Chart 12). The decrease of wetland habitat within the belt transect may be the result of the contraction of the wetland exacerbated by the location of the transect along the wetland/upland boundary. The failure of the crib dam to impound water at this location may have contributed to the decrease in the extent of wetland habitat.

Table 6. CSKT Peterson Transect 2 data summary for 2008 to 2011, 2013, and 2014.

Monitoring Year	2008	2009	2010	2011	2013	2014
Transect Length (feet)	325	325	325	325	325	325
Vegetation Community Transitions along Transect	3	3	2	3	3	3
Vegetation Communities along Transect	3	3	3	3	3	2
Hydrophytic Vegetation Communities along Transect	2	2	2	2	2	1
Total Vegetative Species	21	23	22	18	15	18
Total Hydrophytic Species	11	11	11	10	10	13
Total Upland Species	10	12	11	8	5	5
Estimated % Total Vegetative Cover	93	85	85	90	90	90
Estimated % Unvegetated	7	15	15	10	10	10
% Transect Length Comprising Hydrophytic Vegetation Communities	90	90	90.5	70.8	54.8	54.8
% Transect Length Comprising Upland Vegetation Communities	10	10	9.5	29.2	45.2	45.2
% Transect Length Comprising Unvegetated Open Water	0	0	0	0	0	0
% Transect Length Comprising Mudflat	0	0	0	0	0	0

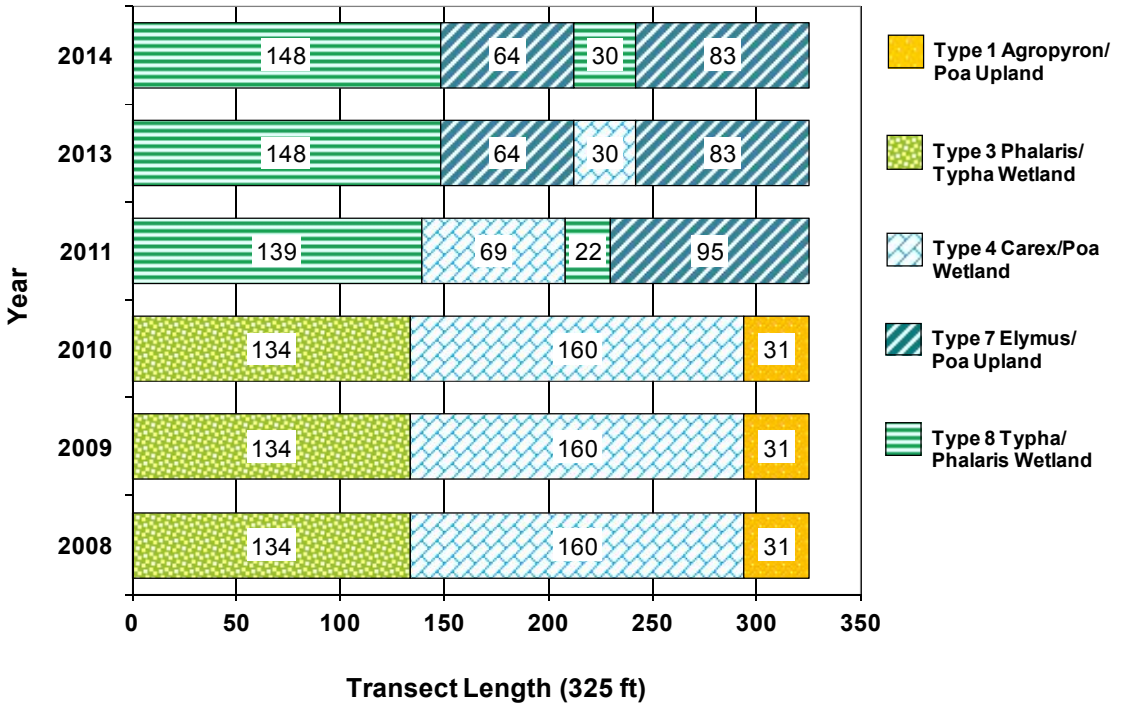


Chart 3. CSKT Peterson Transect 2 maps showing vegetation types from transect start (0 feet) to finish (325 feet) from 2008 to 2011, 2013, and 2014.

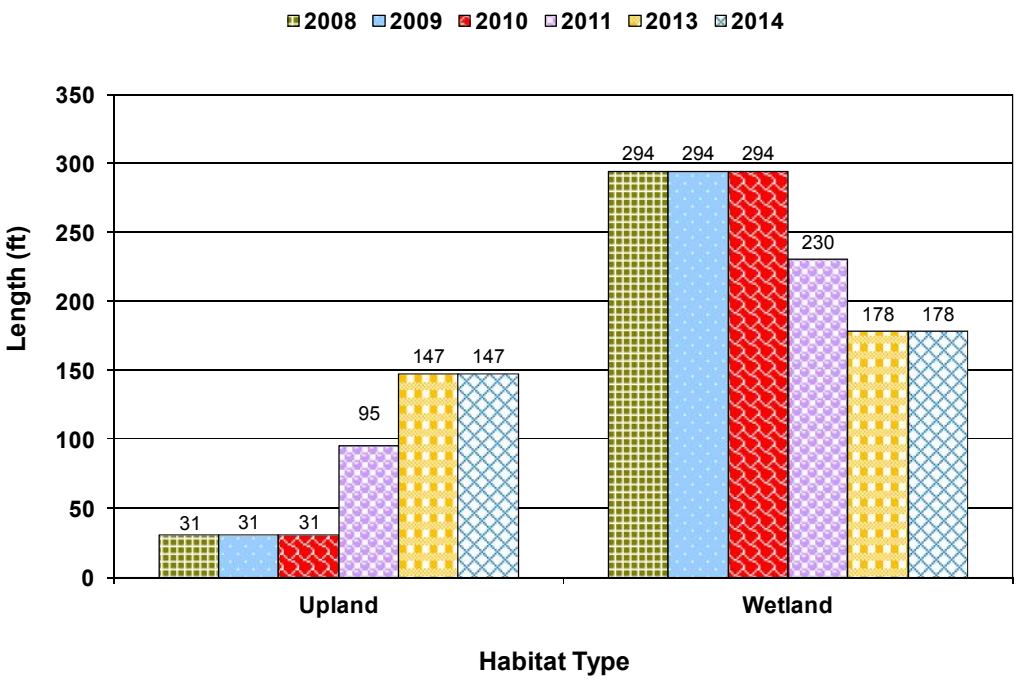


Chart 4. Length of vegetation habitats within CSKT Peterson Transect 2 from 2008 to 2011, 2013, and 2014.

The location of a Priority 2A noxious weed, yellowflag iris (*Iris pseudacous*), and Priority 2B noxious weeds, Canadian thistle (*Cirsium arvense*), sulfur cinquefoil (*Potentilla recta*), oxeye daisy (*Chyrsanthehmum leucanthemum*), and gypsy-flower (houndstongue – *Cynoglossum officinale*), observed during 2014 field monitoring were mapped on Figure 3 (Appendix A). The eight Canadian thistle infestations were generally less than 0.1 acre in size in 2014. The percent cover ranged from trace (less than 1 percent) to moderate (6 to 25 percent). Gypsy-flower, oxeye daisy, and yellowflag iris were found at trace (less than 1 percent) to low (1 to 5 percent) cover classes, on less than 0.1 acre. Sulfur cinquefoil was identified in two areas covering less than 0.1 acre, with less than 1 percent cover. Extensive weed control has been conducted on this site every year since 2009. Weed control was conducted at this site in June and again in late July of 2013 and in May and early July of 2014.

Wetland and riparian vegetation were planted in 2007. The plants included native containerized shrubs, cuttings, and grass-like seedlings. Plants were installed along the constructed log crib structures, excavated oxbow depressions, wetland fringes, and disturbed areas. Woody species survival including the number of live plants was recorded on the Monitoring Form (Appendix B). Shrub and tree planting survival data were collected along transects established along the edges of the wetland swale encompassing the creation and enhancement mitigation areas. The majority of the planted species along the upland/wetland boundary died shortly following planting. Approximately 40 live speckled alder, 20 willows, and 35 live Wood's rose were observed in 2014. The live plants looked healthy with moderate to vigorous growth for the season and few

discolored leaves. Speckled alder planted within the wetland boundaries and inundated areas exhibited a significant increase in height since 2013. Overall survival was considered low based on the visual assessment conducted in 2014; however, the shrub species that have survived appear to be thriving and contributing to the development of scrub-shrub habitat at this site. Natural recruitment of alder within the site appears to be contributing to the scrub-shrub habitat along the riparian corridor.

3.3. Soil

The project site was mapped in the Lake County Soil Survey (NRCS 2010) as Colake loam, on 0 to 1 percent slopes, and Ronan silty clay loam. The Colake series are poorly drained soils, occurring in swales and depressions on plains and stream terraces. This series is included on the Montana Hydric Soil List. The Ronan series consists of very deep, well-drained soils that were not identified on either the national or Montana hydric soil lists. The map units were generally confirmed by test pit soils at wetland data point.

Data point P-1w met the hydric soil criteria. Test pit P-1w displayed a gray (10 YR 5/1) silt loam soil with yellowish brown (10 YR 5/6) redoximorphic concentrations in the matrix. The depleted matrix was indicative of a hydric soil. The profile at P-1u revealed a light gray (10 YR 7/1) silt loam without redox features. There were no positive indicators of hydric soil at data point P-1u.

3.4. Wetland Delineation

Two data points were collected in 2014 to determine the wetland and upland boundaries at the site (Wetland Data Forms, Appendix B). The wetland boundaries were delineated and mapped on Figure 3 in Appendix A. The delineation identified 3.09 acres of wetland in 2013 and 2014, a decrease of 1.16 acres since 2011 (Table 7). Approximately 1.1 acres of the decrease was attributed to previously delineated, marginal wetlands being reclassified as upland habitat in 2013. A portion of the decrease may be associated with refinement of the mapping techniques for the wetland boundary along the approximate one-quarter mile long riparian corridor. The wetland boundaries were originally mapped by hand drawing the boundary on non-orthorectified aerial photographs. Additionally, some of the decline in wetland habitat may be attributed to a decline in hydrology as a result of failing crib structures within the site. The current wetland boundary as presented on Figure 3 was surveyed with a GPS during the 2013 and 2014 field visits for enhanced accuracy.

Table 7. Aquatic habitat acreages delineated from 2009 to 2011, 2013, and 2014 at the CSKT Peterson Wetland Mitigation Site.

Aquatic Habitat	2009	2010	2011	2013	2014
Wetland Area (acres)	3.71	4.18	4.25	3.09	3.09

3.5. Wildlife

A list of wildlife species observed directly and indirectly at the site from 2008 to 2014 is presented in Table 8. Forty-three red-wing blackbirds (*Agelaius*

phonecius), three black-billed magpies (*Pica hudsonia*), six song sparrows (*Melospiza melodia*), and three cedar waxwing (*Bombycilla cedrorum*) were observed in 2014. Sign and bird activity codes are noted on the Monitoring Form in Appendix B. Two white-tailed deer (*Odocoileus virginianus*) and the tracks of a grizzly bear (*Ursus artos*) were also observed in 2014. An adjacent landowner reported spotting a grizzly sow and cub within the riparian community on the mitigation property in 2014.

Table 8. Wildlife species observed at the CSKT Peterson Wetland Mitigation Site from 2008 to 2011, 2013, and 2014.

COMMON NAME	SCIENTIFIC NAME
AMPHIBIAN	
Columbia Spotted Frog	*Rana luteiventris*
REPTILE	
Plains Gartersnake	*Thamnophis radix*
Terrestrial Gartersnake	*Thamnophis elegans*
INVERTEBRATE	
Unk crayfish	Crayfish sp.
BIRD	
American Kestrel	*Falco sparverius*
American Robin	*Turdus migratorius*
Barn Swallow	*Hirundo rustica*
Black-billed Magpie	***Pica hudsonia***
Canada Goose	*Branta canadensis*
Cedar Waxwing	***Bombycilla cedrorum***
Grasshopper Sparrow	*Ammodramus savannarum*
Gray Partridge	*Perdix perdix*
Killdeer	*Charadrius vociferus*
Mallard	*Anas platyrhynchos*
Marsh Wren	*Cistothorus palustris*
Mourning Dove	*Zenaida macroura*
Northern Harrier	*Circus cyaneus*
Red-winged Blackbird	***Agelaius phoeniceus***
Ring-necked Pheasant	*Phasianus colchicus*
Song Sparrow	***Melospiza melodia***
Sora	*Porzana carolina*
Sparrow Spp.	*Passer sp.*
Vesper Sparrow	*Pooecetes gramineus*
Western Bluebird	*Sialia mexicana*
Western Meadowlark	*Sturnella neglecta*
Yellow-headed Blackbird	*Xanthocephalus xanthocephalus*
MAMMAL	
Black Bear	*Ursus americanus*
Deer Spp.	*Odocoileus sp.*
Grizzly Bear	***Ursus arctos***
Meadow Vole	*Microtus pennsylvanicus*
Muskrat	*Ondatra zibethicus*
Raccoon	*Procyon lotor*
White-tailed Deer	***Odocoileus virginianus***

Species identified in 2014 are **bolded**.

3.6. Functional Assessment

Results of the 2004 (baseline), 2008 to 2011, 2013, and 2014 functional assessment are summarized in Table 9. The 2014 Wetland Assessment Form is included in Appendix B. The total aquatic habitat developed to date within the 25-acre project area is 3.09 acres.

The Peterson Property was evaluated as one assessment area (AA-1) that encompassed 3.09 acres in 2013 and 2014. The AA was rated as a Category II wetland in 2014 with 78 percent of the total possible points and 26.57 total functional units. A gain of 7 percentage points was realized in 2014 and was the result of the documented sighting of a grizzly bear on site and the improvement of structural diversity as shrub-scrub habitat continues to develop on the site. The rating for the T&E species habitat function increased from low to high. The functional unit (FU) gain from 2013 to 2014 was 1.55 FU. The decrease in total functional units between 2011 and 2014 corresponds with the overall decrease of wetland acreage at the Peterson mitigation site, presumably the result of a log crib structure failure. Functional ratings were high for general wildlife habitat, short and long term surface water storage, sediment/shoreline stabilization, sediment/nutrient/toxicant removal, production export/food chain support, groundwater discharge/recharge, and recreation/educational potential.

3.7. Photo Documentation

Photographs of photo points PP1 to PP6 (Figure 2, Appendix A) and of the transect endpoints are shown on pages C-1 to C-5 of Appendix C. The data points are shown on C-6

3.8. Maintenance Needs

The location of a Priority 2A noxious weed, yellowflag iris (*Iris pseudacous*), and Priority 2B noxious weeds, Canadian thistle (*Cirsium arvense*), sulfur cinquefoil (*Potentilla recta*), oxeye daisy (Chyrsanthehmum leucanthemum), and gypsy-flower (houndstongue – *Cynoglossum officinale*), observed during 2014 field monitoring were mapped on Figure 3, Appendix A. The eight Canadian thistle infestations were generally less than 0.1 acre in size in 2014. The percent cover ranged from trace (less than 1 percent) to moderate (6 to 25 percent). Gypsy-flower, oxeye daisy, and yellowflag iris were found at trace (less than 1 percent) to low (1 to 5 percent) cover classes, on less than 0.1 acre. Sulfur cinquefoil was identified in two areas covering less than 0.1 acre, with less than 1 percent cover. Extensive weed control has been conducted on this site every year since 2009. Weed control was conducted at this site in June and again in late July of 2013 and in May and early July of 2014. The MDT will continue to complete weed control measures based on the annual monitoring results.

Based on a conversation with MDT personnel in 2013, several of the log crib structures were not functioning as designed and were not impounding water. An evaluation of these structures in 2014 revealed that some of these structures appeared to have been compromised as water was piping through instead of being impounded. It is recommended that MDT repair the log cribs to restrict water from going under and through the structures.

Table 9. Summary of 2004 (Baseline), 2008 to 2011, 2013, and 2014 wetland function/value ratings and functional points at the US 93 Peterson Wetland Mitigation Site.

Function and Value Parameters from the MDT Montana Wetland Assessment Method (1999)	2004 (Baseline) (AA-1)	2008 (AA-1)	2009 (AA-1)	2010 (AA-1)	2011 (AA-1)	2013 (AA-1)	2014 (AA-1)
Listed/Proposed T&E Species Habitat	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	High (0.8)
MTNHP Species Habitat	Low (0.1)	Low (0.1)	Low (0.1)	Low (0.1)	Low (0.1)	Low (0.1)	Low (0.1)
General Wildlife Habitat	Low (0.5)	Mod (0.7)	Mod (0.7)	Mod (0.7)	High (0.9)	High (0.9)	High (0.9)
General Fish/Aquatic Habitat	Low (0.1)	NA	NA	NA	NA	NA	NA
Flood Attenuation	Low (0.2)	Mod (0.4)	Mod (0.4)	Mod (0.4)	Mod (0.4)	Mod (0.5)	Mod (0.5)
Short and Long Term Surface Water Storage	Mod (0.4)	High (0.8)	High (0.8)	High (0.8)	High (0.8)	High (0.8)	High (0.8)
Sediment/Nutrient/Toxicant Removal	High (0.9)	High (0.9)	High (0.9)	High (0.9)	High (0.9)	High (1.0)	High (1.0)
Sediment/Shoreline Stabilization	High (0.7)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)
Production Export/Food Chain Support	High (0.8)	High (0.8)	High (0.8)	High (0.8)	High (0.8)	High (0.8)	High (0.9)
Groundwater Discharge/Recharge	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)
Uniqueness	Low (0.2)	Low (0.3)	Low (0.3)	Mod (0.4)	Mod (0.4)	Mod (0.4)	Mod (0.6)
Recreation/Education Potential	Low (0.1)	Mod (0.5)	Mod (0.5)	High (1.0)	High (1.0)	High (1.0)	High (1.0)
Actual Points / Possible Points	**5.3 / 12**	**6.8 / 11**	**6.8 / 11**	**7.4 / 11**	**7.6 / 11**	**7.8 / 11**	**8.6 / 11**
% of Possible Score Achieved	**44%**	**61%**	**61%**	**67%**	**69%**	**71%**	**78%**
Overall Category	**III**	**III**	**III**	**II**	**II**	**II**	**II**
Total Acreage of Assessed Wetlands and Open Water within Easement (ac)	**1.26**	**3.71**	**3.71**	**4.18**	**4.25**	**3.09**	**3.09**
Total Functional Units (acreage x actual points) **(fu)**	**6.68**	**25.23**	**25.23**	**30.93**	**32.30**	**24.10**	**26.57**
Net Acreage Gain (ac)	NA	**2.45**	**2.45**	**2.92**	**2.99**	**1.83**	**1.83**
Net Functional Unit Gain	NA	**18.55**	**18.55**	**24.25**	**25.62**	**17.42**	**19.89**

3.9. Current Credit Summary

The wetland acreage delineated in 2014 totaled 3.09 acres, consistent with 2013 and less than the 1.16 acres delineated in 2011. The net acreage gain from 2004 to 2014 is 1.83 acres and the functional unit gain is 18.97. Table 10 summarizes the 2014 estimated credits for the Peterson mitigation site. The 2011 estimated credits were separated into individual mitigation types. The acreages were calculated for each type and credit ratios were applied for the CSKT and USACE crediting systems. The Peterson mitigation types were creation and rehabilitation under the USACE system and creation and secondary restoration under the CSKT system.

The following equation was used to calculate the USACE enhancement ratio for rehabilitation activities based on the total functional assessment point scores listed in Table 9. The formula was developed to measure the post-construction functional lift expected to occur after rehabilitation of the mitigation site.

Enhancement factor = $(F_{post} - F_{pre}) / F_{pre}$
Enhancement factor = (7.6 – 5.3) / 5.3; Enhancement factor = 0.43
Enhancement ratio = 1/ 0.43 = 2.33

The site has earned 2.38 USACE credit acres and 1.22 CSKT credit acres to date. The 2014 credit estimates have not yet exceeded the USACE and CSKT projected acreages for the mitigation site.

Table 10. Credit summary for 2009 to 2011, 2013, and 2014 at the CSKT Peterson Property Wetland Mitigation Site.

Targeted Mitigation Type	Projected Credit (acre)		Credit Ratio		2009 Wetland (acre)	2009 Credit (acre)		2010 Wetland (acre)	2010 Credit (acre)	
	USACE	CSKT	USACE	CSKT		USACE	CSKT		USACE	CSKT
Creation	2.14	0.64	1:1	3.36:1	2.46	2.46	0.73	2.93	2.93	0.87
Rehabilitation/ secondary restoration	0.25	0.67	3.57:1 (2009) 2.50:1 (2010) 2.33:1 (2011) 2.33:1 (2013)	1.86:1	1.25	0.35	0.67	1.25	0.50	0.67
Total	**2.39**	**1.31**	--	--	**3.71**	**2.81**	**1.40**	**4.18**	**3.43**	**1.54**

Targeted Mitigation Type	2011 Wetland (acre)	2011 Credit (acre)		2013 Wetland (acre)	2013 Credit (acre)		2014 Wetland (acre)	2014 Credit (acre)	
		USACE	CSKT		USACE	CSKT		USACE	CSKT
Creation	3.00	3.00	0.89	1.84	1.84	0.55	1.84	1.84	0.55
Rehabilitation/ secondary restoration	1.25	0.54	0.67	1.25	0.54	0.67	1.25	0.54	0.67
Total	**4.25**	**3.54**	**1.56**	**3.09**	**2.38**	**1.22**	**3.09**	**2.38**	**1.22**

There were no quantitative performance measures or success criteria established for this site. Created wetlands within the project corridor were to

meet the three parameter criteria for hydrology, vegetation, and soils established for wetland determination as outlined in the 1987 Corps of Engineers Wetland Delineation Manual for the Determination of Wetlands. All wetlands delineated within the site in 2014 met the three-parameter criteria for hydrology, vegetation, and soils, satisfying the indicated measure of success for this site.

4. REFERENCES

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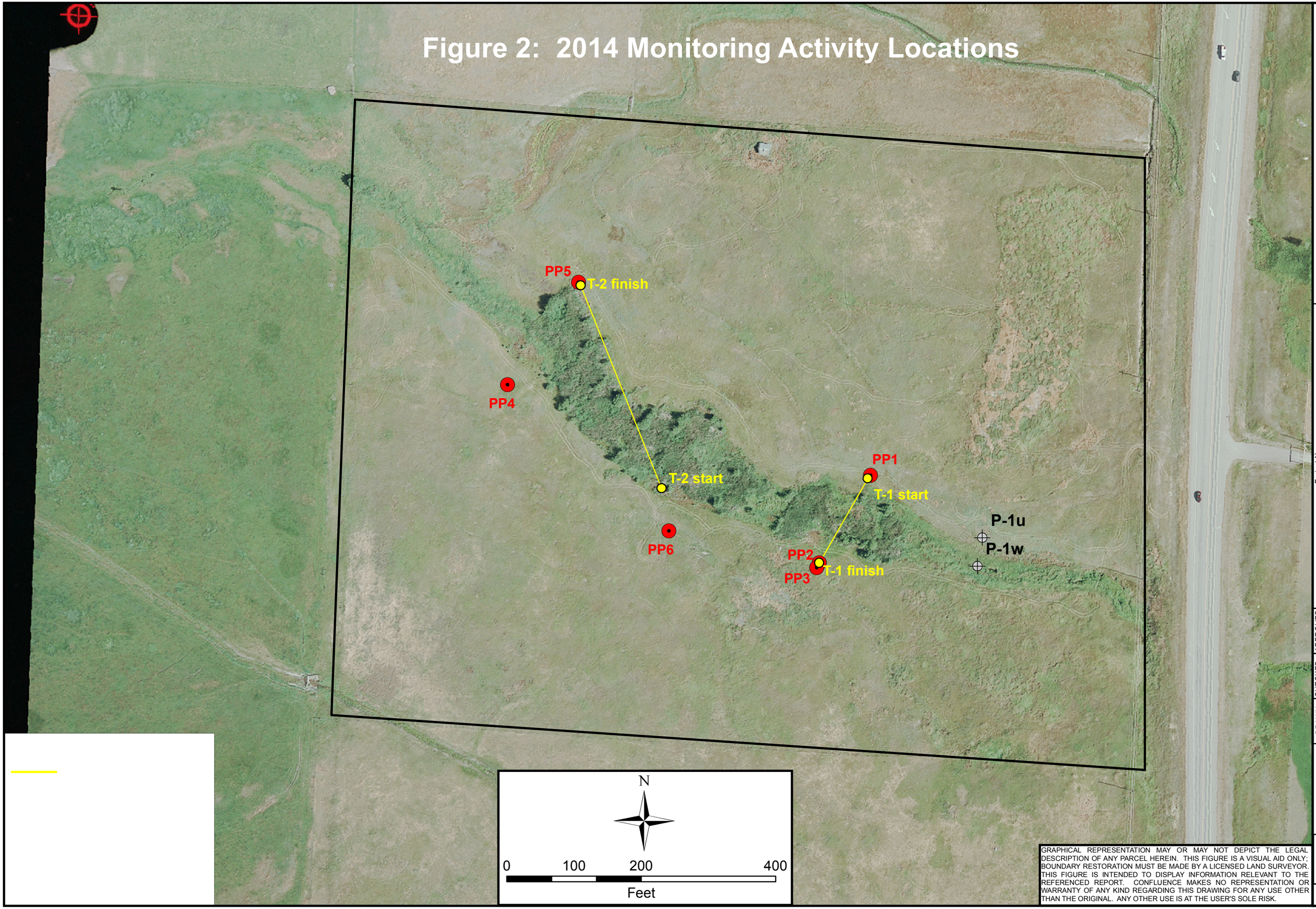
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Appendix A

Figures 2 and 3

MDT Wetland Mitigation Monitoring
Peterson Property
Lake County, Montana

Figure 2: 2014 Monitoring Activity Locations



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. CONFLUENCE 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.

LOCATION: Lake Co., MT

PROJECT NO: NH 5-2(122)31

FILE: Peterson/Monitor2014.mxd

Project Name
US-93 Peterson Mitigation Site

Drawing Title
2014 Monitoring Activity Locations

DRAWN	CHECKED	APPROVED
BCS	BV	LU

SCALE: Noted

Drawn: October 10, 2014

PROJ MGR: B Sandefur

CONFLUENCE
consulting incorporated

Figure
2

REV -

Figure 3: 2014 Mapped Site Features

Legend

Monitoring Limits

Wetland Limits

Vegetation Communities

Base Photography Date: July 26, 2014

Noxious Weeds

Cirsium arvense

Cynoglossum officinale

Chrysanthemum leucanthemum

Iris pseudacorus

Potentilla recta

Infestation Size

X = <0.1 acre

▲ = 0.1 to 1 acre

■ = 1 to 5 acre

Cover Class

T = Trace (<1% cover)

L = Low (1-5% cover)

M = Moderate (6-25% cover)

H = High (26-100% cover)

Vegetation Community Types

8 Phalaris arundinacea

Elymus repens/Poa pratensis

Typha latifolia/Phalaris arundinacea

10 Elymus repens/Sisymbrium altissimum

N

0 100 200 400

Feet

Acreages

Project Area	25.01 acres
Wetland Area	3.09 acres
Uplands	21.92 acres

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. CONFLUENCE 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.

LOCATION: Lake Co., MT

PROJECT NO: NH 5-2(122)31

FILE: US93Peterson/Veg2014.mxd

Project Name: US-93 Peterson Mitigation Site

Drawing Title: 2014 Mapped Site Features

DRAWN BCS | CHECKED BV | APPROVED LU

SCALE: Noted

Drawn: October 10, 2014

PROJ MGR: B Sandefur

CONFLUENCE consulting Incorporated

Figure 3

REV -

Appendix B

2014 MDT Wetland Mitigation Site Monitoring Form
2014 USACE Routine Wetland Determination Data Forms
2014 MDT Montana Wetland Assessment Form

MDT Wetland Mitigation Monitoring
Peterson Property
Lake County, Montana

MDT WETLAND MITIGATION SITE MONITORING FORM

Project Site: US93 North Peterson Assessment Date/Time 8/6/2014 9:00:00 AM

Person(s) conducting the assessment: B. Sandefur, E Sandefur

Weather: Sunny, smokey, 90s Location: St. Ignatius

MDT District: Missoula Milepost: 35.5

Legal Description: T 19N R 20W Section(s) 35

Initial Evaluation Date: 8/15/2008 Monitoring Year: 5 #Visits in Year: 1

Size of Evaluation Area: 25 (acres)

Land use surrounding wetland:

Pasture land and agricultural uses to the north, south, west. US 93 Corridor to the east.

HYDROLOGY

Surface Water Source: Unnamed tributary to Post Creek; irrigation ditch diversion

Inundation: ☑ Average Depth: 0.5 **(ft)** Range of Depths: 0-3 **(ft)**

Percent of assessment area under inundation: 10 %

Depth at emergent vegetation-open water boundary: 1 **(ft)**

If assessment area is not inundated then are the soils saturated within 12 inches of surface: Yes

Other evidence of hydrology on the site (ex. – drift lines, erosion, stained vegetation, etc:

Inundation, saturation, drainage pattern, water-stained leaves, FAC-neutral test

Groundwater Monitoring Wells

Record depth of water surface below ground surface, in feet.

Well ID	Water Surface Depth (ft)
No wells	

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.

Hydrology Notes:

VEGETATION COMMUNITIES

Site US93 North Peterson

(Cover Class Codes **0** = < 1%, **1** = 1-5%, **2** = 6-10%, **3** = 11-20%, **4** = 21-50% , **5** = >50%)

Community # 2 **Community Type:** Phalaris arundinacea / **Acres** 1.42

Species	Cover class	Species	Cover class
Alnus incana	0	Carex utriculata	0
Cirsium arvense	0	Cirsium vulgare	0
Dipsacus fullonum	1	Epilobium ciliatum	0
Geum macrophyllum	0	Impatiens ecalcarata	2
Iris pseudacorus	0	Juncus balticus	1
Lactuca serriola	0	Leucanthemum vulgare	0
Mentha arvensis	0	Nasturtium officinale	0
Phalaris arundinacea	5	Poa palustris	1
Rosa woodsii	0	Rumex crispus	0
Schoenoplectus acutus	1	Scirpus microcarpus	0
Solanum dulcamara	1	Typha latifolia	0

Comments:

Community # 7 **Community Type:** Elymus repens / Poa pratensis **Acres** 20.57

Species	Cover class	Species	Cover class
Alnus incana	0	Bromus arvensis	1
Bromus inermis	2	Carex nebrascensis	0
Cirsium arvense	1	Cirsium vulgare	0
Cynoglossum officinale	0	Dactylis glomerata	0
Dipsacus fullonum	2	Elymus repens	5
Geum macrophyllum	0	Lactuca serriola	0
Lepidium perfoliatum	0	Mentha arvensis	0
Phalaris arundinacea	0	Plantago lanceolata	0
Poa pratensis	3	Potentilla recta	0
Rosa woodsii	1	Rumex crispus	0
Sisymbrium altissimum	1	Sonchus arvensis	1
Suaeda calceoliformis	1	Thlaspi arvense	0

Comments:

Community # 8 **Community Type:** Typha latifolia / Phalaris arundinacea **Acres** 1.67

Species	Cover class	Species	Cover class
Alnus incana	2	Aquatic macrophytes	0
Carex nebrascensis	0	Carex utriculata	2
Cirsium arvense	1	Cynoglossum officinale	0
Dipsacus fullonum	1	Epilobium ciliatum	2
Geum macrophyllum	0	Glyceria grandis	1
Impatiens ecalcarata	0	Iris pseudacorus	0
Juncus balticus	0	Juncus ensifolius	0
Juncus tenuis	0	Mentha arvensis	0
Persicaria amphibia	0	Phalaris arundinacea	3
Plantago lanceolata	0	Poa palustris	0
Poa pratensis	1	Potentilla sp.	0
Rosa woodsii	1	Rumex crispus	0
Salix sp.	0	Solanum dulcamara	0
Sonchus arvensis	1	Typha latifolia	5

Comments:

Community # 10 **Community Type:** Elymus repens / Sisymbrium altissimum **Acres** 1.36

Species	Cover class	Species	Cover class
Bromus inermis	1	Cirsium vulgare	0
Elymus repens	3	Sisymbrium altissimum	1

Comments:

Change in dominant species of the vegetation community following weed control activities, old com
6. The vegetation community is currently dominated by quackgrass instead of tumble mustard.

Total Vegetation Community Acreage **25.02**

(Note: some area within the project bounds may be open water or other non-vegetative ground cover.)

VEGETATION TRANSECTS

Site: US93 North Peterson Date: 8/6/2014 9:00:00 AM

Transect Number: 1 **Compass Direction from Start:** 210

Interval Data:

Ending Station 10 **Community Type:** Elymus repens / Poa pratensis

Species	Cover class	Species	Cover class
Cirsium arvense	0	Cynoglossum officinale	0
Dipsacus fullonum	1	Elymus repens	1
Phalaris arundinacea	3	Poa pratensis	4
Rosa woodsii	0	Thlaspi arvense	0

Ending Station 112 **Community Type:** Typha latifolia / Phalaris arundinacea

Species	Cover class	Species	Cover class
Carex utriculata	3	Cirsium arvense	0
Dipsacus fullonum	0	Epilobium ciliatum	3
Impatiens ecalcarata	1	Iris pseudacorus	0
Juncus balticus	1	Mentha arvensis	0
Persicaria amphibia	0	Phalaris arundinacea	2
Rosa woodsii	1	Typha latifolia	5

Ending Station 144 **Community Type:** Elymus repens / Poa pratensis

Species	Cover class	Species	Cover class
Alnus incana	1	Cirsium arvense	1
Dipsacus fullonum	2	Elymus repens	2
Geum macrophyllum	0	Phalaris arundinacea	1
Poa pratensis	4	Potentilla recta	0
Rosa woodsii	0		

Transect Notes:

Transect Number: 2 **Compass Direction from Start:** 340

Interval Data:

Ending Station 148 **Community Type:** Typha latifolia / Phalaris arundinacea

Species	Cover class	Species	Cover class
Alnus incana	2	Cirsium arvense	2
Dipsacus fullonum	2	Epilobium ciliatum	1
Geum macrophyllum	0	Impatiens ecalcarata	1
Mentha arvensis	0	Phalaris arundinacea	3
Plantago lanceolata	0	Rosa woodsii	1
Typha latifolia	5		

Ending Station 212 **Community Type:** Elymus repens / Poa pratensis

Species	Cover class	Species	Cover class
Alnus incana	1	Bromus arvensis	0
Cirsium arvense	1	Elymus repens	1
Poa pratensis	5	Rosa woodsii	1
Thlaspi arvense	0		

Ending Station 242 **Community Type:** Typha latifolia / Phalaris arundinacea

Species	Cover class	Species	Cover class
Alnus incana	1	Carex nebrascensis	3
Cirsium arvense	1	Cynoglossum officinale	0
Dipsacus fullonum	0	Epilobium ciliatum	1
Geum macrophyllum	0	Poa palustris	5
Typha latifolia	2		

Ending Station 325 **Community Type:** Elymus repens / Poa pratensis

Species	Cover class	Species	Cover class
Bromus arvensis	0	Cirsium arvense	2
Cynoglossum officinale	0	Elymus repens	1
Mentha arvensis	0	Phalaris arundinacea	0
Poa pratensis	5	Rosa woodsii	1
Thlaspi arvense	0		

Transect Notes:

PLANTED WOODY VEGETATION SURVIVAL

US93 North Peterson

Planting Type	#Planted	#Alive	Notes
Alnus incana	1163	40	
Betula occidentalis	817	0	
Cornus alba	408	0	
Crataegus douglasii		0	
Ribes hudsonianum	245	0	
Rosa woodsii	450	35	
Salix bebbiana		0	
Salix spp.	408	20	
Symphoricarpos albus		0	

Comments

The majority of the planted species along the upland / wetland boundary have died over the monitoring period. General observations were recorded regarding woody vegetation located within the wetlands areas. Alder planted within the wetland boundaries and areas of inundation were observed to have vigorous growth and significant increase in height since previous monitoring. Natural recruitment of alder appears to be occurring.

US93 North Peterson

WILDLIFE

Birds

Were man-made nesting structures installed? No

If yes, type of structure: _____

How many? _____

Are the nesting structures being used? No

Do the nesting structures need repairs? No

Nesting Structure Comments:

Species	#Observed	Behavior	Habitat
Black-billed Magpie	3	F, L	SS, WM
Cedar Waxwing	3	F	SS
Red-winged Blackbird	43	FO, L	MA
Song Sparrow	6	F, L	SS, UP, WM

Bird Comments

BEHAVIOR CODES

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

HABITAT CODES

AB = Aquatic bed **SS** = Scrub/Shrub **FO** = Forested **UP** = Upland buffer **I** = Island

WM = Wet meadow **MA** = Marsh **US** = Unconsolidated shore **MF** = Mud Flat **OW** = Open Water

Mammals and Herptiles

Species	# Observed	Tracks	Scat	Burrows	Comments
Grizzly Bear		Yes	No	No	
White-tailed Deer	2	Yes	Yes	No	

Wildlife Comments:

Adjacent landowner reported spotting a grizzly sow and cub within the riparian community on the mitigation property.

US93 North Peterson

PHOTOGRAPHS

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.

Photo #	Latitude	Longitude	Bearing	Description
3302	47.361565	-114.098856	215	PP1, T-1 start
3303	47.361565	-114.098856	135	T-1 start
3304	47.361174	-114.099143	45	PP3
3305	47.361174	-114.099143	100	PP2
3306	47.361174	-114.099143	45	T-1 end
3307	47.361174	-114.099143	35	T-1 end
3310	47.361289	-114.100042	315	PP6, T-2 start
3311	47.361286	-114.100043	315	PP6
3312	47.361845	-114.101063	30	PP4
3319	47.362278	-114.100671	135	PP5, T-2 end
3322	47.361335	-114.098161	270	P-1u
3325	47.361219	-114.098179	115	P-1w

Comments:

US93 North Peterson

ADDITIONAL ITEMS CHECKLIST

Hydrology

☑ Map emergent vegetation/open water boundary on aerial photos.
☑ Observe extent of surface water. Look for evidence of past surface water elevations (e.g. drift lines, vegetation staining, erosion, etc).

Photos

☑ One photo from the wetland toward each of the four cardinal directions
☑ One photo showing upland use surrounding the wetland.
☑ One photo showing the buffer around the wetland
☑ One photo from each end of each vegetation transect, toward the transect

Vegetation

☑ Map vegetation community boundaries

☑ Complete Vegetation Transects

Soils

☑ Assess soils

Wetland Delineations

☑ Delineate wetlands according to applicable USACE protocol (1987 form or Supplement)
☑ Delineate wetland – upland boundary onto aerial photograph.

Wetland Delineation Comments

Functional Assessments

☑ Complete and attach full MDT Montana Wetland Assessment Method field forms.

Functional Assessment Comments:

The functional ratings for the site remained similar with a category II rating.

Maintenance

Were man-made nesting structure installed at this site? No

If yes, do they need to be repaired?

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 in need of repair? Yes

If yes, describe the problems below.

Per conversation with MDT personnel in 2013, several of the water control structures did not appear to be functioning as designed and were not impounding water. An evaluation of these structures in 2014 revealed that some of these structures had been compromised and water was piping through instead of impounding water. It is recommended MDT conduct repairs to the log cribs to prevent water from going under/through these structures.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: US93 Peterson | City/County: St. Ignatius - Lake Co. | Sampling Date: 8/6/2014

Applicant/Owner: MDT | State: MT | Sampling Point: P-1u

Investigator(s): B Sandefur | Section, Township, Range: S 35 T 19N R 20W

Landform (hillslope, terrace, etc.): Toeslope | Local relief (concave, convex, none): flat | Slope (%):

Subregion (LRR): LRR E | Lat: 47.361335 | Long: -114.09816 | Datum: WGS84

Soil Map Unit Name: Colake silt loam, 0 to 1 percent slopes | NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☑ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☑ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☑ No ☐	Is the Sampled Area within a Wetland? Yes ☐ No ☑
Hydric Soil Present?	Yes ☐ No ☑	
Wetland Hydrology Present?	Yes ☐ No ☑	

Remarks:
Upland companion point to P-1w, located along dry sideslope above influence of drainage and seasonal high water.

VEGETATION - Use scientific names of plant

Tree Stratum Plot size (30 Foot Radius) — Absolute % Cover: | Domiant Species? | Indicator Status

Sapling/Shrub Stratum Plot size (15 Foot Radius)

Herbaceous Stratum Plot size (5 Foot Radius)

Bromus inermis	60	☑	FAC
Elymus repens	30	☑	FAC
Thlaspi arvense	10	☐	UPL

Woody Vine Stratum Plot size (30 Foot Radius)

Percent Bare Ground

Dominance Test worksheet

Number of Dominant Species that are OBL, FACW or FAC:	2	(A)
Total Number of Dominant Species Across All Strata:	2	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	100	% (A/B)

Prevalence Index worksheet

Total % Cover of:			Multiply by:
OBL species	0	X 1	0
FACW species	0	X 2	0
FAC species	90	X 3	270
FACU species	0	X 4	0
UPL species	10	X 5	50
Column Totals	100 (A)		320 (B)

Prevalence Index = B/A = 3.2

Hydrophytic Vegetation Indicators

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☐ 3 - Prevalence Index is <= 3.0
- ☐ 4 - Morphological Adaptations (Provide supporting data in remarks or on separate sheet.
- ☐ 5 - Wetland Non-Vascular Plants
- ☐ Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric sil and wetland hydrology must be present, unless disturbed or problematic for #3, 4, 5.

Hydrophytic Vegetation Present? Yes ☑ NO ☐

Remarks:

SOIL

Sampling Point: P-1u

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 7/1	100					Silt Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ☐ No ☑

Remarks:
Soils friable with no redox.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) **(LRR A)**
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Raised Ant Mounds (D6) **(LRR A)**
- ☐ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ☐ No ☑ Depth (inches): _____

Water Table Present? Yes ☐ No ☑ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ☐ No ☑ Depth (inches): _____

Wetland Hydrology Present? Yes ☐ No ☑

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Point dry, no signs of wetland hydrology.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: US93 Peterson | City/County: St. Ignatius - Lake Co. | Sampling Date: 8/6/2014

Applicant/Owner: MDT | State: MT | Sampling Point: P-1w

Investigator(s): B Sandefur | Section, Township, Range: S 35 T 19N R 20W

Landform (hillslope, terrace, etc.): Valley bottom | Local relief (concave, convex, none): flat | Slope (%):

Subregion (LRR): LRR E | Lat: 47.361218 | Long: -114.09818 | Datum: WGS84

Soil Map Unit Name: Colake silt loam, 0 to 1 percent slopes | NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☑ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☑ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☑ No ☐	**Is the Sampled Area within a Wetland?** Yes ☑ No ☐
Hydric Soil Present?	Yes ☑ No ☐	
Wetland Hydrology Present?	Yes ☑ No ☐	

Remarks:
Data point approx 5 ft from channel (2-3ft wide, 1 ft deep).

VEGETATION - Use scientific names of plant

Tree Stratum Plot size (30 Foot Radius) — Absolute % Cover: | Domiant Species? | Indicator Status

Sapling/Shrub Stratum Plot size (15 Foot Radius)

Herbaceous Stratum Plot size (5 Foot Radius)

Epilobium ciliatum	5	☐	FACW
Phalaris arundinacea	90	☑	FACW
Solanum dulcamara	5	☐	FAC

Woody Vine Stratum Plot size (30 Foot Radius)

Percent Bare Ground

Dominance Test worksheet

Number of Dominant Species that are OBL, FACW or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 % (A/B)

Prevalence Index worksheet

Total % Cover of:			Multiply by:
OBL species	0	X 1	0
FACW species	95	X 2	190
FAC species	5	X 3	15
FACU species	0	X 4	0
UPL species	0	X 5	0
Column Totals	100 (A)		205 (B)

Prevalence Index = B/A = 2.05

Hydrophytic Vegetation Indicators

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☑ 3 - Prevalence Index is <= 3.0
- ☐ 4 - Morphological Adaptations (Provide supporting data in remarks or on separate sheet.
- ☐ 5 - Wetland Non-Vascular Plants
- ☐ Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric sil and wetland hydrology must be present, unless disturbed or problematic for #3, 4, 5.

Hydrophytic Vegetation Present? Yes ☑ NO ☐

Remarks:

SOIL

Sampling Point: P-1w

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-7	10YR 5/1	100					Silt Loam	
7-15	10YR 5/1	95	10YR 5/6	5	C	M		

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ☑ No ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☑ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) **(LRR A)**
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☑ FAC-Neutral Test (D5)
- ☐ Raised Ant Mounds (D6) **(LRR A)**
- ☐ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ☑ No ☐ Depth (inches): 1

Water Table Present? Yes ☑ No ☐ Depth (inches): 0

Saturation Present? (includes capillary fringe) Yes ☑ No ☐ Depth (inches): 0

Wetland Hydrology Present? Yes ☑ No ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

MDT Montana Wetland Assessment Form (revised 5/25/1999)

1. Project name US 93 North Peterson **2. MDT project#** NH 5-2(122)31 **Control#**

3. Evaluation Date 8/6/2014 **4. Evaluators** B. Sandefur **5. Wetland/Site# (s)** AA-1

6. Wetland Location(s): T 19N **R** 20W **Sec1** 35 **T** **R** **Sec2**

Approx Stationing or Mileposts ~RP 35.5 US93 North

Watershed 17010212 **Watershed/County** Flathead / Lake County

7. Evaluating Agency Confluence for MDT **8. Wetland size acres** 3.09

Purpose of Evaluation

- ☐ **Wetlands potentially affected by MDT project**
- ☐ **Mitigation Wetlands: pre-construction**
- ☑ **Mitigation Wetlands: post construction**
- ☐ **Other**

How assessed: Measured e.g. by GPS

9. Assesssment area (AA) size (acres) 3.09

How assessed: Measured e.g. by GPS

10. Classification of Wetland and Aquatic Habitats in AA

HGM Class (Brinson)	System	Subsystem	Class (Cowardin)	Modifier (Cowardin)	Water Regime	% of AA
Riverine	Palustrine	none	Emergent Wetland	Impounded	Permanently flooded	70
Riverine	Riverine	lower perennial	Aquatic Bed	Impounded	Permanently flooded	5
Riverine	Riverine	lower perennial	Unconsolidated Bottom	Impounded	Permanently flooded	5
Riverine	Palustrine	none	Emergent Wetland	Impounded	seasonally flooded	10
Riverine	Palustrine	none	Scrub-Shrub Wetland	Impounded	Permanently flooded	10

11. Estimated Relative Abundance: (of similarly classified sites within the same major Montana Watershed Basin, see definitions) Common

12. General Condition of AA

i. Regarding disturbance: (use matrix below to determine [circle] appropriate resonse)

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	low disturbance	moderate 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%.	moderate disturbance	moderate disturbance	high disturbance
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%.	high disturbance	high disturbance	high disturbance

Comments: (types of disturbance, intensity, season, etc)

AA includes an unnamed perennial stream channel and adjacent wetlands, including those associated with a stream diversion that enters mitigation site from the north. Wetlands within AA constructed in 2006 and managed in a natural state. Adjacent AA is subject to grazing. Approximately 5% of the AA classified as Riverine (HGM) based on topography and inferred hydrologic connection to the stream.

ii. Prominent noxious, aquatic nuisance, other exotic species:

Cirsium arvense; Cirsium vulgare; Cardaria draba; Potentilla recta; Leucanthemum vulgare; & Iris pseudocorus.

iii. Brief descriptive summary of surrounding land use/habitat

Rangeland to the north, south, and west; US93 corridor to the east.

13. Structural Diversity: (Based on number of "Cowardin" vegetated classes present [do not include unvegetated classes], see #10 above)

# of "Cowardin" vegetated classes present in AA (see #10)	> 3 vegetated classes (or > 2 if one is forested)	2 vegetated classes (or 1 if forested)	< 1 vegetated class
Rating (circle)	H	M	L

Comments: Emergent, scrub/shrub, and aquatic bed vegetation types.

SECTION PERTAINING TO FUNCTION VALUES ASSESSMENT

14A. Habitat for Federally Listed or Proposed Threatened or Endangered Plants or Animals:

i. AA is documented (D) or suspected (S) to contain (circle one basedon definition contained in instructions):

Primary or critical habitat (list species)	**D S**	
Secondary habitat (list Species)	**D S**	Grizzly Bear (LT)
Incidental habitat (list species)	**D S**	
No usable habitat	**S**	

ii. Rating (use the conclusions from i above and the matrix below to arrive at [circle] the functional points and rating)

Highest Habitat Level	doc/primary	sus/primary	doc/secondary	sus/secondary	doc/incidental	sus/incidental	None
Functional Points and Rating	1H	.9H	.8H	.7M	.5L	.3L	0L

Sources for documented use USFWS T & E list, MNHP, adj landowner observation

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14B. Habitat for plant or animals rated S1, S2, or S3 by the Montana Natural Heritage Program: (not including species listed in14A above)

i. AA is documented (D) or suspected (S) to contain (circle one basedon definition contained in instructions):

Primary or critical habitat (list species)	**D S**	
Secondary habitat (list Species)	**D S**	
Incidental habitat (list species)	**D S**	Great Blue Heron (S3)
No usable habitat	**S**	

ii. Rating (use the conclusions from i above and the matrix below to arrive at [circle] the functional points and rating [H=high, M=moderate, or L=low] for the function)

Highest Habitat Level	Doc./primary	Sus./primary	Doc./secondary	Sus./secondary	Doc./incidental	Sus./incidental	None
Functional Points and Rating	1H	.8H	.7M	.6M	.2L	.1L	0L

Sources for documented use MNHP

14C. General Wildlife Habitat Rating:

i. Evidence of overall wildlife use in the AA Moderate

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
- ☐ interviews with local biologists 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
- ☐ interviews with local biologists with knowledge of the 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
- ☐ interviews with local biologists with knowledge of the AA

ii. Wildlife habitat features (Working from top to bottom, circle 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 instructions 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)	E	E	E	H	E	E	H	H	E	H	H	M	E	H	M	M	E	H	M	M
Moderate disturbance at AA (see #12i)	H	H	H	H	H	H	H	M	H	H	M	M	H	M	M	L	H	M	L	L
High disturbance at AA (see #12i)	M	M	M	L	M	M	L	L	M	M	L	L	M	L	L	L	L	L	L	L

iii. Rating (use the conclusions from i and ii above and the matrix below to arrive at [circle] the functional points and rating)

Evidence of wildlife use (i)	*Wildlife habitat features rating (ii)*			
	Exceptional	High	Moderate	Low
Substantial	1E	.9H	.8H	.7M
Moderate	.9H	.7M	.5M	.3L
Minimal	.6M	.4M	.2L	.1L

Comments General wildlife rated high based on low disturbance to the area and moderate habitat use.

14D. General Fish/Aquatic Habitat Rating: (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, etc.]. If the AA is not or was not historically used by fish due to lack of habitat, excessive gradient, etc., click ☑ **(NA)** here and proceed to the next function. If fish use occurs in the AA but is not desired from a resource management perspective [such as fish use within an irrigation canal], the Habitat Quality [i below] should be marked as "Low", applied accordingly in ii below, and noted in the comments.)

i. Habitat Quality (circle appropriate AA attributes in matrix to arrive at exceptional (E), high (H), moderate (M), or low (L) quality rating.

Duration of surface water in AA	Permanent/ Perennial			Seasonal/ Intermittent			Temporary/ Ephemeral		
Cover - % of waterbody in AA containing cover objects such as submerged logs, large rocks & boulders, overhanging banks, floating-leaved vegetation, etc.	>25%	10-25%	<10%	>25%	10-25%	<10%	>25%	10-25%	<10%
Shading - >75% of streambank or shoreline within AA contains riparian or wetland scrub-shrub or forested communities	E	E	H	H	H	M	M	M	M
Shading – 50 to 75% of streambank or shoreline within AA contains rip. Or wetland scrub-shrub or forested communities	H	H	M	M	M	M	M	L	L
Shading - <50% of streambank or shoreline within AA contains rip. Or wetland scrub-shrub or forested communities	H	M	M	M	L	L	L	L	L

ii. Modified Habitat Quality (Circle the appropriate response to the following question. If answer is Y, then reduce rating in i above by one level [E=H, H=M, M=L, L=L]). *Is fish use of the AA precluded or significantly reduced by a culvert, dike, or other man-made structure or activity or is the waterbody included on the MDEQ list of waterbodies in need of TMDL development with listed "Probable Impaired Uses" including cold or warm water fishery or aquatic life support?* Y ○ N ◉ Modified habitat quality rating = (circle) E H M L

iii. Rating (use the conclusions from i and ii above and the matrix below to arrive at [circle] the functional points and rating [E=exceptional, H=high, M=moderate, L=low] for this function)

Types of fish known or suspected within AA	*Modified Habitat Quality (ii)*			
	Exceptional	High	Moderate	Low
Native game fish	1E	.9H	.7M	5M
Introduced game fish	.9H	.8H	..6M	.4M
Non-game fish	.7M	.6M	.5M	.3L
No fish	.5M	.3L	.2L	.1L

Comments General fish habitat rating determined Not Applicable due to impassable barriers (log cribs) that prevent fish from using A

14E. Flood Attenuation: (applies only to wetlands subject to flooding via in-channel or overbank flow. If wetlands in AA are not flooded from in-channel or overbank flow, check ☐ **NA** here and proceed to the next function.)

i. Rating (working from top to bottom, use the matrix below to arrive at [circle] the functional points and rating [H=high, M=moderate, or L=low] for this function.

Estimated wetland area in AA subject to periodic flooding	≥ 10 acres			<10>2 acres			≤ 2 acres		
% of flooded wetland classified as forested, scrub/shrub, or both	75%	25-75%	<25%	75%	25-75%	<25%	75%	25-75%	<25%
AA contains not outlet or restricted outlet	1H	.9H	.6M	.8H	.7M	.5M	.4M	.3L	.2L
AA contains unrestricted outlet	.9H	.8H	.5M	.7M	.6M	.4M	.3L	.2L	.1L

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 (circle)? **Y** ○ **N** ◉

Comments: Log cribs installed to restrict flow.

14F. Short and Long Term Surface Water Storage: (Applies to wetlands that flood or pond from overbank or in-channel flow, precipitation, upland surface flow, or groundwater flow. If no wetlands in the AA are subject to flooding or ponding, check ☐ **NA** here and proceed to 14G.)

i. Rating (Working from top to bottom, use the matrix below to arrive at [circle] the functional points and rating. Abbreviations for surface water durations are as follows: P/P = permanent/perennial; S/I = seasonal/intermittent; and T/E = temporary/ephemeral [see instructions 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**	1H	.9H	.8H	.8H	.6M	.5M	.4M	.3L	.2L
Wetlands in AA flood or pond **< 5 out of 10 years**	.9H	.8H	.7M	.7M	.5M	.4M	.3L	.2L	.1L

Comments: AA constructed with log cribs to serve as impoundments for short and long term water storage behind.

14G. Sediment/Nutrient/Toxicant Retention and Removal: (Applies to wetlands 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 ☐ **NA** here and proceed to 14H.)

i. Rating (working from top to bottom, use the matrix below to arrive at [circle] the functional points and rating [H = high, M = moderate, or L = low])

Sediment, nutrient, and toxicant input levels within AA	AA receives or surrounding land use with potential to deliver levels of 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 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 with 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**	1H	.8H	.7M	.5M	.5M	.4M	.3L	.2L
AA contains **unrestricted outlet**	.9H	.7M	.6M	.4M	.4M	.3L	.2L	.1L

Comments: AA has restricted outlet and routinely floods.

14H Sediment/Shoreline Stabilization: (Applies only if AA occurs on or within the banks or a river, stream, or other natural or man-made drainage, or on the shoreline of a standing water body which is subject to wave action. If 14H does not apply, click ☐ **NA** here and proceed to 14I.)

i. Rating (working from top to bottom, use the matrix below to arrive at [circle] the functional points and rating)

*% 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%	1H	.9H	.7M
35-64%	.7M	.6M	.5M
< 35%	.3L	.2L	.1L

Comments: Species within the streambanks of unnamed tributary consist of grasses and shrubs with high stability ratings.

14I. Production Export/Food Chain Support:

i. Rating (working from top to bottom, use the matrix below to arrive at [circle] the functional points and rating [H=high, M=moderate, or L=low] for this function. Factor A = acreage of vegetated component in the AA; Factor B = Structural diversity rating from #13; Factor C = whether or not the AA contains a surface or subsurface outlet; the final three rows pertain to duration of surface water in the AA, where P/P=permanent/perennial; S/I=seasonal/intermittent; T/E/A=temporary/ephemeral or absent [see instructions 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	1H	.9H	.9H	.8H	.8H	.7M	.9H	.8H	.8H	.7M	.7M	.6M	.7M	.6M	.6M	.4M	.4M	.3L
S/I	.9H	.8H	.8H	.7M	.7M	.6M	.8H	.7M	.7M	.6M	.6M	.5M	.6M	.5M	.5M	.3L	.3L	.2L
T/E/A	.8H	.7M	.7M	.6M	.6M	.5M	.7M	.6M	.6M	.5M	.5M	.4M	.5M	.4M	.4M	.2L	.2L	.1L

Comments:

14J. Groundwater Discharge/Recharge: (check the appropriate indicators in i & 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:

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 arrive at [circle] the functional points and rating [H=high, L=low] for this function.

Criteria	*Functional Points and Rating*
AA is known Discharge/Recharge area or one or more indicators of D/R present	1H
No Discharge/Recharge indicators present	0.1L
Available Discharge/Recharge information inadequate to rate AA D/R potential	NA

Comments:

14K. Uniqueness:

i. Rating (working from top to bottom, use the matrix below to arrive at [circle] the functional points 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)	1H	.9H	.8H	.8H	.6M	.5M	.5M	.4M	.3L
Moderate disturbance at AA (#12i)	.9H	.8H	.7M	.7M	.5M	.4M	.4M	.3L	.2L
High disturbance at AA (#12i)	.8H	.7H	.6M	.6M	.4M	.3L	.3L	.2L	.1L

Comments:

14L. Recreation/Education Potential: i. Is the AA a known rec./ed. Site ○ Y ◉ **N** (If yes, rate as [circle] High [1] and go to ii; if no go to iii)

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

iii. **Based on the location, diversity, size, and other site attributes, is there strong potential for rec./ed. use?** ◉ Y ○ **N** (If yes, go to i then proceed to iv; if no, then rate as [circle] Low [0.1])

iv. **Rating** (use the matrix below to arrive at [circle] the functional points and rating [H=high, M=moderate, or L=low] for this function)

Ownership	*Disturbance at AA (#12i)*		
	Low	Moderate	High
Public ownership	1H	.5M	.2L
Private ownership	.7M	.3L	.1L

Final Rating:

1 H

Comments:

General Site Notes

FUNCTION & VALUE SUMMARY & OVERALL RATING FOR WETLAND/SITE #(S) AA-1

Function & Value Variables	Rating	Actual Functional Points	Possible Functional Points	Functional Units: (Actual Points x Estimated AA Acreage)
A. Listed/Proposed T&E Species Habitat	H	.8	1	2.472
B. MT Natural Heritage Program Species Habitat	L	.1	1	0.309
C. General Wildlife Habitat	H	.9	1	2.781
D. General Fish Habitat	NA	0	0	0
E. Flood Attenuation	M	.5	1	1.545
F. Short and Long Term Surface Water Storage	H	.8	1	2.472
G. Sediment/Nutrient/Toxicant Removal	H	1	1	3.09
H. Sediment/Shoreline Stabilization	H	1	1	3.09
I. Production Export/Food Chain Support	H	.9	1	2.781
J. Groundwater Discharge/Recharge	H	1	1	3.09
K. Uniqueness	M	.6	1	1.854
L. Recreation/Education Potential	H	1	1	3.09
Totals:		8.6	11	26.574
Percent of Possible Score		**78.18** %		

Category I Wetland: (Must satisfy **one** of the following criteria; if does not meet criteria, 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**
- ☐ Total actual functional points > 80% (round to nearest whole #) of total possible functional points

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

☐ **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 does not satisfy criteria go to Category III)
- ☐ "Low" rating for Uniqueness; **and**
- ☐ "Low" rating for Production Export/Food Chain Support; **and**
- ☐ Total actual functional points < 30% (round to nearest whole #) of total possible functional points

OVERALL ANALYSIS AREA RATING:
(circle appropriate category based on the criteria outlined below)

I **II** **III**

Appendix C

Project Area Photographs

MDT Wetland Mitigation Monitoring
Peterson Property
Lake County, Montana



Photo Point 1 – *Photo 1* **Location:** T-1 start
Bearing: 215 Degrees **Taken in 2009**



Photo Point 1 – *Photo 2* **Location:** PP1
Bearing: 175 Degrees **Taken in 2009**



Photo Point 1 – *Photo 1* **Location:** T-1 start
Bearing: 215 Degrees **Taken in 2013**



Photo Point 1 – *Photo 2* **Location:** PP1
Bearing: 135 Degrees **Taken in 2013**



Photo Point 1 – *Photo 1* **Location:** T-1 start
Bearing: 215 Degrees **Taken in 2014**



Photo Point 1 – *Photo 2* **Location:** PP1
Bearing: 135 Degrees **Taken in 2014**



Photo Point 2 – *Photo 1* **Location:** T-1 finish
Bearing: 45 Degrees **Taken in 2009**



Photo Point 2 – *Photo 2* **Location:** PP2
Bearing: 35 Degrees **Taken in 2009**



Photo Point 2 – *Photo 1* **Location:** T-1 finish
Bearing: 45 Degrees **Taken in 2011**



Photo Point 2 – *Photo 2* **Location:** PP2
Bearing: 35 Degrees **Taken in 2010**



Photo Point 2 – *Photo 1* **Location:** T-1 finish
Bearing: 45 Degrees **Taken in 2014**



Photo Point 2 – *Photo 2* **Location:** PP2
Bearing: 35 Degrees **Taken in 2014**



Photo Point 2 – *Photo 3* **Location:** PP2
Bearing: 110 Degrees **Taken in 2009**



Photo Point 3 – *Photo 1* **Location:** T-1 finish
Bearing: 45 Degrees **Taken in 2009**



Photo Point 2 – *Photo 3* **Location:** PP2
Bearing: 110 Degrees **Taken in 2013**



Photo Point 3 – *Photo 1* **Location:** T-1 finish
Bearing: 45 Degrees **Taken in 2013**



Photo Point 2 – *Photo 3* **Location:** PP2
Bearing: 110 Degrees **Taken in 2014**



Photo Point 3 – *Photo 1* **Location:** T-1 finish
Bearing: 45 Degrees **Taken in 2014**



Photo Point 4 – *Photo 1*
Bearing: 30 Degrees
Location: Looking across T-2
Taken in 2009



Photo Point 5 – *Photo 1*
Bearing: 175 Degrees
Location: Wetland boundary
Taken in 2009



Photo Point 4 – *Photo 1*
Bearing: 30 Degrees
Location: Looking across T-2
Taken in 2013



Photo Point 5 – *Photo 1*
Bearing: 135 Degrees
Location: Wetland boundary
Taken in 2013



Photo Point 4 – *Photo 1*
Bearing: 30 Degrees
Location: Looking across T-2
Taken in 2014



Photo Point 5 – *Photo 1*
Bearing: 45 Degrees
Location: Wetland boundary
Taken in 2013



Photo Point 6 – *Photo 1*
Bearing: 315 Degrees
Location: T-2 start
Taken in 2009



Photo Point 6 – *Photo 1*
Bearing: 315 Degrees
Location: T-2 start
Taken in 2013



Photo Point 6 – *Photo 1*
Bearing: 315 Degrees
Location: T-2 start
Taken in 2014



Data Point – P-1u
Bearing: 270 Degrees
Location: Veg Com 2
Taken in 2014

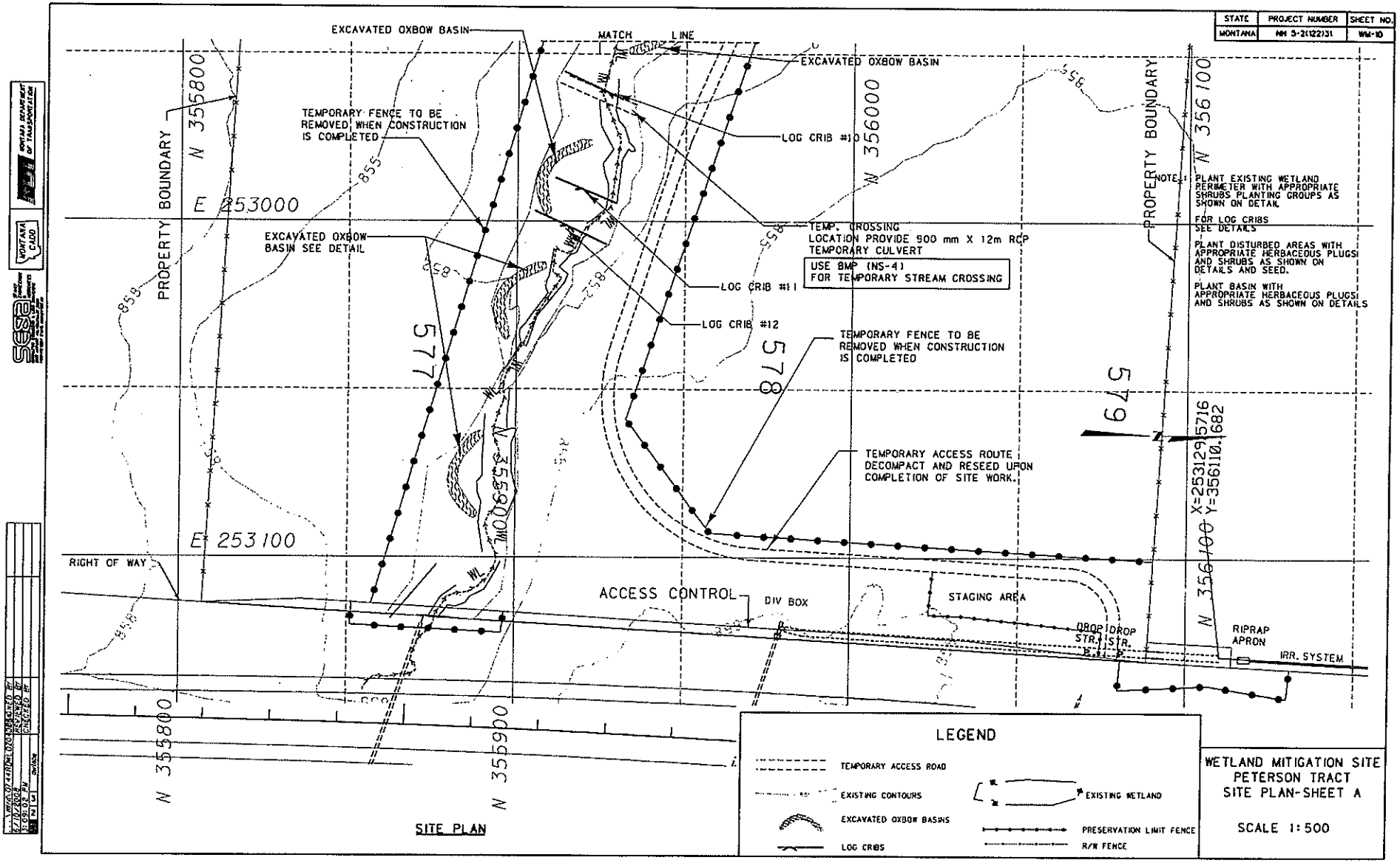


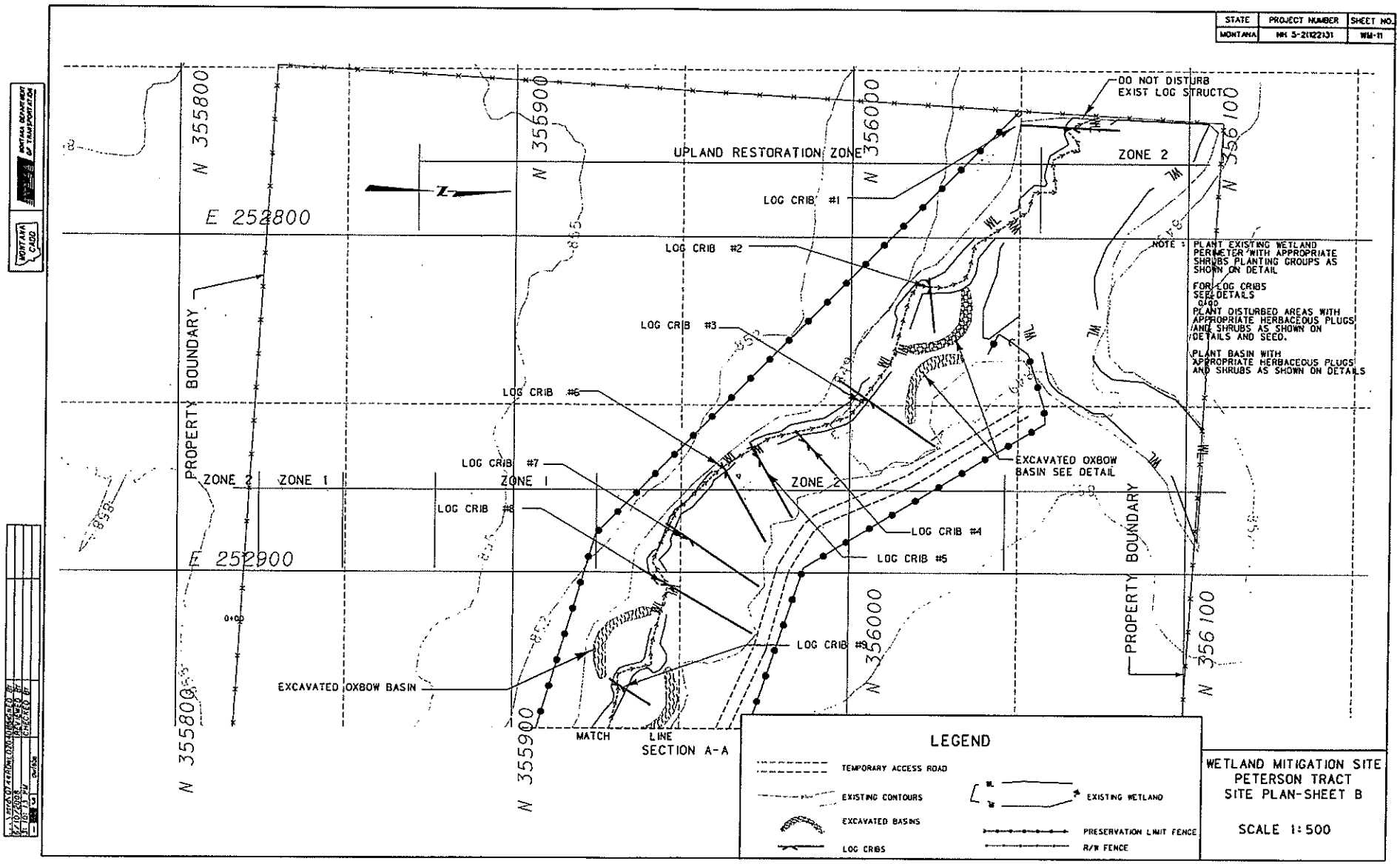
Data Point – P-1w
Bearing: 115 Degrees
Location: Veg Com 7
Taken in 2014

Appendix D

Original Site Plans

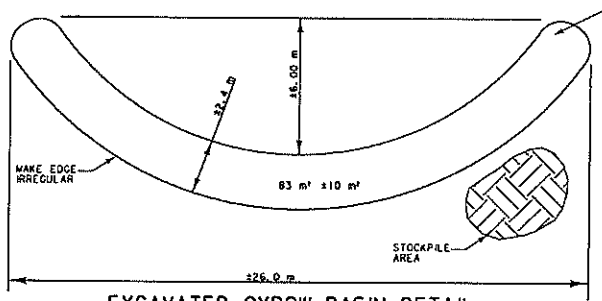
MDT Wetland Mitigation Monitoring
Peterson Property
Lake County, Montana


EXCAVATED OXBOW BASIN
MATCH LINE
EXCAVATED OXBOW BASIN
TEMPORARY FENCE TO BE REMOVED WHEN CONSTRUCTION IS COMPLETED
LOG CRIB #10
PROPERTY BOUNDARY
N 355800
E 253000
EXCAVATED OXBOW BASIN SEE DETAIL
TEMP. CROSSING LOCATION PROVIDE 900 mm X 12m RCP TEMPORARY CULVERT
USE BMP (NS-4) FOR TEMPORARY STREAM CROSSING
LOG CRIB #11
LOG CRIB #12
N 356000
PROPERTY BOUNDARY
N 356100
NOTE:
PLANT EXISTING WETLAND PERIMETER WITH APPROPRIATE SHRUBS PLANTING GROUPS AS SHOWN ON DETAIL
FOR LOG CRIBS SEE DETAILS
PLANT DISTURBED AREAS WITH APPROPRIATE HERBACEOUS PLUGS AND SHRUBS AS SHOWN ON DETAILS AND SEED.
PLANT BASIN WITH APPROPRIATE HERBACEOUS PLUGS AND SHRUBS AS SHOWN ON DETAILS
577
578
579
TEMPORARY FENCE TO BE REMOVED WHEN CONSTRUCTION IS COMPLETED
N 355900
E 253100
TEMPORARY ACCESS ROUTE DECOMPACT AND RESEED UPON COMPLETION OF SITE WORK.
X=253129.5716
Y=356110.1682
RIGHT OF WAY
ACCESS CONTROL
DIV BOX
STAGING AREA
DROP STR.
DROP STR.
RIPRAP APRON
IRR. SYSTEM
N 355800
N 355900
SITE PLAN
LEGEND
TEMPORARY ACCESS ROAD
EXISTING CONTOURS
EXCAVATED OXBOW BASINS
LOG CRIBS
EXISTING WETLAND
PRESERVATION LIMIT FENCE
R/W FENCE
WETLAND MITIGATION SITE
PETERSON TRACT
SITE PLAN-SHEET A
SCALE 1:500
STATE
MONTANA
PROJECT NUMBER
NH 5-2(122)31
SHEET NO.
WM-10


STATE
MONTANA
PROJECT NUMBER
NH 5-2(122)31
SHEET NO.
WM-11
DO NOT DISTURB EXIST LOG STRUCTO
UPLAND RESTORATION ZONE
ZONE 2
LOG CRIB #1
LOG CRIB #2
LOG CRIB #3
LOG CRIB #6
LOG CRIB #7
LOG CRIB #8
LOG CRIB #4
LOG CRIB #5
LOG CRIB #9
EXCAVATED OXBOW BASIN SEE DETAIL
EXCAVATED OXBOW BASIN
PROPERTY BOUNDARY
ZONE 1
N 355800
N 355900
N 356000
N 356100
E 252800
E 252900
MATCH LINE
SECTION A-A
NOTE :
PLANT EXISTING WETLAND PERIMETER WITH APPROPRIATE SHRUBS PLANTING GROUPS AS SHOWN ON DETAIL
FOR LOG CRIBS SEE DETAILS
PLANT DISTURBED AREAS WITH APPROPRIATE HERBACEOUS PLUGS AND SHRUBS AS SHOWN ON DETAILS AND SEED.
PLANT BASIN WITH APPROPRIATE HERBACEOUS PLUGS AND SHRUBS AS SHOWN ON DETAILS
LEGEND
TEMPORARY ACCESS ROAD
EXISTING CONTOURS
EXCAVATED BASINS
LOG CRIBS
EXISTING WETLAND
PRESERVATION LIMIT FENCE
R/W FENCE
WETLAND MITIGATION SITE
PETERSON TRACT
SITE PLAN-SHEET B
SCALE 1:500

PETERSON TRACT WETLAND MITIGATION DETAILS

STATE	PROJECT NUMBER	SHEET NO.
MONTANA	NH 5-2112(33)1	WM-7



EXCAVATED OXBOW BASIN DETAIL

7 LOCATIONS

NOTE:

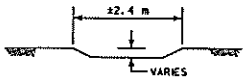
EXCAVATE APPROXIMATELY 12-18 m³ PER SITE AS DIRECTED BY PROJECT MANAGER. INCLUDE 100 mm OF TOPSOIL BELOW FINISHED GRADE

SALVAGE & PLACE 8 m³ OF TOPSOIL PER SITE

VARY DEPTH BETWEEN 150mm AND 300 mm

MINIMUM OF 2 m OF SEPARATION BETWEEN EXCAVATION AREA AND ZONE 1

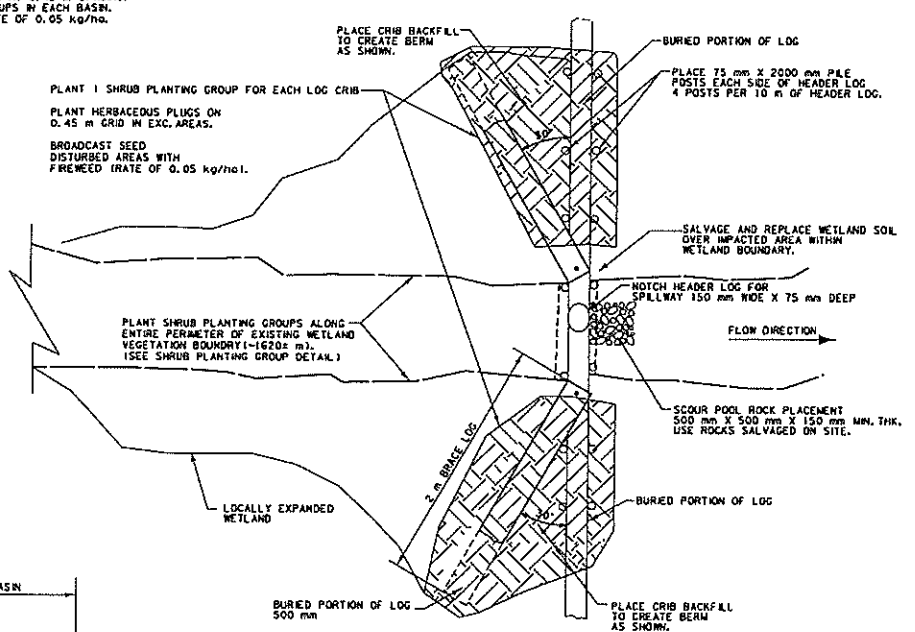
TYPICAL SECTION



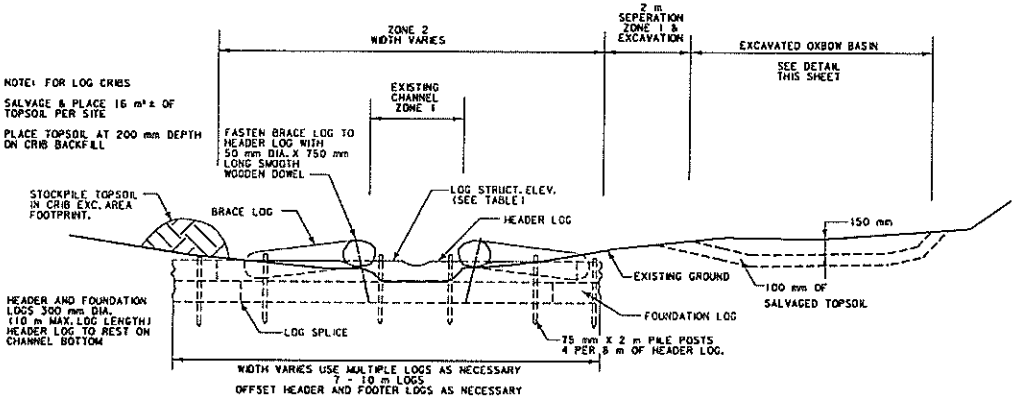
NOTE:

SEE SHEET WM-6 FOR PLANTING GROUP AND PLANTING DETAILS.

SEE SHEET WM-4 FOR LOG CRIB AND OXBOW SUMMARY.

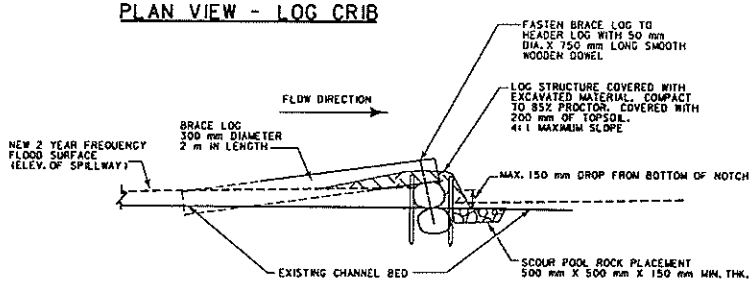


PLAN VIEW - LOG CRIB



SECTION VIEW - LOG CRIB

LOOKING DOWNSTREAM
SEE SUMMARY INFORMATION ON WM-4



PROFILE VIEW - LOG CRIB

WETLAND MITIGATION SITE
PETERSON TRACT
LOG CRIB AND OXBOW DETAILS

SCALE N. T. S.

Appendix E

Mitigation Crediting Systems

MDT Wetland Mitigation Monitoring
Peterson Property
Lake County, Montana

U.S. ARMY CORPS OF ENGINEERS
HELENA REGULATORY OFFICE
10 WEST 15TH STREET, SUITE 2200
HELENA, MONTANA 59626

December 18, 2002

REPLY TO
ATTENTION OF:

Helena Regulatory Office
(406) 441-1375 Phone
(406) 441-1380 Fax

Subject: Corps File Number 2001-90-416
US Highway 93: Evaro to Polson
Compensatory Wetland Mitigation Crediting

Mr. Tom Parker
Herrera Environmental Consultants, Inc.
101 East Broadway, Suite 610
Missoula, Montana 59802

Dear Mr. Parker:

The purpose of this letter is to outline a compensatory wetland mitigation crediting scheme for the Montana Department of Transportation (MDT) Evaro – Polson US 93 project. The project is being split into at least nine separate segments for the purposes of design and construction, but the corridor was the subject of a single integrated Environmental Impact Statement.

1. Compensatory mitigation must be developed for all unavoidable, non-isolated aquatic impacts on the entire Evaro-Polson project. Unavoidable impacts and a compensatory mitigation package will be reviewed on a watershed and corridor basis for all design segments.

2. All compensatory mitigation sites recognized by the US Army Corps of Engineers (Corps) must be protected by a perpetual conservation easement or similar permanent land use restriction.

3. Use the methods in the 1987 Corps Wetland Delineation Manual to determine whether or not an area is a wetland.

4. All compensatory mitigation for the corridor should be within the limits of the watershed described by USGS Hydrologic Unit Code 17010212, Lower Flathead River, Montana.

5. All wetland impacts must be assessed using the 1999 MDT Montana Wetland Assessment Method.

6. Wetland compensatory mitigation ratios will be based on use of the 1999 MDT Montana Wetland Assessment Method to assign a functional score. The baseline (pre-project) mitigation site assessment score will be compared to the post-project rating, as described in your December 3, 2002 Draft Memorandum to this office. The basis for awarding credit will be the same for on- and off-site mitigation areas. While the crediting method presented was generally acceptable, a review of the proposal has resulted on the following limits on mitigation crediting:

    7.1 **Creation:** The establishment of a wetland or other aquatic resource where one did not formerly exist. Creation of wetlands will result in a mitigation ratio of 1:1, with one acre of satisfactory wetland creation compensating for one acre of unavoidable wetland impact.

7.2 **Restoration:** Re-establishment of wetland and/or other aquatic resource characteristics and function(s) at a site where there were wetlands existed historically, but have been modified so that they are now considered non-wetland or exist in a substantially degraded state.

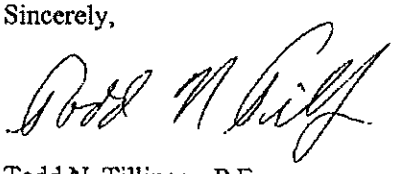
7.2.1 **Restoration (re-establishment)** of wetland characteristics to existing non-wetland areas that were historically wetlands will also result in a mitigation ratio of 1:1, with one acre of satisfactory wetland restoration of this type compensating for one acre of unavoidable wetland impact.

7.2.2 **Restoration (rehabilitation)** of wetland functions at existing wetland areas that exist in a substantially degraded state will result in a mitigation ratio of not less than 1½:1, with a minimum of one and a half acres of satisfactory wetland restoration of this type required to compensate for one acre of unavoidable wetland impact. For example, if the calculated crediting ratio for this type of site was calculated at 1.84:1, that is the ratio that would be used. If the calculation showed 1.34:1, the limit of 1½:1 would be used.

7.3 **Enhancement:** Altering the physical characteristics of an existing jurisdictional wetland such that it permanently modifies and improves one or more specific wetland functions with no corresponding decrease in any other functions. Examples include restoring normal hydrology to a partially drained wetland, or restoring a high level of species diversity to a monotypic plant community. Enhancement of existing wetland areas that are not substantially degraded will result in a mitigation ratio of not less than 3:1, with a minimum of three acres of satisfactory wetland enhancement of this type required to compensate for one acre of unavoidable wetland impact. For example, if the calculated crediting ratio for this type of site was calculated at 4.23:1, that is the ratio that would be used. If the calculation showed 2.23:1, the limit of 3:1 would be used.

This information is provided in response to our recent meeting and the December 3, 2002 Draft Memorandum on US 93 Wetland Mitigation Crediting provided by Herrera, Inc. Additional input from this office will be provided as necessary and as the plan for mitigation crediting matures. If you have questions feel free to call me at (406) 441-1375, and reference Corps File Number 2001-90-416.

Sincerely,



Todd N. Tillinger, P.E.
Project Manager

Cc: Gordon Stockstad – MDT Environmental Services, Helena, Montana
Scott Jackson – U.S. Fish and Wildlife Service, Helena, Montana
Craig Genzlinger – U.S. Federal Highway Administration, Helena, Montana
Steve Potts – U.S. Environmental Protection Agency, Helena, Montana

Herrera Environmental Consultants, Inc.

Memorandum

To	U.S. Army Corps of Engineers, Helena Office
cc	Montana Department of Transportation
From	Tom Parker, Herrera Environmental Consultants
Date	December 3, 2002
Subject	US 93 Wetland Mitigation Crediting

Introduction

Compensatory wetland mitigation, as credited by the Army Corps of Engineers, is often evaluated based on area ratios of mitigated wetlands to impacted wetlands. *Mitigated wetlands* include all wetland areas that are created, enhanced or preserved to compensate for impacted wetlands. Created wetlands are often credited at a 1:1 ratio, while existing wetlands that are enhanced or preserved may be credited at ratios ranging from 3:1 to 10:1.

Many opportunities exist along the US 93 corridor to enhance existing wetlands using combinations of active re-vegetation, land management change, weed management and other restoration actions. Often, it is difficult to determine the appropriate wetland credit ratio that should be assigned for a given wetland enhancement project. A quantitative basis for calculating appropriate enhancement ratios would benefit all participants in the wetland regulatory process. We understand that the regulatory agency has final authority to determine wetland mitigation credits.

Proposed Approach

We propose using the MDT Wetland Functional Assessment Method (MDT 1999) as a tool to measure the projected shift in wetland functions and values based on wetland mitigation activities. This method, which was used to assess functions and values of impacted wetlands along the corridor, evaluates 12 wetland functions and values (Tables 1 and 2). Using the procedure documented in MDT (1999), a wetland specialist assigns scores of 0 or 0.1 (low) to 1.0 (high) to each of the 12 categories at a particular site. These scores are totaled, resulting in a functional score for the site.

An evaluator measures projected shift in wetland functions and values by first assessing existing conditions on the site, then estimating changes in scores that would occur as a result of mitigation activities, and finally calculating the difference between these scores.

The shift in wetland function at a mitigation site could then be used to determine a crediting ratio for enhancement projects. Using this approach, the process for calculating wetland mitigation credits at a given site would have two components. First, a wetland creation component, assuming a 1:1 ratio for created wetlands, would be equal to the number of created wetland acres at a mitigation site. This creation component could be expressed as:

$A_{created}$ = Created wetland acres (1)

Second, an enhancement component would be the number of existing wetland acres to be enhanced, multiplied by an enhancement factor. The enhancement factor represents the ratio of functional shift (the difference between pre-project functional score and projected post-project functional score) to the pre-project functional score. The enhancement factor can be expressed as:

$$\text{Enhancement factor} = \left(\frac{F_{post} - F_{pre}}{F_{pre}} \right) \quad (2)$$

where:

F_{post} = Projected post-mitigation project functional score
F_{pre} = Pre-project functional score

Note: *The enhancement ratio is the inverse* $\left(\frac{1}{X}\right)$ *of the enhancement factor. The enhancement ratio is the term most frequently used to discuss crediting ratios for wetland mitigation projects. For example, an enhancement factor of 0.25 would be equal to an enhancement ratio of 4:1. This means that four enhanced acres at a particular site would be worth one acre of credit to offset wetland acres impacted by the project.*

The enhancement component of the equation can then be expressed as:

$$A_{existing}\left(\frac{F_{post} - F_{pre}}{F_{pre}} \right) \quad (3)$$

where:

$A_{existing}$ = Existing wetland acres to be enhanced
F_{post} = Projected post-mitigation project functional score
F_{pre} = Pre-project functional score

The following equation, which includes both a creation and enhancement component, can then be used to calculate wetland mitigation credits expressed as acres:

$$A_{credited} = A_{created} + A_{existing}\left(\frac{F_{post} - F_{pre}}{F_{pre}}\right) \quad (4)$$

where:

$A_{credited}$ = Wetland mitigation credits expressed as acres
$A_{created}$ = Wetland creation acres
$A_{existing}$ = Existing wetland acres to be enhanced
F_{post} = Projected post-mitigation project functional score
F_{pre} = Pre-project functional score

To demonstrate how these equations can be applied in the context of US 93 wetland mitigation, we have selected two proposed wetland mitigation sites as examples. The Bouchard property (Example 1) is a 40-acre parcel north of Arlee. The Ludwig property (Example 2) includes slightly less than 20 acres and is two miles north of St. Ignatius.

Example 1

The Bouchard property has been acquired recently by MDT. This site is near the headwaters of Spring Creek and supports a mixture of upland, emergent wetland and scrub/shrub wetland. A proposed wetland mitigation project at this site will include approximately 8 acres of wetland creation and up to 20 acres of wetland enhancement. A summary of pre- and post-project wetland functional scores is provided in Table 1.

Table 1. Expected change in wetland functions and values, Bouchard site.

	Functional Points Pre-Project	Functional Points Post-Project	Factors Affecting Score
A. Listed/proposed T&E species habitat	.3	.3	No populations in area, not likely corridor
B. Habitat for S1, S2, or S3 plants or animals	.1	.1	No populations in area
C. General wildlife habitat	.8	1	Decreased disturbance
D. General fish/aquatic habitat	N/A	N/A	Not historic fish habitat
E. Flood attenuation	N/A	N/A	No channel
F. Short- and long-term surface water storage	.8	.8	Seasonal surface water
G. Sediment/nutrient/toxicant retention and removal	N/A	N/A	Does not receive excess sediment, nutrient, toxicant inputs
H. Sediment/shoreline stabilization	N/A	N/A	No channel
I. Production export/food chain support	.9	.9	Vegetation at site already diverse
J. Ground water discharge/recharge	1	1	Discharge/recharge indicators present
K. Uniqueness	.6	.8	Decreased disturbance
L. Recreation/education potential	.1	1	Decreased disturbance
Totals	4.6	5.9	

The following example assumes that 8 ($A_{created}$) new wetland acres are created and the functional score of 20 ($A_{existing}$) existing wetland acres shifts from 4.6 (F_{pre}) to 5.9 (F_{post}). Using Equation (2):

$$\text{Enhancement factor} = \left(\frac{F_{post} - F_{pre}}{F_{pre}}\right) = \left(\frac{5.9 - 4.6}{4.6}\right) = 0.28$$

In this case, the enhancement factor equals 0.28. The corresponding enhancement ratio (1/0.28) would be 3.5 and would be expressed as 3.5 to 1, indicating 3.5 acres of enhancement replaces 1 impacted wetland acre.

Next, applying equation (3), it is possible to calculate the mitigation credits for the 20 acres of existing wetland that would be enhanced at the Bouchard site:

$$A_{existing}\left(\frac{F_{post} - F_{pre}}{F_{pre}}\right) = 20(0.28) = 5.6 \text{ acres of credit for enhancement portion}$$

Finally, applying equation (4), it is possible to calculate total mitigation credits at the Bouchard site.

$$A_{credited} = A_{created} + A_{existing}\left(\frac{F_{post} - F_{pre}}{F_{pre}}\right) = 8 + 20(0.28) = \textbf{13.65 total acres of credit}$$

Example 2

The Montana Department of Transportation has requested an assessment of wetland mitigation potential on the Ludwig property north of St. Ignatius, Montana. Because the decision to acquire this property partly depends upon how many wetland mitigation credits it is feasible to generate there, we decided to use the Ludwig property as an example of how one might use a functional score approach to calculate an appropriate crediting ratio for enhancement projects. Tables 1 and 2 include summaries of functional scores for (1) existing conditions and (2) estimated post-mitigation project conditions at each of the two proposed mitigation projects on the Ludwig property. A tributary to Post Creek runs through the property and was assessed as one wetland site (Table 2). The second wetland site consists of a created stock pond and small adjacent wetlands supported by the pond (Table 3). Both sites are impacted by livestock grazing and altered hydrology.

Stream Site. The Post Creek portion of the site would increase from an estimated 1.3 ($A_{existing}$) acres of wetland to 5.2 acres, resulting in 3.9 ($A_{created}$) created wetland acres. From Table 2, the functional score would shift from 5.4 (F_{pre}) to 9.5 (F_{post}). Using Equation (2):

$$\text{Enhancement factor} = \left(\frac{F_{post} - F_{pre}}{F_{pre}}\right) = \left(\frac{9.5 - 5.4}{5.4}\right) = 0.76$$

Table 2. Expected change in wetland functions and values, Ludwig property, Post Creek Tributary.

MDT Assessment Method Functions and Values	Functional Points Pre-Project	Functional Points Post-Project	Factors Affecting Score
A. Listed/proposed T&E species	.3	.8	Grizzly, Sus/inc. to Doc/secondary
B. Habitat for S1, S2, or S3 plants or animals	.1	.7	Grizzly, Sus/inc. to Doc/secondary
C. General wildlife habitat	.5	.9	Increased cover
D. General fish/aquatic habitat	.1	.3	Increased cover and connectivity, but unlikely fish habitat
E. Flood attenuation	.2	.7	Increased size, woody component
F. Short- and long-term surface water storage	.4	.8	Increased size
G. Sediment/nutrient/toxicant removal	.9	.9	Close to highway, cattle removal
H. Sediment/shoreline stabilization	.7	1	Increase deep binding root mass
I. Production export/food chain support	.9	1	Increased size
J. Ground water discharge/recharge	1	1	
K. Uniqueness	.2	.4	Shift to shrub community
L. Recreation/education potential	.1	1	Not likely site
Total Functional Points	5.4	9.5	

Table 3. Expected change in wetland functions and values, Ludwig property, stock pond and adjacent wetlands.

MDT Assessment Functions and Values	Functional Points Pre-Project	Functional Points Post-Project	Factors Affecting Score
A. Listed/proposed T&E species	.3	.7	Grizzly bear use adjacent areas, increased cover may increase use
B. Habitat for S1, S2, or S3 plants or animals	.2	.2	No known occurrence
C. General wildlife habitat	.3	.9	Increased cover
D. General fish/aquatic habitat	N/A	N/A	No habitat
E. Flood attenuation	N/A	N/A	No overbank flow
F. Short- and long-term surface water storage	.7	.8	
G. Sediment/nutrient/toxicant removal	1	1	Close to highway, cattle removal
H. Sediment/shoreline stabilization	N/A	N/A	
I. Production export/food chain support	.6	.7	Increased structural diversity
J. Ground water discharge/recharge	1	1	
K. Uniqueness	.1	.4	Shift to shrub
L. Recreation/education potential	.1	1	Not likely site
Total Functional Points	4.3	6.7	

In this case, the enhancement factor equals 0.76. The corresponding enhancement ratio (1/0.76) would be 1.32 and would be expressed as 1.32 to 1, indicating 1.32 acres of enhancement replaces 1 impacted wetland acre.

Next, applying equation (3), it is possible to calculate the mitigation credits for the 1.3 acres of existing wetland that would be enhanced at the Ludwig stream channel site:

$$A_{existing}\left(\frac{F_{post}-F_{pre}}{F_{pre}}\right) = 1.3(0.76) \quad = 0.98 \text{ acres of credit for enhancement portion}$$

Finally, applying equation (4), it is possible to calculate total mitigation credits at the Ludwig stream channel site.

$$A_{credited} = A_{created} + A_{existing}\left(\frac{F_{post}-F_{pre}}{F_{pre}}\right) = 3.9 + 1.3(0.76) \quad = \textbf{4.9 total acres of credit}$$

Stock Pond Site. The stock pond portion of the site would increase from an estimated 0.35 ($A_{existing}$) acres of wetland to 1.8 acres, resulting in 1.45 ($A_{created}$) created wetland acres. From Table 3, the functional score would shift from 4.3 (F_{pre}) to 6.7 (F_{post}). Using Equation (2):

$$\text{Enhancement factor} = \left(\frac{F_{post}-F_{pre}}{F_{pre}}\right) \qquad = \left(\frac{6.7-4.3}{4.3}\right) \qquad = 0.56$$

In this case, the enhancement factor equals 0.56. The corresponding enhancement ratio (1/0.56) would be 1.79 and would be expressed as 1.79 to 1, indicating 1.79 acres of enhancement replaces 1 impacted wetland acre.

Next, applying equation (3), it is possible to calculate the mitigation credits for the 0.35 acres of existing wetland that would be enhanced at the Ludwig stock pond site:

$$A_{existing}\left(\frac{F_{post}-F_{pre}}{F_{pre}}\right) = 0.35(0.56) \quad = 0.20 \text{ acres of credit for enhancement portion}$$

Finally, applying equation (4), it is possible to calculate total mitigation credits at the Ludwig stock pond site.

$$A_{credited} = A_{created} + A_{existing}\left(\frac{F_{post}-F_{pre}}{F_{pre}}\right) = 1.45 + 0.35(0.56) = \textbf{1.64 total acres of credit}$$

CSKT Mitigation Ratios from Wetlands Conservation Plan (pre-project only)

Prepared by Tom Parker, Ecologist, Herrera Environmental Consultants, Inc.
May 2, 2002

Impacted Wetland Type	Mitigation Type			
	Preservation	*Restoration*	*Enhancement*	*Creation*
Forested and Shrub	3:1	2.5:1	4:1	4:1
Emergent and Open Water	2:1	1.5:1	3:1	3:1

Equation for calculating required mitigation acres based on CSKT Mitigation Guidelines.

Required mitigation acres = $P(3\ I_{sf} + 2\ I_{oe}) + R(2.5\ I_{sf} + 1.5\ I_{oe}) + E(4\ I_{sf} + 3\ I_{oe}) + C(4\ I_{sf} + 3\ I_{oe})$

Where:
I_{sf} = # of scrub/shrub or forested impact acres = 18
I_{oe} = # of emergent or open water impact acres = 32

P = estimated **Preservation** proportion of mitigation area
R = estimated **Restoration** proportion of mitigation area
E = estimated **Enhancement** proportion of mitigation area
C = estimated **Creation** proportion of mitigation area

Example 1: To find required mitigation acres, assuming that mitigation projects will be distributed as follows based on area: Preservation = 30 percent; Restoration = 50 percent; Enhancement = 10 percent; Creation = 10 percent.

.3 (3*18 + 2*32) + .5(2.5*18+1.5*32) + .1(3*18 + 4*32) + .1(3*18 + 4*32) = 104.2 required acres

Example 2: To find required mitigation acres, assuming that mitigation projects will be distributed as follows based on area: Preservation = 10 percent; Restoration = 90 percent; Enhancement = 0 percent; Creation = 0 percent.

.1 (3*18 + 2*32) + .9(2.5*18+1.5*32) + 0(3*18 + 4*32) + 0(3*18 + 4*32) = 96.0 required acres

Example 3: Given 18 impacted acres (36% of total) of shrub or forested and 32 impacted acres (64 percent of total) of open water or emergent, what is the weighted ratio for restoration projects?

2.5(.36) + 1.5(.64) = 1.86

Therefore: A 20-acre restoration project will mitigate for 20/1.86 =10.75 impacted acres.