MONTANA DEPARTMENT OF TRANSPORTATION STATEWIDE WETLAND MITIGATION SITE MONITORING PROJECT

Executive Summary – 2015 Monitoring Results

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December 2016

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1 INTRODUCTION

This document summarizes the results of the 2015 monitoring efforts on 12 wetland mitigation projects located throughout Montana that were constructed by or for the Montana Department of Transportation (MDT). Full monitoring reports for each of these sites were prepared and presented to MDT in December 2011. One project, Forsyth Northwest, consisted of four sites. The following mitigation sites were monitored in 2015 and their locations are shown on Figure 1:

American Colloid
Big Muddy
Easton Ranch
Forsyth Northwest
Kindsfater Wetland
McGinnis Meadows
Redstone East and West
Rostad Ranch
Schrieber Lake
Schrieber Meadows
Silicon Mountain
US 93 North Peterson

Monitoring activities were conducted by Confluence Consulting Inc. wetlands personnel under contract to MDT during the months of June, July and August 2015 in accordance with U.S. Army Corps of Engineers (USACE) wetlands standards and MDT wetland mitigation site monitoring protocols. Activities conducted and information collected included: wetland delineation, wetland boundaries, vegetation community mapping, vegetation transects, soils and hydrology data, wildlife observations, photograph points, functional assessments, and non-engineering examination of constructed features. Monitoring methods are discussed at length in the individual site monitoring reports and are not presented in detail in this summary.

For all MDT monitoring events performed prior to 2008, wetland delineation was conducted according to the 1987 USACE Wetland Delineation Manual. In 2008, the USACE released Regional Supplements which modified the 1987 wetland delineation method for the Great Plains (GP) and Western Mountain Valleys and Coast (WMVC) regions of Montana. At that time, USACE determined that the original 1987 manual methodology should continue to be used for the duration of the monitoring period of those MDT wetland mitigation sites for which the original 1987 method had been used to establish baseline wetland conditions. This approach was applied to the US 93 Peterson project reported here.

In 2010, updates to the Regional Supplements for the GP and WMVC regions were released by the USACE. These most recent Regional Supplements were used to evaluate the mitigation wetland projects constructed during or after 2008. Sites evaluated using the MVC supplement included: Easton Ranch, McGinnis Meadows, Schrieber Lake, Schrieber Meadows, and Silicon Mountain. Sites evaluated with the GP version included: American Colloid, Big Muddy, Forsyth NW, Kindsfater, Redstone E&W, and Rostad Ranch.

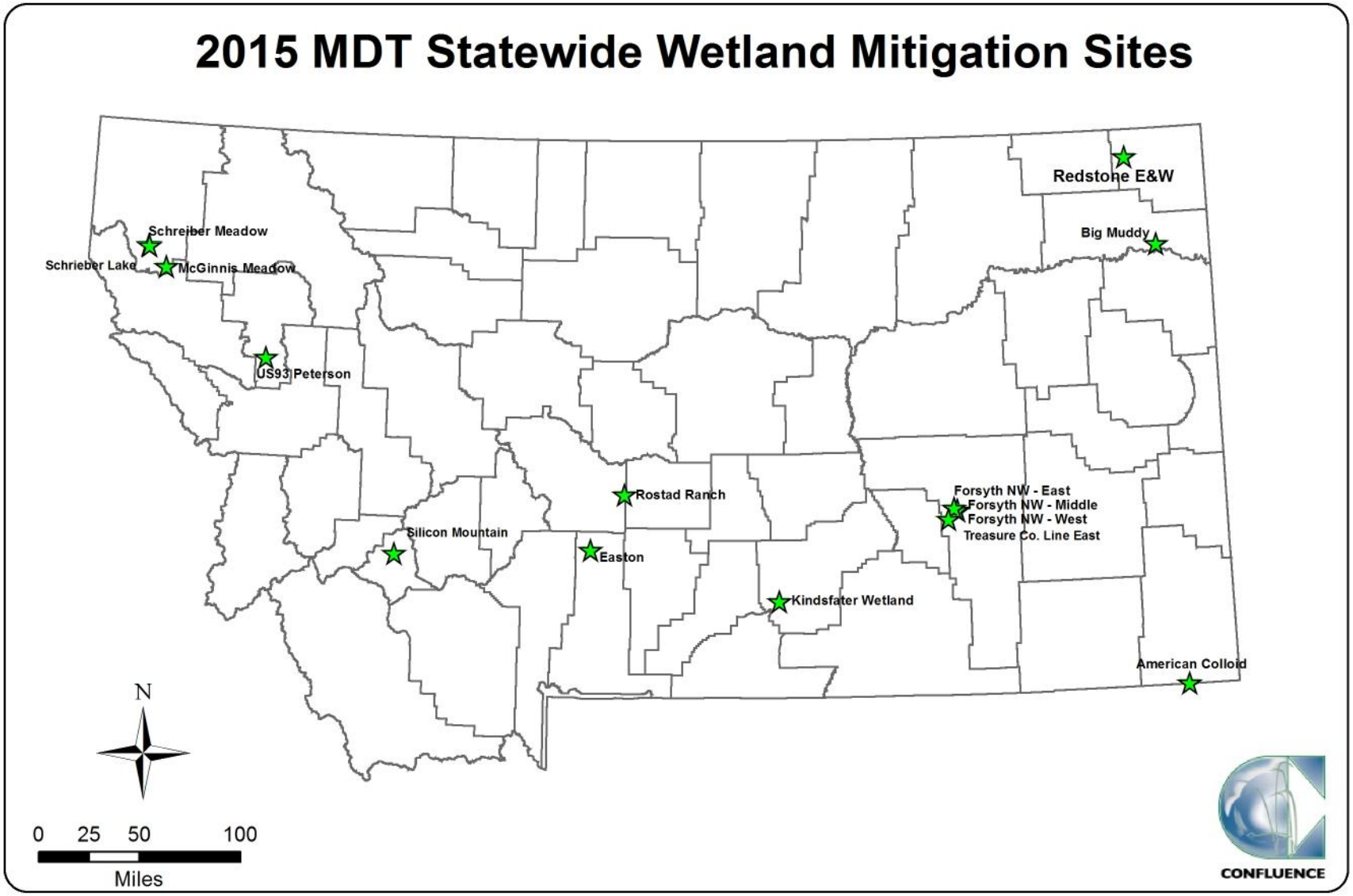

Figure 1. Location map for all 12 MDT mitigation sites monitored in 2015.

Similarly, there has been an evolution over time in the methodology used to assess wetland function and values. From 2001 to 2007 wetland functional assessments were conducted at all monitoring sites using the 1999 MDT Montana Wetland Assessment Method (MWAM). In 2008, use of the 1999 method was discontinued for most projects, as the 2008 MWAM became available and was applied. Use of the 1999 method was continued at sites for which baseline conditions were established using that method and for which functional assessment using that version of the method was integrated into the project's credit calculation. Projects that meet those criteria and continue to use the 1999 MWAM version include US93 Peterson. All other projects summarized here were evaluated for wetland function and values using the 2008 MDT MWAM method. Table 1 presents a summary of the monitoring methods used for each site, along with their total project area.

Table 1. Summary of current mitigation wetland site monitoring site parameters.

Project Site	Total Acres	USACE Delineation Method	MWAM Method
Missoula District:			
US 93 North – Peterson	25	1987 (MVC)	1999
McGinnis Meadows – Libby	32.7	MVC	2008
Schrieber Meadows – Libby	59.6	MVC	2008
Schrieber Lake - Libby	104.7	MVC	2008
Butte District:			
Easton – Wilsall	33.5	MVC	2008
Rostad Ranch	67	GP	2008
Silicon Mountain - Silver Bow	50.1	MVC	2008
Glendive District:			
American Colloid – Alzada	6.4	GP	2008
Big Muddy - Culbertson	17.87	GP	2008
Redstone E&W	1.26	GP	2008
Forsyth NW - East	2.74	GP	2008
Forsyth NW - Middle	1.8	GP	2008
Forsyth NW - West	13.71	GP	2008
Forsyth NW-Treasure Co Line	5.89	GP	2008
Billings District:			
Kindsfater Wetland	138	GP	2008

Monitoring summaries for all mitigation sites investigated in 2015 are presented in alphabetical order in Section 2.0. Each discussion section includes a summary of site history and objectives, delineation, crediting, functional assessment results, and maintenance and other recommendations, where applicable.

Appendix A provides for each monitoring site: the site name, MDT District, year constructed, major Montana watershed basin, pre-project wetland acreage and functional assessment category, target wetland credit, 2015 wetland acreage and functional assessment category, upland buffer acreage, total credit acreage and functional unit as of 2015, and general site comments.

2 INDIVIDUAL MITIGATION SITE DISCUSSIONS

2.1 American Colloid (Glendive District, Fifth and Final Year)

The American Colloid wetland mitigation project is situated approximately 2 miles south and 7 miles west of Alzada, Montana, on Lot 7, Lot 10, and Lot 11 of Section 36, Township 9 South, Range 58 East, Carter County, Montana. These parcels are Montana School Trust Land administered by the Montana Department of Natural Resources and Conservation (DNRC). The site was formerly leased to the American Colloid Mining Company, and is currently under an MDT conservation easement. The project serves the mitigation requirements of MDT's Little Missouri River Basin (Watershed 16), in the Glendive District.

The project elevation is approximately 3,518 feet above mean sea level. The site was mined for bentonite clay prior to the 1971 Open Cut Mining Act and is surrounded by topography typical of open cut mining activities. A dike approximately 190 feet in length was constructed along a topographic depression to impound precipitation runoff from an approximate 167-acre ephemeral drainage. Soil borings at the site revealed highly erodible clay soils underlain by shale, suitable for impounding and storing surface water. A fenced enclosure surrounds the 15-acre site, which includes the proposed 5-acre wetland and a 10-acre buffer zone of upland vegetation. The mitigation monitoring limits, for purposes of this report, encompass only 6.44 acres of created wetland and upland buffer within the fenced enclosure.

The MDT designed and constructed the American Colloid wetland restoration project. The site was constructed in October 2001 to mitigate for 4.4 acres of wetland impacts associated within the Alzada-West and Alzada-South projects in Watershed 16. The initial mitigation monitoring event was conducted in 2002. Monitoring ceased in 2007 following the dike failure, and resumed in 2011 following the dike repair.

Above average precipitation was recorded for the area during the January to August period of 2015. There were approximately 3 acres of surface water (up from 2.9 acres the previous year with near average precipitation) at depths ranging from 0.0 to 2.7 feet. Hydrologic indicators observed during the investigation indicated that water levels measured in July were less than the maximum elevation attained during spring runoff at the beginning of the growing season. The water surface was approximately 0.8 feet below the outlet elevation.

Table 2 presents the current credit summary for this site. A total of 3.58 acres of aquatic habitat, predominantly open water, was delineated in 2015. The calculation of estimated credit acres shown in Table 2 assumed a mitigation ratio of 1:1 for the created wetland and aquatic bed habitat within the wetland depression and a 5:1 ratio for preservation and maintenance of the upland buffer. The estimated credit acres for 2015 totaled 5.86.

Table 2. Estimated credit summary for the American Colloid Wetland Mitigation Site, 2011-2015.

COMPENSATORY MITIGATION TYPE	USACE MITIGATION RATIO	PROPOSED ACRES	2011 DELINEATED ACRES	2011 CREDIT ACRES	2012 DELINEATED ACRES	2012 CREDIT ACRES
Creation: Establishment (wetland)	1:1	5	0.26	0.26	1.23	1.23
Creation: Establishment (open water)	1:1		3.01	3.01	2.04	2.04
Upland Buffer (Preservation and Maintenance)	5:1	10 (2 credit acres)	11.73*	2.35	11.73*	2.35
Total		7	15.00	5.62	15.00	5.62

Table 2. (Continued)

COMPENSATORY MITIGATION TYPE	2013 DELINEATED ACRES	2013 CREDIT ACRES	2014 DELINEATED ACRES	2014 CREDIT ACRES	2015 DELINEATED ACRES	2015 CREDIT ACRES
Creation: Establishment (wetland)	0.38	0.38	0.71	0.71	0.61	0.61
Creation: Establishment (open water)	3.2	3.20	2.87	2.87	2.97	2.97
Upland Buffer (Preservation and Maintenance)	11.42*	2.28	11.42*	2.28	11.42*	2.28
Total	15.00	5.86	15.00	5.86	15	5.86

*Value includes all uplands within fenced 15-acre site

No formal goals or success criteria were required by USACE for this project, which was constructed prior to release of the 2008 USACE mitigation rule requiring such components. All MDT internal success criteria for the delineated wetlands and upland buffer have been achieved. Given that all success criteria have been met, the required fifth year of monitoring has been completed, and that it is unlikely that any expected changed to the site will materially affect the credits earned, it was recommended that ongoing monitoring of this site be discontinued.

The first year of monitoring in 2011 provided the baseline MWAM score for comparison to subsequent functional assessments. The American Colloid wetland encompasses one 3.58-acre assessment area (AA) that includes the 3-acre open water depression and 0.6-acre adjacent wetland fringe. Table 3 summarizes the function and value ratings of the AA for 2011 to 2015.

The AA was rated as a Category II wetland with 48 percent of the total points possible in 2015. This AA achieved 15.39 functional units in 2015, an increase from 13.6 in 2014 which was related to the reevaluation of the general wildlife habitat component within the AA. A modification to the production export/food chain support rating between 2014 and 2015 was related to the reevaluation of the vegetated component within the AA. The AA received moderate ratings for sediment/nutrient/toxicant removal and uniqueness.

Table 3: Wetland assessment (MWAM) results for the American Colloid Wetland Mitigation Site, 2011-2015.

Function and Value Parameters from the 2008 Montana Wetland Assessment Method	2011	2012	2013	2014	2015
Listed/Proposed T&E Species Habitat	Low (0.0)	Low (0.0)	Low (0.0)	Low (0.0)	Low (0.0)
MTNHP Species Habitat	Low (0.1)	Low (0.1)	Low (0.1)	Low (0.1)	Low (0.1)
General Wildlife Habitat	Mod (0.4)	Mod (0.6)	Mod (0.6)	Mod (0.6)	High (0.9)
General Fish/Aquatic Habitat	NA	NA	NA	NA	NA
Flood Attenuation	NA	NA	NA	NA	NA
Short and Long Term Surface Water Storage	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)
Sediment/Nutrient/Toxicant Removal	Mod (0.6)	Mod (0.6)	Mod (0.6)	Mod (0.6)	Mod (0.6)
Sediment/Shoreline Stabilization	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)
Production Export/Food Chain Support	Mod (0.7)	High (0.8)	Mod (0.7)	Mod (0.7)	High (0.9)
Groundwater Discharge/Recharge	Low (0.1)	Low (0.1)	Low (0.1)	Low (0.1)	Low (0.1)
Uniqueness	Low (0.3)	Mod (0.4)	Mod (0.4)	Mod (0.4)	Mod (0.4)
Recreation/Education Potential (bonus points)	NA	NA	NA	NA	NA
Actual Points/Possible Points	**3.5 / 9**	**3.9 / 9**	**3.8 / 9**	**3.8 / 9**	**4.3/9**
% of Possible Score Achieved	**39%**	**43%**	**42%**	**42%**	**48%**
Overall Category	**III**	**III**	**III**	**III**	**II**
Total Acreage of Assessed Wetlands within Site Boundaries	**3.27**	**3.27**	**3.58**	**3.58**	**3.58**
Functional Units (acreage x actual points)	**11.45**	**12.75**	**13.60**	**13.60**	**15.39**

There were no nesting structures installed at the site. The outlet control structure was repaired in 2010. The water-control standpipes and armored earthen berm were in good condition and working as designed during the 2015 investigation. A wildlife friendly fence that surrounds the 15-acre site was in good condition and did not require maintenance. Two clusters of Canadian thistle, a Priority 2B weed, less than 0.1 acre in size were noted near the western mitigation boundary. The cover class was less than 1.0 percent. The MDT administers an ongoing weed control program that annually assesses the location and size of State noxious weed infestations on each mitigation site and administers controls as necessary.

2.2 Big Muddy (Glendive District, Year 5)

The Big Muddy Creek Wetland Mitigation Project is located four miles west of Culbertson, along US Highway 2, in Section 21, Township 28 North, Range 55 East, Roosevelt County, Montana. This project is situated within the Lower Missouri River Basin (Watershed 12). Wetlands developed at this location were to provide compensatory mitigation for wetland impacts associated with transportation improvement projects in the Glendive District including Brockton-East and Big Muddy-West.

The MDT initiated a feasibility study in August 2009 with the baseline delineation and Montana Wetland Assessment completed in 2010, finding approximately 0.73 acres of existing wetlands within the project boundary. Those wetlands encompassed an inundated, emergent marsh that extended from the banks of an unnamed tributary to Big Muddy Creek and a narrow emergent wet meadow that extended into upland habitat from the marsh.

The initial construction work on this site was completed in spring 2011 with the intention of creating 6.53 acres of emergent/aquatic bed shallow marsh within three wetland cells on 10.62-acres located on the north side of Highway 2. The cells were to be excavated to intersect groundwater and provide water depths ranging from 0.5 to 2 feet. Additional wetland hydrology was to be provided by direct precipitation and snowmelt.

In 2012, the overall size of the wetland mitigation site was increased to provide compensatory mitigation for unavoidable impacts associated with the MDT Brockton – East project. An additional 7.25 acres of mitigation area were added on the south side of Highway 2 and included the construction of a 5.47 acre wetland depression along the floodplain of an unnamed tributary to Big Muddy Creek in an area previously delineated as upland. A 1.83-acre pre-existing wetland was located in the southern project area adjacent to the excavated depression and has been included in the preservation category for crediting purposes. The total mitigation area monitored across the northern and southern mitigation project parcels since 2012 was approximately 17.9 acres. The mitigation goals were to create and preserve wetland habitat functions associated with rangeland located adjacent to the Big Muddy Creek tributary. The project objectives include:

- Maximize the development of emergent and aquatic bed wetlands, general wildlife habitat, short and long-term surface water storage, sediment/nutrient/toxicant removal, and production export/food chain support
- Create up to 14.8 acres of wetland
- Preserve approximately 2.56 acres of wetland through permanent protection and weed management
- Preserve a protected, managed 0.43-acre upland buffer adjacent to wetlands in the parcel north of Highway 2

- Minimize site operation and maintenance requirements

Table 5 summarizes the originally proposed mitigation acreages, credit ratios, and scaled performance standards from the May 2011 Mitigation Plan. This table was modified in 2012 to include the additional acreages monitored within the southern parcel. Table 6 presents a summary of the site's progress in relation to the established performance standards. Table 4 provides a breakdown of the credit acreages (based on the 2015 delineation) listed for each category scaled according to the credit criteria listed in Table 5. Each mitigation category has been divided into the respective parcels, northern or southern. The total credit acres accrued at the Big Muddy wetland mitigation area in 2015 was 12.95 acres, an increase of 1.62 credit acres from 2014.

Within the northern parcel, the number of acres of created wetland within the excavated areas between cells and passive creation was 1.63 in 2015. Based on meeting Performance Standards 1 through 3, 100 percent of the total created acreage was credited and totaled 1.63. The area between the excavated cells within the northern parcel exhibited greater than 70 percent cover by hydrophytic vegetation, less than 20 percent bare ground, and no noxious weeds. Wetland creation within the excavated cells in the northern parcel remained consistent from 2012 through 2015, totaling 5.76 acres. The estimated credit acreage was 100 percent of the total possible, or 5.76 credit acres based on the scaled criteria for meeting standards 1, 2, and 3. The absolute cover of hydrophytic vegetation within the excavated wetland cells increased in 2015, achieving 70 percent cover and meeting performance standard 2, with noxious weed cover observed at less than five percent. Preservation of 0.73 acres in the north parcel has been credited 100 percent at a 4:1 ratio providing 0.18 credits based on continued delineation as wetland habitat and noxious weed absolute cover less than five percent.

Wetland creation within the southern parcel totaled 4.17 acres in 2015, the same as 2013 and 2014. This value decreased in 2013 in response to a reevaluation of total constructed and preserved wetland acreage within the northern and southern parcels and does not represent an actual decrease of wetland acreage south of Highway 2. Similar to the north mitigation area, 100 percent of wetland credits were allocated for meeting standards 1 through 3. Wetlands created in the southern parcel satisfy the criteria for wetland hydrology, hydric soils, and hydrophytic vegetation. Estimated vegetation cover within this excavated basin is approximately 95 percent, with 5 percent bare ground. No noxious weeds were identified within the created wetland. Wetland preservation within the southern parcel totaled 1.83 acres and provided 0.46 credits. The three performance standards for the preservation wetland have been met since 2012. The preservation wetland within the southern parcel continues to satisfy wetland hydrology, hydric soils, and hydrophytic vegetation criteria, absolute cover of FAC or wetter plants is estimated at nearly 100 percent, and less than five percent noxious weed cover has been identified. Maintenance of the upland buffer around the southern parcel generated an additional 0.25 credits in 2013

through 2015. Full credit at a 5:1 ratio was attained through meeting the success criteria for noxious weed cover below five percent within the upland buffer.

Table 4. Estimated credit summary for the Big Muddy Wetland Mitigation Site, 2011-2015.

	Compensatory Mitigation Type	USACE Mitigation Credit Ratio	2011 Delineated Acres	Scaled % Credit Standards	2011 Credit Acres	2012 Delineated Acres	Scaled % Credit Standards	2012 Credit Acres	2013 Delineated Acres	Scaled % Credit Standards	2013 Credit Acres	2014 Delineated Acres	Scaled % Credit Standards	2014 Credit Acres	2015 Delineated Acres	Scaled % Credit Standards	2015 Credit Acres
Nothern Parcel	Wetland Creation: Establishment (Area between constructed cells in Northern Parcel)	1:1	0.44	70%	0.31	0.00	0%	0.00	1.76	70%	1.23	1.76	100%	1.76	1.63	100%	1.63
	Wetland Creation: Establishment (wetland cells in Northern Parcel)	1:1	5.75	70%	4.03	5.76	70%	4.03	5.76	70%	4.03	5.76	70%	4.03	5.76	100%	5.76
	Wetland Preservation (Northern Parcel)	4:1	0.73	100%	0.18	0.73	100%	0.18	0.73	100%	0.18	0.73	100%	0.18	0.73	100%	0.18
	Upland Buffer (Northern Parcel)	5:1	3.70	100%	0.74	3.69	100%	0.74	2.37	100%	0.47	2.37	100%	0.47	2.50	100%	0.50
	Northern Subtotal		**10.62**		**5.26**	**10.18**		**4.95**	**10.62**		**5.92**	**10.62**		**6.45**	**10.62**		**8.07**
Southern Parcel	Wetland Creation: Establishment (wetland cell in Southern Parcel)	1:1	--	70%	4.03	4.55	70%	3.19	4.17	70%	2.92	4.17	100%	4.17	4.17	100%	4.17
	Wetland Preservation (Southern Parcel)	4:1	--	100%	--	1.83	100%	0.46	1.83	100%	0.46	1.83	100%	0.46	1.83	100%	0.46
	Upland Buffer (Southern Parcel)	5:1	--	100%	--	1.31	100%	0.26	1.25	100%	0.25	1.25	100%	0.25	1.25	100%	0.25
	Southern Subtotal					**7.69**		**3.90**	**7.25**		**3.63**	**7.25**		**4.88**	**7.25**		**4.88**
	Total		**10.62**		**9.29**	**17.87**		**8.86**	**17.87**		**9.55**	**17.87**		**11.33**	**17.87**		**12.95**

Table 5. Wetland Crediting and performance standard summary for the original Big Muddy Creek Wetland Mitigation site.

	Compensatory Mitigation Type	COE Mitigation Credit Ratio [1]	Proposed Acres	Preliminary Credit Estimate (Acres)	Performance Standard 1	Performance Standard 2	Performance Standard 3	Scaled % Credit Criteria [2]
Northern Parcel	**Creation: Establishment [3] (Area between cells [1.76 ac] and Passive creation in northern tip of site[1.03 ac])**	1:1	1.03 to 2.79	1.03 to 2.79	Satisfy 1987 Manual and Regional Supplement Wetland Hydrology Wetland Soils Hydrophytic Vegetation Criteria	Achieve 70% Absolute Cover of FAC or Wetter Plants	Noxious Weed Absolute Cover <5%	Features constructed / implemented and: All standards met = 100% Standard 1 met and demonstrable progress on 2-3 = 70% Standard 1 not met but demonstrable progress on 1-3 = 50% Standard 1 met but lack of progress / corrective action on 2-3 = 30% Standard 1 not met and no demonstrable progress / corrective Action = 0%
	Creation: Establishment (Emergent Marsh and Open Water in Northern Parcel)	1:1	6.53	6.53	Satisfy 1987 Manual and Regional Supplement Wetland Hydrology Wetland Soils Hydrophytic Vegetation Criteria (excluding open water areas)	Achieve 70% Absolute Cover of FAC or Wetter Plants (excluding open water areas)	Noxious Weed Absolute Cover <5%	Features constructed / implemented and: All standards met = 100% Standard 1 met and demonstrable progress on 2-3 = 70% Standard 1 not met but demonstrable progress on 1-3 = 50% Standard 1 met but lack of progress / corrective action on 2-3 = 30% Standard 1 not met and no demonstrable progress / corrective Action = 0%
	Preservation (Northern Parcel)	4:1	0.73	0.18	Satisfy 1987 Manual and Regional Supplement Wetland Hydrology Wetland Soils Hydrophytic Vegetation Criteria	NA	Noxious Weed Absolute Cover <5%	All standards met = 100% Standard 1 met and demonstrable progress on 3 = 75% Standard 1 not met but demonstrable progress on 1 and 3 = 50% Standard 1 met but lack of progress on 3 = 30% Standard 1 not met = 0%
	Upland Buffer (Northern Parcel)	5:1	0.43	0.09	NA	NA	Noxious Weed Absolute Cover <5%	Standard 3 met = 100% Standard 3 not met but with demonstrable progress = 30% Standard 3 not met with no demonstrable progress = 0%
Southern Parcel	***Creation: Establishment (Emergent Marsh and Open Water in Southern Parcel)**	1:1	5.47	5.47	Satisfy 1987 Manual and Regional Supplement Wetland Hydrology Wetland Soils Hydrophytic Vegetation Criteria (excluding open water areas)	Achieve 70% Absolute Cover of FAC or Wetter Plants (excluding open water areas)	Noxious Weed Absolute Cover <5%	Features constructed / implemented and: All standards met = 100% Standard 1 met and demonstrable progress on 2-3 = 70% Standard 1 not met but demonstrable progress on 1-3 = 50% Standard 1 met but lack of progress / corrective action on 2-3 = 30% Standard 1 not met and no demonstrable progress / corrective Action = 0%
	***Preservation (Southern Parcel)**	4:1	1.83	0.46	Satisfy 1987 Manual and Regional Supplement Wetland Hydrology Wetland Soils Hydrophytic Vegetation Criteria	NA	Noxious Weed Absolute Cover <5%	All standards met = 100% Standard 1 met and demonstrable progress on 3 = 75% Standard 1 not met but demonstrable progress on 1 and 3 = 50% Standard 1 met but lack of progress on 3 = 30% Standard 1 not met = 0%
	Upland Buffer (Southern Parcel)	5:1	NA	NA	NA	NA	Noxious Weed Absolute Cover <5%	Standard 3 met = 100% Standard 3 not met but with demonstrable progress = 30% Standard 3 not met with no demonstrable progress = 0%
	Total			**13.76 to 15.52 acres**				

[1]Corps of Engineers 2005 Wetland Compensatory Mitigation Ratios, Montana Regulatory Program.

[2]Percentages to be applied to credit estimate acres in Column 5.

[3]Incidentally created wetlands will be credited according to parameters listed under "Creation: Establishment".

*Areas added in 2012 have been included in preliminary wetland crediting and performance standard summary approved by Corps for the Big Muddy Wetland Mitigation Project.

Table 6. Summary of performance standards for Big Muddy credit areas.

	Compensatory Mitigation Type	Performance Standard 1	Performance Standard 2	Performance Standard 3	Discussion
Northern Parcel	**Creation: Establishment [3] (Area between cells [1.76 ac] and Passive creation in northern tip of site[1.03 ac])**	Satisfy 1987 Manual and Regional Supplement Wetland Hydrology Wetland Soils Hydrophytic Vegetation Criteria	Achieve 70% Absolute Cover of FAC or Wetter Plants	Noxious Weed Absolute Cover <5%	Performance Standards 1, 2 and 3 met. Full credit allocated.
	Creation: Establishment (Emergent Marsh and Open Water in Northern Parcel)	Satisfy 1987 Manual and Regional Supplement Wetland Hydrology Wetland Soils Hydrophytic Vegetation Criteria (excluding open water areas)	Achieve 70% Absolute Cover of FAC or Wetter Plants (excluding open water areas)	Noxious Weed Absolute Cover <5%	Performance Standards 1, 2 and 3 met. Full credit allocated.
	Preservation (Northern Parcel)	Satisfy 1987 Manual and Regional Supplement Wetland Hydrology Wetland Soils Hydrophytic Vegetation Criteria	NA	Noxious Weed Absolute Cover <5%	Performance Standards 1 and 3 met. Full credit allocated.
	Upland Buffer (Northern Parcel)	NA	NA	Noxious Weed Absolute Cover <5%	Performance Standard 3 met. Full credit allocated.
Southern Parcel	***Creation: Establishment (Emergent Marsh and Open Water in Southern Parcel)**	Satisfy 1987 Manual and Regional Supplement Wetland Hydrology Wetland Soils Hydrophytic Vegetation Criteria (excluding open water areas)	Achieve 70% Absolute Cover of FAC or Wetter Plants (excluding open water areas)	Noxious Weed Absolute Cover <5%	Performance Standards 1, 2 and 3 met. Full credit allocated.
	***Preservation (Southern Parcel)**	Satisfy 1987 Manual and Regional Supplement Wetland Hydrology Wetland Soils Hydrophytic Vegetation Criteria	NA	Noxious Weed Absolute Cover <5%	Performance Standards 1 and 3 met. Full credit allocated.
	Upland Buffer (Southern Parcel)	NA	NA	Noxious Weed Absolute Cover <5%	Performance Standard 3 met. Full credit allocated.

The 2008 MWAM was used in the May 2011 Mitigation Plan to evaluate 8 acres of the existing riverine wetland associated with the tributary to Big Muddy Creek and 2 acres of the remnant wet meadow located north and south of the mitigation site. Both AAs extended outside the current project boundaries. The 2008 MWAM has also been used to evaluate the functional values of the mitigation wetlands from 2011 through 2015 (Table 7). Four AAs were assessed in 2015 that included the created wetlands within the north parcel, preserved wetlands within the north parcel, created wetlands within the south parcel, and preserved wetlands within the south parcel. The created and preserved wetland AAs within the Big Muddy mitigation site were not separated by parcel (north/south) in 2012.

The Creation North Parcel AA encompassed 7.39 acres and included the constructed wetland cells and excavated areas between the cells, characterized by wetland community Types 3, 9, 15, and 18. This AA was rated as a Category II wetland with 72 percent of the total possible points in 2015, an increase of one percent since 2014. The AA has shown continued improvement since construction in 2011. The functional ratings improved after 2012, increasing from 66.5 percent to 72 percent as a result of improvements in the level of disturbance, general wildlife habitat, production export/food chain support (tied to general wildlife habitat and increased hydrophytic vegetation), and uniqueness (tied to disturbance level). High ratings were assessed for general wildlife habitat, short and long term surface water storage, sediment/nutrient/toxicant removal, sediment/shoreline stabilization, groundwater discharge/recharge, production export/food chain support, and recreation/education potential. This AA achieved 53.21 total functional units in 2015, a decrease by 0.18 functional units since 2014, and was a result of the decline in wetland acreage in this AA by 0.13 acres since 2014.

The Preservation North Parcel AA included 0.73 acres located within the floodway fringe of the existing tributary to Big Muddy Creek (wetland community Type 4). This AA was rated as a Category III wetland with 56 percent of the total possible points and 4.09 functional units in 2015. The total possible points and functional units achieved decreased within this AA in 2014 due to re-evaluation of the water regime (changed from perennial to seasonal) and surface water outlet (changed from unrestricted to restricted outlet). The AA received high ratings in 2015 for sediment/nutrient/toxicant removal, sediment/shoreline stabilization and recreation/education potential. The North Parcel Creation and Preservation AAs scored 53.21 and 4.09 functional units, respectively. Combined, the North Parcel Creation and Preservation AAs scored a total of 57.3 functional units in 2015.

The Creation South Parcel AA encompassed 4.17 acres within the footprint of the excavated wetland cell and was dominated by wetland community Type 12. The AA was rated as a Category III wetland with 61 percent of the total possible points and 25.44 functional units in 2015, the same as 2014. The AA received high ratings for short and long term surface water storage, sediment/nutrient/toxicant removal, sediment/shoreline stabilization, and recreation/education potential.

The Preservation South Parcel AA identified in 2015 included 1.83 acres of existing wetland and 10.61 functional units. The AA was rated as a Category III wetland with 58 percent of the total possible points from 2013 through 2015. The seasonal/intermittent nature of the wetland hydrology within this AA was the primary factor limiting overall functional ratings. The AA received high ratings for sediment/shoreline stabilization, sediment/nutrient/toxicant removal, and recreation/education potential. The South Parcel Creation and Preservation AAs scored 25.44 and 10.61 functional units, respectively. Combined, the South Parcel Creation and Preservation AAs attained a total 36.05 functional units in 2015.

There are no diversion structures or nesting structures currently installed at the site. Two infestations of Canadian thistle, a Priority 2B noxious weed, were observed at the edge of the unnamed tributary in the northeast quadrant of the north mitigation site. The infestations each covered less than 0.1 acre with trace to moderate cover classes. Two infestations of field bindweed, a Priority 2B noxious weed, were observed in the southern cell. The infestations each covered less than 0.1 acre with a trace to low cover class. The MDT has an ongoing weed control program for their mitigation sites that includes an annual assessment of weeds identified at each location and treatment to contain and control identified populations.

Table 7. Wetland assessment (MWAM) results for the Big Muddy Wetland Mitigation Site, 2011-2015.

Function and Value Parameters from the 2008 Montana Wetland Assessment Method	2011 (Creation) AA-1	2011 (Preservation) AA-2	2012* (Creation) AA-1	2012* (Preservation) AA-2	2013 Creation North Parcel	2013 Preservation North Parcel	2013 Creation South Parcel	2013 Preservation South Parcel
Listed/Proposed T&E Species Habitat	Low (0.0)	Low (0.0)	Low (0.0)	Low (0.0)	Low (0.0)	Low (0.0)	Low (0.0)	Low (0.0)
MTNHP Species Habitat	Mod (0.5)	Mod (0.5)	Mod (0.5)	Mod (0.5)	Mod (0.5)	Mod (0.5)	Mod (0.5)	Mod (0.5)
General Wildlife Habitat	Mod (0.5)	High (0.9)	Mod (0.7)	High (0.9)	High (0.9)	High (0.9)	Mod (0.7)	Mod (0.7)
General Fish/Aquatic Habitat	NA	NA	NA	NA	NA	NA	NA	NA
Flood Attenuation	Mod (0.5)	Mod (0.4)	Mod (0.5)	Mod (0.4)	Mod (0.5)	Mod (0.4)	Mod (0.5)	Mod (0.4)
Short and Long Term Surface Water Storage	High (1.0)	Mod (0.4)	High (1.0)	High (0.8)	High (1.0)	Mod (0.4)	High (0.9)	Low (0.3)
Sediment/Nutrient/Toxicant Removal	Mod (0.7)	High (0.9)	High (1.0)	High (0.9)	High (1.0)	High (0.9)	High (1.0)	High (0.9)
Sediment/Shoreline Stabilization	Low (0.3)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (0.9)	High (1.0)
Production Export/Food Chain Support	Mod (0.5)	High (0.9)	Mod (0.6)	High (1.0)	Mod (0.7)	High (0.9)	Mod (0.4)	Mod (0.7)
Groundwater Discharge/Recharge	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	Mod (0.7)	Mod (0.7)
Uniqueness	Low (0.2)	Mod (0.4)	Low (0.2)	Mod (0.4)	Low (0.3)	Mod (0.4)	Low (0.2)	Mod (0.4)
Recreation/Education Potential (bonus points)	High (0.15)	High (0.15)	High (0.15)	High (0.15)	High (0.2)	High (0.2)	High (0.2)	High (0.15)
Actual Points/Possible Points	**5.35/10**	**6.55/10**	**6.65/10**	**7.05/10**	**7.1/10**	**6.6/10**	**6.0/10**	**5.8/10**
% of Possible Score Achieved	**53.5%**	**65.5%**	**66.5%**	**70.5%**	**71.0%**	**66.0%**	**60.0%**	**58.0%**
Overall Category	**III**	**II**	**II**	**II**	**II**	**II**	**III**	**III**
Total Acreage of Assessed Wetlands within Site Boundaries	**6.19**	**0.73**	**10.31**	**2.56**	**7.52**	**0.73**	**4.17**	**1.83**
Functional Units (acreage x actual points)	**33.12**	**4.78**	**68.56**	**18.05**	**53.39**	**4.82**	**25.02**	**10.61**

*2012 AAs included wetland areas on both sides (north/south) of Highway 2

Function and Value Parameters from the 2008 Montana Wetland Assessment Method	2014 Creation North Parcel	2014 Preservation North Parcel	2014 Creation South Parcel	2014 Preservation South Parcel	2015 Creation North Parcel	2015 Preservation North Parcel	2015 Creation South Parcel	2015 Preservation South Parcel
Listed/Proposed T&E Species Habitat	Low (0.0)	Low (0.0)	Low (0.0)	Low (0.0)	Low (0.0)	Low (0.0)	Low (0.0)	Low (0.0)
MTNHP Species Habitat	Mod (0.5)	Mod (0.5)	Mod (0.5)	Mod (0.5)	Mod (0.5)	Mod (0.5)	Mod (0.5)	Mod (0.5)
General Wildlife Habitat	High (0.9)	Mod (0.7)	Mod (0.7)	Mod (0.7)	High (0.9)	Mod (0.7)	Mod (0.7)	Mod (0.7)
General Fish/Aquatic Habitat	NA	NA	NA	NA	NA	NA	NA	NA
Flood Attenuation	Mod (0.5)	Mod (0.5)	Mod (0.5)	Mod (0.4)	Mod (0.5)	Mod (0.5)	Mod (0.5)	Mod (0.4)
Short and Long Term Surface Water Storage	High (1.0)	Low (0.3)	High (0.9)	Low (0.3)	High (1.0)	Low (0.3)	High (0.9)	Low (0.3)
Sediment/Nutrient/Toxicant Removal	High (1.0)	High (1.0)	High (1.0)	High (0.9)	High (1.0)	High (1.0)	High (1.0)	High (0.9)
Sediment/Shoreline Stabilization	High (1.0)	High (0.9)	High (0.9)	High (1.0)	High (1.0)	High (0.9)	High (0.9)	High (1.0)
Production Export/Food Chain Support	Mod (0.7)	Mod (0.4)	Mod (0.4)	Mod (0.7)	High (0.8)	Mod (0.4)	Mod (0.4)	Mod (0.7)
Groundwater Discharge/Recharge	High (1.0)	Mod (0.7)	Mod (0.7)	Mod (0.7)	High (1.0)	Mod (0.7)	Mod (0.7)	Mod (0.7)
Uniqueness	Low (0.3)	Mod (0.4)	Low (0.3)	Mod (0.4)	Low (0.3)	Mod (0.4)	Low (0.3)	Mod (0.4)
Recreation/Education Potential (bonus points)	High (0.2)	High (0.2)	High (0.2)	High (0.2)	High (0.2)	High (0.2)	High (0.2)	High (0.2)
Actual Points/Possible Points	**7.1/10**	**5.6/10**	**6.1/10**	**5.8/10**	**7.2/10**	**5.6/10**	**6.1/10**	**5.8/10**
% of Possible Score Achieved	**71.0%**	**56.0%**	**61.0%**	**58.0%**	**72.0%**	**56.0%**	**61.0%**	**58.0%**
Overall Category	**II**	**III**	**III**	**III**	**II**	**III**	**III**	**III**
Total Acreage of Assessed Wetlands within Site Boundaries	**7.52**	**0.73**	**4.17**	**1.83**	**7.39**	**0.73**	**4.17**	**1.83**
Functional Units (acreage x actual points)	**53.39**	**4.09**	**25.44**	**10.61**	**53.21**	**4.09**	**25.44**	**10.61**

2.3 *Easton Ranch (Butte District, Year 6)*

The Montana Department of Transportation wetland mitigation project at the Easton Ranch is located in the northwest quarter of Section 32, Township 4 North, Range 9 East, Park County, Montana. The property is located approximately three miles east of US Highway 89 and four miles northeast of Wilsall. The wetland mitigation conservation easement area encompasses approximately 34 fenced acres and is located east of the Shields River within the boundaries of the larger Easton Family Ranch, the previous landowner. The wetland restoration site is located within Watershed 13 – Upper Yellowstone River Basin. Wetlands were developed at this location to provide compensatory mitigation for wetland impacts associated with transportation projects in the Butte District.

Construction entailed the excavation of a series of wetland cells and a flood channel that bisects the 34-acre mitigation area. The primary source of wetland hydrology is groundwater supplemented by surface water from high flows associated with the Shields River. An existing irrigation diversion and delivery system was maintained to provide supplemental water to the northeast corner of the site. Revegetation tasks included planting woody cuttings and containerized shrubs, seeding wetland herbaceous species within the excavated wetland areas, and transplanting wetland plants and soils from existing wetlands to excavated areas. The wetland project was designed to increase flood storage, improve wildlife habitat, and restore riparian and wetland habitat impacted by past agricultural practices within the Shields River watershed. The project objectives include:

- Re-establish a previously existing, relic floodplain channel and associated riparian and floodplain wetland areas
- Create approximately 25 acres of emergent, scrub/shrub and riparian wetlands by replacing existing hay fields with a variety of wetland communities that mimic habitats found in bio-reference wetland areas located north and south of the project
- Re-establish hydrology to approximately 1.56 acres of drained wetlands in the north portion of the site
- Preserve 1.1 acres of existing scrub/shrub, forested, and palustine emergent communities at several locations within the project area
- Mimic old meander scars and relic flood channels within the wetland mitigation site
- Improve water storage capacity and increase the amount of floodplain area across the site
- Increase the amount of wildlife habitat in this reach of the Shields River

Table 8 summarizes the current estimated wetland credits based on the USACE approved credit ratios (MDT 2008) and the wetland delineation completed in June 2015. Proposed mitigation included the creation of 24.95 acres of emergent and shrub/scrub wetlands, the re-establishment of a 1.56 acre flood

channel, the preservation of 1.10 acres of pre-existing wetland, and the maintenance of 6.43 acres of upland buffer. Proposed wetland credits for the project site totaled 27.41 credit acres, which accounted for 0.67 acres of impacts associated with the construction of the mitigation wetland.

The 2015 delineation identified a total of 12.01 acres of wetlands within the project boundary. Approximately 9.34 acres of emergent wetland has developed to date within the constructed cells. The restored channel encompassed 1.56 acres of riverine emergent wetland. The pre-existing wetlands, which included portions of communities 3, 4 and 5, encompassed 1.1 acres. Uplands accounted for 20.64 acres of the 32.65 acre site. The current 50-foot upland buffer calculated for this site totals 11.5 acres. The expected value of 2.6 acres of upland buffer was replaced in 2015 with the GIS-calculated 50-foot upland buffer of 11.5 acres based on the existing extent of wetland development within the site. This resulted in a slight increase of credits between 2014 and 2015 although the overall extent of wetland habitat has decreased. Applying the approved USACE Mitigation ratios to each mitigation feature, a total of 12.81 acres of credit were estimated in 2015 (**Error! Reference source not found.**), approximately 14.6 acres shy of the proposed final credit acreage.

This mitigation site has not developed wetland habitat as expected. Several of the excavated depressions that contained surface water in 2011 and 2014 were dry in 2012, 2013, and 2015, limiting the potential expansion of wetland acreage within the site (see photo sheets). The increase of wetland acreage delineated in 2014 was primarily associated with the lower topographical swales and basins and seasonal groundwater. Decreased water levels within the open-water depressions observed on site during the 2012, 2013, and 2015 field surveys were likely due to a decrease in precipitation during those years; in 2012, 2013, and 2015 precipitation was 18%, 11%, and 8% respectively, below the January to August long term average. In 2014 precipitation was 22% above the January to August long term average. It is expected that if water is not added to the site, the southern portion of the restored channel and the created wetland directly west of the channel will revert to non-wetland status. This could result in a loss of approximately 0.5 acres (0.5 estimated credits) of created and restored wetland area. There is currently a transition of hydrophytic vegetation to upland vegetation occurring in several areas of the project area which may result in a loss of even more wetland acres.

Table 8. Estimated credit summary for the Easton Ranch Wetland Mitigation Site, 2011-2015.

Proposed Mitigation Features	Compensatory Mitigation Type	USACE Mitigation Ratios	Anticipated Final Credit Acreages	Proposed Final Wetland Credits (Acres)	2010 Wetland Acreages	2010 Estimated Credit (Acres)	2011 Wetland Acreages	2011 Estimated Credit (Acres)
Creation of palustrine emergent wetland via shallow excavation.	Creation	1:1	24.95	24.95	7.78	7.78	9.09	9.09
Re-establishment of relic flood channel.	Restoration (Re-establishment)	1:1	1.56	1.56	1.45	1.45	1.45	1.45
Preservation of existing shrub/scrub and palustrine emergent wetland.	Preservation	4:1	1.10	0.28	1.10	0.28	1.10	0.28
Establish a 50-foot wide upland buffer.	Upland Buffer	5:1	6.43	1.29	6.43*	1.29	6.43*	1.29
Project Impacts			-0.67	-0.67	-0.67	-0.67	-0.67	-0.67
Total				**27.41**		**10.12**		**11.44**

Proposed Mitigation Features	Compensatory Mitigation Type	2012 Wetland Acreages	2012 Estimated Credit (Acres)	2013 Wetland Acreages	2013 Credit Estimated (Acres)	2014 Wetland Acreages	2014 Credit Estimated (Acres)	2015 Wetland Acreages	2015 Credit Estimated (Acres)
Creation of palustrine emergent wetland via shallow excavation.	Creation	9.09	9.09	9.74	9.74	9.98	9.98	9.34	9.34
Re-establishment of relic flood channel.	Restoration (Re-establishment)	1.45	1.45	1.56	1.56	1.56	1.56	1.56	1.56
Preservation of existing shrub/scrub and palustrine emergent wetland.	Preservation	1.10	0.28	1.10	0.28	1.10	0.28	1.10	0.28
Establish a 50-foot wide upland buffer.	Upland Buffer	6.43*	1.29	6.43*	1.29	2.60**	0.52	11.5**	2.30
Project Impacts		-0.67	-0.67	-0.67	-0.67	-0.67	-0.67	-0.67	-0.67
Total			**11.44**		**12.19**		**11.67**		**12.81**

*The upland buffer was expected to decrease as wetland areas expand within the mitigation boundary. Value presented in this table prior to 2014 (6.43ac) represented the expected extent of upland buffer once maximum wetland acreage has been achieved.

**50-foot buffer calculated with GIS in 2015.

The 2008 MDT Montana Wetland Assessment Method (MWAM) (Berglund and McEldowney 2008) has been used to evaluate three assessment areas (AA). The AAs were separated by Creation, Restoration, and Preservation areas of the mitigation site and are discussed below. Table 9 summarizes the function and value ratings of the AA for 2010 to 2015.

The Creation AA encompassed 9.34 acres of constructed palustrine, emergent wetland cells and has generated 52.77 functional units. The decrease of 0.6 acres of created wetland was due to both reduced hydrology in the system and a correction of the project boundary to correspond with the most recent rectified aerial imagery. The overall rating for the Creation AA remained at a Category III wetland characterized by low disturbance in 2015. The ratings were high for short and long term surface water storage, sediment/nutrient/toxicant removal, and production export/food chain support. The number of units and acreage are expected to increase as some areas of upland in the excavated areas (community 13) transition to wetland habitat, provided sufficient wetland hydrology exists within the site. However, the current lack of hydrology on the area has resulted in a reduction of wetland acres and will not be sufficient enough to result in the expansion of wetland acreage.

The Restoration AA consisted of 1.56 acres of re-established flood channel. The Restoration AA (flood channel) received a Category III rating with 58.5 percent of the total possible points. There was an increase from moderate to high rating for sediment/shoreline stabilization between 2012 and 2013. Ratings were high for sediment/nutrient/toxicant removal and moderate for general wildlife habitat, flood attenuation, short and long term surface water storage, production export/food chain support, groundwater discharge/recharge, and uniqueness. The Restoration AA achieved a total of 9.13 functional units in 2015.

The 1.1 acre Preservation AA encompassed the existing forested, shrub/scrub and palustrine emergent wetlands. The existing wetland within the Preservation AA was rated as Category II with 65.0 percent of the possible points. The presence of emergent, scrub/shrub, and forested wetland types increased the structural diversity and flood attenuation ratings. Ratings were high for general wildlife habitat, flood attenuation and sediment/nutrient/toxicant removal. This AA was re-evaluated in 2014 as supporting a seasonal/intermittent water regime, a decrease from a perennial water regime recognized on previous evaluations and resulted in a decrease of actual points and functional units. The Preservation AA scored a total of 6.44 functional units in 2015.

Table 9. Wetland assessment (MWAM) results for the Easton Ranch Wetland Mitigation Site, 2010-2015.

Function and Value Parameters from the 2008 MDT Montana Wetland Assessment Method	2010 Creation	2011 Creation	2012 Creation	2013 Creation	2014 Creation	2015 Creation
Listed/Proposed T&E Species Habitat	Low (0.0)	Low (0.1)	Low (0.1)	Low (0.1)	Low (0.0)	Low (0.0)
MTNHP Species Habitat	Mod (0.6)	Mod (0.6)	Low (0.2)	Low (0.2)	Low (0.2)	Low (0.2)
General Wildlife Habitat	Mod (0.5)	Mod (0.7)	Mod (0.7)	Mod (0.7)	Mod (0.7)	Mod (0.7)
General Fish/Aquatic Habitat	NA	NA	NA	NA	NA	NA
Flood Attenuation	Mod (0.6)	Mod (0.5)	Mod (0.5)	Mod (0.5)	Mod (0.5)	Mod (0.5)
Short and Long Term Surface Water Storage	High (0.9)	High (0.8)	High (0.8)	High (0.8)	High (0.8)	High (0.8)
Sediment/Nutrient/Toxicant Removal	Mod (0.7)	Mod (0.7)	High (0.9)	High (0.9)	High (0.9)	High (0.9)
Sediment/Shoreline Stabilization	Low (0.2)	Low (0.2)	Mod (0.6)	Mod (0.6)	Mod (0.6)	Mod (0.6)
Production Export/ Food Chain Support	Mod (0.5)	High (0.8)	High (0.8)	High (0.8)	High (0.8)	High (0.8)
Groundwater Discharge/Recharge	High (1.0)	High (1.0)	Mod (0.7)	Mod (0.7)	Mod (0.7)	Mod (0.7)
Uniqueness	Low (0.2)	Low (0.3)	Mod (0.4)	Mod (0.4)	Mod (0.4)	Mod (0.4)
Recreation/Education Potential (bonus points)	Low (0.05)	Low (0.05)	Low (0.05)	Low (0.05)	Low (0.05)	Low (0.05)
Actual Points / Possible Points	**5.25 / 10**	**5.75 / 10**	**5.75 / 10**	**5.75 / 10**	**5.65 / 10**	**5.65 / 10**
% of Possible Score Achieved	**52.5%**	**57.5%**	**57.5%**	**57.5%**	**56.5%**	**56.5%**
Overall Category	**III**	**III**	**III**	**III**	**III**	**III**
Acreage of Assessed Aquatic Habitats within Easement	**8.98**	**9.09**	**9.09**	**9.74**	**9.98**	**9.34**
Functional Units (acreage x actual points)	**47.15**	**52.27**	**52.27**	**56.01**	**56.39**	**52.77**

Function and Value Parameters from the 2008 MDT Montana Wetland Assessment Method	2010 Restoration	2011 Restoration	2012 Restoration	2013 Restoration	2014 Restoration	2015 Restoration
Listed/Proposed T&E Species Habitat	Low (0.0)	Low (0.1)	Low (0.1)	Low (0.1)	Low (0.0)	Low (0.0)
MTNHP Species Habitat	Mod (0.6)	Mod (0.6)	Low (0.2)	Low (0.2)	Low (0.2)	Low (0.2)
General Wildlife Habitat	Low (0.3)	Mod (0.7)	Mod (0.7)	Mod (0.7)	Mod (0.7)	Mod (0.7)
General Fish/Aquatic Habitat	NA	NA	NA	NA	NA	NA
Flood Attenuation	Mod (0.5)	Mod (0.6)	Mod (0.6)	Mod (0.6)	Mod (0.6)	Mod (0.6)
Short and Long Term Surface Water Storage	Mod (0.6)	Mod (0.6)	Mod (0.6)	Mod (0.6)	Mod (0.6)	Mod (0.6)
Sediment/Nutrient/Toxicant Removal	Mod (0.6)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)
Sediment/Shoreline Stabilization	Mod (0.6)	Mod (0.6)	Mod (0.6)	High (0.9)	High (0.9)	High (0.9)
Production Export/ Food Chain Support	Mod (0.5)	Mod (0.7)	Mod (0.7)	Mod (0.7)	Mod (0.7)	Mod (0.7)
Groundwater Discharge/Recharge	High (1.0)	Mod (0.7)	Mod (0.7)	Mod (0.7)	Mod (0.7)	Mod (0.7)
Uniqueness	Low (0.2)	Low (0.3)	Mod (0.4)	Mod (0.4)	Mod (0.4)	Mod (0.4)
Recreation/Education Potential (bonus points)	Low (0.05)	Low (0.05)	Low (0.05)	Low (0.05)	Low (0.05)	Low (0.05)
Actual Points / Possible Points	**4.95 / 10**	**5.95 / 10**	**5.65 / 10**	**5.95 / 10**	**5.85 / 10**	**5.85 / 10**
% of Possible Score Achieved	**49.5%**	**59.5%**	**56.5%**	**59.5%**	**58.5%**	**58.5%**
Overall Category	**III**	**III**	**III**	**III**	**III**	**III**
Acreage of Assessed Aquatic Habitats within Easement	**1.45**	**1.45**	**1.45**	**1.56**	**1.56**	**1.56**
Functional Units (acreage x actual points)	**7.18**	**8.63**	**8.19**	**9.28**	**9.13**	**9.13**

Function and Value Parameters from the 2008 MDT Montana Wetland Assessment Method	2010 Preservation	2011 Preservation	2012 Preservation	2013 Preservation	2014 Preservation	2015 Preservation
Listed/Proposed T&E Species Habitat	Low (0.0)	Low (0.1)	Low (0.1)	Low (0.1)	Low (0.0)	Low (0.0)
MTNHP Species Habitat	Mod (0.6)	Mod (0.6)	Low (0.2)	Low (0.2)	Low (0.2)	Low (0.2)
General Wildlife Habitat	High (0.9)	High (0.9)	High (0.9)	High (0.9)	High (0.9)	High (0.9)
General Fish/Aquatic Habitat	NA	NA	NA	NA	NA	NA
Flood Attenuation	Exc (1.0)	High (0.9)	Mod (0.6)	High (0.9)	High (0.9)	High (0.9)
Short and Long Term Surface Water Storage	High (0.8)	High (0.8)	High (0.8)	High (0.8)	Mod (0.6)	Mod (0.6)
Sediment/Nutrient/Toxicant Removal	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)
Sediment/Shoreline Stabilization	NA	NA	NA	NA	NA	NA
Production Export/ Food Chain Support	Mod (0.7)	Exc (1.0)	Exc (1.0)	Exc (1.0)	High (0.9)	High (0.9)
Groundwater Discharge/Recharge	High (1.0)	High (1.0)	High (1.0)	High (1.0)	Mod (0.7)	Mod (0.7)
Uniqueness	Mod (0.6)	Mod (0.6)	Mod (0.6)	Mod (0.6)	Mod (0.6)	Mod (0.6)
Recreation/Education Potential (bonus points)	Low (0.05)	Low (0.05)	Low (0.05)	Low (0.05)	Low (0.05)	Low (0.05)
Actual Points / Possible Points	**6.65 / 9**	**6.95 / 9**	**6.25 / 9**	**6.55 / 9**	**5.85 / 9**	**5.85 / 9**
% of Possible Score Achieved	**73.9%**	**77.2%**	**69.4%**	**72.8%**	**65.0%**	**65.0%**
Overall Category	**II**	**II**	**II**	**II**	**III**	**II**
Acreage of Assessed Aquatic Habitats within Easement	**1.1**	**1.1**	**1.1**	**1.1**	**1.1**	**1.1**
Functional Units (acreage x actual points)	**7.32**	**7.65**	**6.88**	**7.21**	**6.44**	**6.44**

Table 10 summarizes the mitigation goals for the Easton Ranch. The Easton Ranch wetland mitigation site has shown continued progress towards achieving goals, although the targeted credit acreage has not been achieved in 2015 and will not occur without increasing hydrology throughout the footprint of the excavated areas. The site has achieved five of the six goals for this site. Although the site has developed nearly 10 acres of wetland habitat, this value falls over 50 percent short of the 25 acres originally identified as a target for wetland creation. Furthermore, expansion of the current wetland acreage is unlikely unless actions are taken to restore hydrology to the site.

Five of the mitigation goals have been achieved at this site. The constructed floodplain channel was activated during the 2011 spring runoff and resulted in development of scour holes, riffles, and point bars through natural fluvial geomorphic processes. Hydrophytic vegetation has established within the footprint of this channel. No bank erosion has been identified along the constructed channel through the course of yearly monitoring. Existing wetlands within the site have been preserved and grazing eliminated from these areas. The excavated depressions throughout the floodplain function as relic meander scars, storing surface water during periods of high flow within the Shields River. These depressional wetlands have improved the water storage capacity of the floodplain. The establishment of hydrophytic vegetation communities, preservation of existing scrub-shrub, forested, and emergent wetlands, and wildlife-friendly fencing around the site have improved wildlife habitat within the Easton Ranch wetland mitigation site.

The summary of performance standards listed in **Error! Reference source not found.** indicates this site has not achieved the full suite of success criteria established in the mitigation plan for the Easton Ranch wetland mitigation site. All wetlands delineated within this site in 2015 met the USACE three parameter criteria for hydrology, vegetation, and soils. Groundwater has been documented filling the depressional wetlands excavated across the site. Groundwater wells established within the site during baseline evaluation had been removed during construction. Redoximorphic concentrations and other hydric characteristics have developed within the wetland soils across the site. Lower than average precipitation in 2015 and the lack of water flow onto the site has decreased hydrology of the project area. Soils disturbed during construction have developed vegetation communities and are stable with no signs of active erosion. Areas identified as wetland habitat support a prevalence of hydrophytic vegetation. Trees and shrubs planted throughout the mitigation site continue to develop and natural recruitment of aspen, willows, and cottonwoods has been documented. Approximately 165 live planted woody stems were observed in 2015. The woody plants remain small and have yet to achieve areal coverage greater than one percent site wide. The lack of woody plant growth is attributed to the lack of hydrology observed on the site.

Table 10. Summary of mitigation goals for Easton Ranch wetland mitigation site.

Mitigation Goal for Easton Ranch	Goal Achieved Y/N	Discussion
Create approximately 25 acres of new emergent, scrub/shrub and riparian wetlands by replacing existing hay fields with a variety of wetland communities that mimic habitats found in bio-reference wetland areas located north and south of the project.	N	A total of 9.34 acres of wetland habitat has been created at this site to date.
Re-establish a previously existing, relic floodplain channel and associated riparian and floodplain wetland areas totaling 1.56 acres.	Y	A 1.56-acre floodplain channel was excavated through the site. This channel was activated during peak spring runoff in 2011 with fluvial geomorphic processes resulting in scour holes, riffles, and point bars. No areas of bank erosion along this channel have developed and appears to be functioning as designed. Wetland vegetation has established within the footprint of the channel.
Preserve 1.1 acres of existing scrub/shrub, forested, and palustrine emergent communities at several locations within the project area.	Y	The 1.1 acres of existing scrub/shrub, forested, and palustrine emergent wetland communities have been preserved, livestock grazing has been eliminated, and the areas continue to exhibit wetland hydrology.
Mimic old meander scars and relic flood channels within the wetland mitigation site.	Y	Several depressional wetland areas have been constructed across the mitigation site and function as relic meander scars.
Improve water storage capacity and increase the amount of floodplain area across the site.	Y	Several depressional wetland areas have been constructed across the mitigation site and have increased the water storage capacity of the floodplain.
Increase the amount of wildlife habitat in this reach of the Shields River.	Y	Wildlife habitat has been improved and protected by excluding livestock grazing and promoting the establishment of wetland vegetation.

Table 11. Summary of performance standards and success criteria for Easton Ranch wetland mitigation site.

Performance Standards	Success Criteria	Criteria Achieved Y/N	Discussion
Wetland Characteristics	Meet the three parameter criteria for hydrology, vegetation, and soils as outlined in the 1987 Wetland Delineation Manual and 2010 Mountains, Valleys, Coast Region.	Y	Areas identified as wetland habitat within the mitigation site meet the three parameter criteria.
Wetland Hydrology	Soil saturation present for at least 12.5 percent of the growing season.	Y	Areas identified as wetland habitat within the mitigation site exhibit soil saturation for a minimum 12.5 percent of growing season.
	Groundwater wells will be left undisturbed within the site for the purpose of monitoring groundwater elevations during the growing season.	N	No groundwater wells remain on site. Due to construction activities, the original monitoring wells were removed from the site.
	Groundwater is filling the depressional wetlands excavated into the upland areas of the site.	Y	Indicators of groundwater filling the depressional wetlands include sparsely vegetated concave surfaces, saturation to the surface and inundation.
	Constructed stream channel is stable.	Y	The constructed floodplain channel is stable with no bank erosion identified throughout the mitigation area.
Hydric Soil	Hydric soil conditions present or appear to be forming.	Y	Hydric soil characteristics, including redoximorphic concentrations and depleted matrix, have developed throughout a majority of the constructed wetlands.
	Soil is sufficiently stable to prevent erosion.	Y	Disturbed soil is stable and does not exhibit signs of erosion.
	Soil is able to support plant cover.	Y	Plant cover has continued to develop across disturbed soils.
Hydrophytic Vegetation	Achieved when wetlands delineated as hydrophytic utilizing technical guidelines.	Y	Areas identified as wetland habitat within the mitigation site support a prevalence of hydrophytic vegetation (OBL, FACW, and FAC).
Woody Plants	Trees and shrubs will be installed and survival will be assessed.	Y	Trees and shrubs have been planted throughout the mitigation site and are assessed during each yearly monitoring visit.
	Scrub/shrub wetlands habitat will be achieved where 30 percent absolute cover by cuttings, planted and volunteer woody plants is reached within the defined monitoring period or site is showing signs of progression towards that goal at the end of the defined monitoring period.	N	Approximately 2.7 percent of the wetland areas identified within the site are dominated by woody vegetation. Planted woody species continue to survive and develop along the constructed flood channel. Natural recruitment of aspen, willows, and cottonwoods within the site continue to establish. It does not appear the site is exhibiting considerable progress toward this success criteria.
Herbaceous Plants	At least 80 percent ocular vegetation coverage by desirable hydrophytic vegetation.	Y	Desirable hydrophytic vegetation consist of greater than 80 percent of total vegetation cover within delineated wetlands.
Wetland Acreage Development	Provide 27.41 net credit acres for the project area.	N	A total of 12.81 acres of wetland credit has been generated for the mitigation site. This total includes 9.34 acres of created wetland, 1.56 acres of restored wetland, 1.10 acres of preserved wetland, establishment of a 11.5-acre upland buffer, and 0.67-acre debit from project impacts.

Table 11 (Continued). Summary of performance standards and success criteria for Easton Ranch wetland mitigation site.

Performance Standards	Success Criteria	Criteria Achieved Y/N	Discussion
Wetland Acreage Development	Emergent wetland habitat will be 70-75% of mitigation wetland.	N	Emergent wetland habitat comprises approximately 89% of total wetland areas delineated in 2015.
	Scrub/shrub wetland habitat will be 15-20% of wetland area.	N	Scrub/shrub wetland habitat comprises approximately 2.7% of total wetland areas delineated in 2015.
	Open water will be <5% of wetland area.	Y	Aquatic macrophytes habitat comprises approximately 8.1% of total wetland areas delineated in 2015. These inundated areas (<3-ft deep) seasonally fluctuate throughout the growing season and support a diversity of submergent and emergent vegetation. The intent of this criterion was to minimize the amount of deep open water habitat greater than 3 feet in depth.
Floodplain Channel Restoration	Considered stable when banks are vegetated with a majority of deep-rooting riparian and wetland plant species	Y	Streambanks along the constructed channel are vegetated with a diversity of deep-rooting and wetland plant species.
	Bank stability will be evaluated by reference reach comparison.	Y	Banks within the constructed floodplain channel are stable and compare to reference reach conditions with no signs of erosion or channel movement.
	Vegetation transect across the floodplain will be monitored.	Y	Vegetation transect across the floodplain has been monitored yearly and supports a prevalence of species with a root stability index greater than 6.
Bank Stabilization (Shields River)	Area visually inspected and photo documented.	Y	The results of annual inspection and photo documentation along the Shields River in the northwestern corner of the site are presented in the mitigation monitoring reports.
	Stability achieved when the banks are vegetated with a majority of deep-rooting riparian and wetland plant species.	N	The banks of the Shields River are generally dominated by upland pasture grasses. Soil lifts and the riprap installed along the bank are eroding near the NW cornerof the site. Installed willow cuttings did not establish along this bank.
Upland Buffer	Noxious weeds do not exceed 10 percent cover within upland buffer area.	Y	Noxious weed cover is less than 10 percent within the upland buffer.
	Any area disturbed within creditable buffer zone must have at least 50 percent aerial cover of non-weed species by end of monitoring period.	Y	Disturbed areas have established greater than 50 percent cover by non-weed species.
Weed Control	Less than 5 percent absolute cover of state-listed noxious weed species across the site.	Y	State-listed noxious weed species across the site is less than 5 percent absolute cover.
Fencing	Install wildlife-friendly fencing along the easement boundaries.	Y	Wildlife-friendly fencing has been installed around the easement boundaries and is in good condition.
Monitoring	Monitor the site for a minimum period of five years or longer as determined by the US Army Corps.	Y	Comprehensive site monitoring has been on-going for approximately 6 years, since the completion of construction activities in 2009.

The irrigation diversion structure has been closed during all six site investigations. MDT is aware of the lack of water flow into the site and is working with the landowner and the irrigation district to have water diverted to the site earlier in the year. It is recommended that water be diverted into the site during the early growing season to promote increased development of hydric soils and hydrophytic vegetation within the site. Nine bird-boxes were installed at the site between 2010 and 2015. Three of the bird boxes were occupied. All fences were intact. No maintenance was required for the man-made structures.

Thirty one infestations of Canadian thistle, a Priority 2B noxious weed, were identified on site, primarily in uplands and along the site perimeter. The infestations ranged in area from less than 0.1 acres to between 0.1 and 1.0 acre. The cover classes ranged from a trace (<1.0 percent) to moderate (6 to 25 percent) cover. Canadian thistle was observed in communities 1, 3, 5, 13, 10, and 11. Thirteen infestations of gypsy-flower were observed on site, primarily in uplands. The size of the infestations was less than 0.1 acres with a trace (<1.0 percent) to low (1 to 5 percent) cover. MDT has an on-going weed control program and contractors sprayed the site in mid-July.

The east bank of the Shields River along the northwest corner of the Easton Ranch mitigation site remained relatively stable from project completion through the 2011 runoff event. The structural integrity of the coir-wrapped soil lifts was intact following high flows. Fine-grain deposits accumulated on the lifts as flood waters receded. The 2011 flood flows resulted in the formation of a wider base-flow channel due to a slight westward shift of the west bank, away from the site.

In early 2012, a woody debris jam was removed from the outer bend of the Shield River channel (east bank) downstream from photo point 4a, and several downed trees were removed from the cottonwood forest in the adjacent riparian zone. Removal of these stabilizing elements increased the vulnerability of the river to lateral migration. During the next high flow event (spring 2013), significant bank erosion occurred immediately upstream of photo point 4a. This erosion exposed the riprap protecting the reconstructed streambank, undermined the riprap along an approximately 85 foot long section that bank and undermined the coir wrapped soil lifts on that section, causing significant loss of soil and willow cuttings. Photos from photo point 4A on pages C-9 and C-10 of the full report document these changes.

Some re-accumulation of woody debris in the former log jam location was noted in 2014, but 2015 showed little additional accumulation and perhaps some loss of what wood had been gained the previous year. Although little additional bank erosion has been noted since the dramatic lateral cutting event of 2013, this section of bank remains exposed and vulnerable. The 2015 runoff period was fed by below-average precipitation. If some measures are not taken to provide additional stability to the outer bends of the Shields River through this reach, a future high water event may result in significant additional movement of the bank,

which already threatens to capture the northwest fence corner of the project area.

2.4 Forsyth Northwest (4 sites)

The Forsyth-Northwest (FNW) project encompasses four wetland mitigation sites (West, Middle, East, and Treasure County Line) developed to mitigate for a cumulative total of 8.98 acres of wetland impacts associated with two Montana Department of Transportation (MDT) highway construction projects: 1) Volborg – N & S project constructed in 2004, and 2) the Forsyth – Northwest project constructed in 2012. The four wetland mitigation sites are located in Rosebud County in the Sagebrush Steppe ecoregion of the Northwest Great Plains. The sites are within Watershed 14 (Middle Yellowstone).

2.4.1 FNW – East (Glendive District, Year 3)

The East site is located northwest of Forsyth along Montana Highway 12 at mile marker 262.3, approximately 1,000 feet from the Middle site and directly adjacent to US Highway 21. The East mitigation site is a 2.74-acre site owned by MDT, and is intended to provide 1.07 acres of compensatory wetland mitigation. Proposed mitigation actions included the following:

- Excavation of new wetland area with undulating bottoms
- Create emergent wetlands by placing salvaged wetland sod and hydrophytic vegetation within the excavated wetland and seeding with wetland grass mix

The expected wetland community for this site is a palustrine emergent system dominated by herbaceous hydrophytes. Site construction was completed in summer 2012 and the revegetation was completed from August through October 2012.

The wetland acreage delineated in 2015 totaled 0.46 acres, a decrease of 0.73 acres since 2014. This decrease was likely driven by the below-average precipitation received at the site during 2015. It is expected, following a return to higher precipitation levels in subsequent monitoring years, the site will exhibit increased desirable hydrophytic vegetation cover and an expansion of wetland acreage. Upland buffer accounted for 2.28 acres within the FNW-East monitoring boundary. Applying standard wetland compensatory mitigation ratios (Montana Regulatory Program, April 2005), the site attained an estimated 0.92 credit acres, a decrease of 0.58 credit acres since 2014 (Table 12). There are no established performance standards for this site.

Table 12. Estimated credit summary for the FNW-East Wetland Mitigation Site.

Habitat Type	Mitigation Ratio	2013 Delineated Acres	2013 Estimated Credit Acres	2014 Delineated Acres	2014 Estimated Credit Acres	2015 Delineated Acres	2015 Credit Acres
Created Wetland	1:1	1.19	1.19	1.19	1.19	0.46	0.46
Upland Buffer	5:1	1.55	0.31	1.55	0.31	2.28	0.46
Total		**2.74**	**1.50**	**2.74**	**1.50**	**2.74**	**0.92**

Results of the 2013, 2014, and 2015 functional assessments are summarized in Table 13. The total aquatic habitat developed to date within the 2.74-acre project area is 0.46 acres. The site was evaluated as one assessment area. The AA was rated as a Category III wetland with 48.89 percent of the total possible points. The Montana-listed S2 species of concern, grand redstem and western hog-nosed snake were documented in 2013 and 2015, respectively, and provided a high MTNHP species habitat rating. The disturbance rating improved from high in 2013 to moderate in 2014 and 2015. Sediment/shoreline stabilization improved from a low to moderate rating in 2015 due to an increase in percent cover of wetland species with stability ratings greater than or equal to six. Short and long term surface water storage was given a low rating in 2015 as a result of the decrease in water contained in the AA's wetlands subject to periodic flooding/ponding. The site achieved 2.0 functional units, a decrease of 3.1 units since 2014. The decrease in functional units was primarily related to the wetland acreage contraction, which was likely driven by the below-average precipitation received at the site during 2015.

Table 13. Wetland assessment (MWAM) results for the FNW-East Wetland Mitigation Site.

Function and Value Parameters from the 2008 Montana Wetland Assessment Method	2013	2014	2015
Listed/Proposed T&E Species Habitat	Low (0.0)	Low (0.0)	Low (0.0)
MTNHP Species Habitat	High (0.9)	High (0.9)	High (0.9)
General Wildlife Habitat	Low (0.2)	Mod (0.4)	Mod (0.4)
General Fish/Aquatic Habitat	NA	NA	NA
Flood Attenuation	NA	NA	NA
Short and Long Term Surface Water Storage	Mod (0.6)	Mod (0.6)	Low (0.3)
Sediment/Nutrient/Toxicant Removal	Mod (0.7)	High (1.0)	High (1.0)
Sediment/Shoreline Stabilization	Low (0.2)	Low (0.2)	Mod (0.6)
Production Export/Food Chain Support	Low (0.2)	Low (0.3)	Low (0.3)
Groundwater Discharge/Recharge	Mod (0.7)	Mod (0.7)	Mod (0.7)
Uniqueness	Low (0.1)	Low (0.2)	Low (0.2)
Recreation/Education Potential (bonus points)	NA	NA	NA
Actual Points/Possible Points	**3.6 / 9**	**4.3 / 9**	**4.4 / 9**
% of Possible Score Achieved	**40.0%**	**47.8%**	**48.9%**
Overall Category	**III**	**III**	**III**
Total Acreage of Assessed Wetlands within Site Boundaries	**1.19**	**1.19**	**0.46**
Functional Units (acreage x actual points)	**4.3**	**5.1**	**2.0**

Infestations of two Priority 2B noxious weeds, including field bindweed (*Convolvulus arvensis*) and salt-cedar (*Tamarix ramosissima*), were mapped in five locations. Field bindweed was identified in three locations of less than 0.1 acre in size with a trace (less than 1 percent) to moderate cover class (6 to 25 percent). Two infestations of salt-cedar seedlings, less than 0.1 acre in size with a trace cover class (less than 1 percent), were present in the project area. These infestations should be controlled to prevent further colonization and establishment. The recently constructed fence along the site was in good-working order. There were no man-made water control structures installed at FNW-East.

2.4.2 FNW – Middle (Glendive District, Year 3)

The Middle mitigation site is a 1.80-acre site owned by MDT. The site is adjacent to US Highway 21 near mile marker 261.9 and is situated among old meander scars across the Big Porcupine Creek floodplain. This area is intended to provide 0.34 acres of compensatory wetland mitigation. Proposed mitigation actions included the following:

- Excavation of a new wetland area with undulating bottoms
- Create emergent wetland by placing salvaged wetland sod and hydrophytic vegetation within the excavated wetlands and seeding with wetland grass mix

The expected wetland community for this site is a palustrine emergent system dominated by herbaceous hydrophytes. Site construction was completed in summer 2012 and the revegetation was completed from August through October 2012.

Table 14 shows the total delineated acres and credit acres estimated for the FNW-Middle site in 2013, 2014, and 2015. The 2015 wetland delineation identified 0.49 acres of created emergent wetlands and 1.31 acres of upland buffer, the same acreages identified in 2013 and 2014. The site accrued 0.75 estimated credit acres in 2015. There are no performance standards identified for this site. Four noxious weeds were identified within the mitigation site boundaries yet exhibited very low percent areal cover (1-5%). The percent cover of native hydrophytes was low. The cover of wetland vegetation will increase as favorable wetland conditions persist and as the site recovers from the 2012 construction.

Table 14. Estimated credit summary for the FNW-Middle Site, 2013 to 2005.

Habitat Type	Mitigation Ratio	2013 Delineated Acres	2013 Estimated Credit Acres	2014 Delineated Acres	2014 Estimated Credit Acres	2015 Delineated Acres	2015 Estimated Credit Acres
Created Wetland	1:1	0.49	0.49	0.49	0.49	0.49	0.49
Upland Buffer	5:1	1.31	0.26	1.31	0.26	1.31	0.26
TOTAL		**1.80**	**0.75**	**1.80**	**0.75**	**1.80**	**0.75**

Results of the 2013, 2014, and 2015 functional assessments are summarized in Table 15. The FNW-Middle site was evaluated as one assessment area and encompassed 0.49 acres. The prominent factor adversely impacting the overall score and functional units at the site in 2013 was the general condition of the AA including high percentage of bare ground, low vegetation cover, and low quality of wildlife habitat. The disturbance rating went from high in 2013 to moderate in 2014 based on the increased vegetation cover in disturbed areas. The Montana-listed S2 species of concern, grand redstem (*Ammannia robusta*), was documented growing within the constructed wetland in 2013 and provided a high MTNHP rating. The flood attenuation rating was modified based on lack of connection to Big Porcupine Creek. The sediment/shoreline stabilization increased in 2015 to reflect the increase in percent cover of wetland species with stability ratings greater than or equal to six. Ratings for general wildlife habitat, general fish/aquatic habitat, sediment/nutrient/toxicant removal, and uniqueness increased from 2014 to 2015 as a result of less disturbance and higher wetland vegetation cover. This site achieved 42.2 percent of the possible score and a total of 1.9 functional units in 2015. Continued development of the vegetation cover will result in increased functional units although the small size of the AA will limit the total score.

Table 15. Wetland assessment (MWAM) results for the FNW-Middle Wetland Mitigation Site.

Function and Value Parameters from the 2008 Montana Wetland Assessment Method	2013	2014	2015
Listed/Proposed T&E Species Habitat	Low (0.0)	Low (0.0)	Low (0.0)
MTNHP Species Habitat	High (0.9)	High (0.9)	High (0.9)
General Wildlife Habitat	Low (0.2)	Mod (0.4)	Mod (0.4)
General Fish/Aquatic Habitat	NA	NA	NA
Flood Attenuation	High (1.0)	NA	NA
Short and Long Term Surface Water Storage	Mod (0.6)	Mod (0.6)	Mod (0.6)
Sediment/Nutrient/Toxicant Removal	Mod (0.7)	Mod (0.7)	HIgh (0.8)
Sediment/Shoreline Stabilization	Low (0.2)	Low (0.2)	Mod (0.6)
Production Export/Food Chain Support	Low (0.2)	Low (0.3)	Low (0.3)
Groundwater Discharge/Recharge	NA	NA	NA
Uniqueness	Low (0.1)	Low (0.2)	Low (0.2)
Recreation/Education Potential (bonus points)	NA	NA	NA
Actual Points/Possible Points	**3.9 / 9**	**3.3 / 9**	**3.8 / 9**
% of Possible Score Achieved	**43.3%**	**36.7%**	**42.2%**
Overall Category	**III**	**III**	**III**
Total Acreage of Assessed Wetlands within Site Boundaries	**0.49**	**0.49**	**0.49**
Functional Units (acreage x actual points)	**1.9**	**1.6**	**1.9**

Infestations of four Priority 2B noxious weeds, including field bindweed, Canadian thistle, leafy spurge, and salt-cedar, were identified at this site in 2015 and should be controlled to prevent further spread and colonization. The fence along the mitigation area was in good condition. There were no man-made water control structures or bird boxes installed at this site.

2.4.3 FNW – Treasure County Line (Glendive District, Year 3)

The Treasure County Line mitigation site is a 5.89-acre site owned by MDT, located approximately 12 miles west of Forsyth at Interstate 94 mile marker 81.75. The site is situated southwest of the intersection of Interstate 94 and Reservation Road in the Lower Yellowstone River-Sunday Creek sub-basin, and adjacent to an existing wetland complex along Reservation Creek. It is intended to provide 1.78 acres of compensatory wetland mitigation. Proposed mitigation actions included the following:

- Excavation of new wetland area with undulating bottoms
- Create emergent wetland by placing salvaged wetland sod and hydrophytic vegetation within the excavated areas and seeding with wetland grass mix

The expected wetland community for this site is a palustrine emergent system dominated by herbaceous hydrophytes. Site construction was completed in 1999. Prior to 2013, this site had not been monitored for regulatory compliance.

The 5.89-acre FNW-Treasure County Line mitigation site includes 1.67 acres of created wetland and 4.22 acres of upland buffer. Applying standard wetland compensatory mitigation ratios (Montana Regulatory Program, April 2005), the site has attained an estimated 2.51 credit acres, 0.13 more credit acres than in 2014 (**Error! Reference source not found.**).

Table 16. Estimated credit summary for the FNW-Treasure County Line Wetland Mitigation Site.

Habitat Type	Mitigation Ratio	2013 Delineated Acres	2013 Estimated Credit Acres	2014 Delineated Acres	2014 Estimated Credit Acres	2015 Delineated Acres	2015 Estimated Credit Acres
Created Wetland	1:1	1.50	1.50	1.50	1.50	1.67	1.67
Upland Buffer	5:1	4.39	0.88	4.39	0.88	4.22	0.84
Total		**5.89**	**2.38**	**5.89**	**2.38**	**5.89**	**2.51**

Results of the 2013, 2014, and 2015 functional assessments are summarized in Table 17. The total aquatic habitat developed to date within the 5.89-acre project area is 1.67 acres. The FNW-Treasure County Line site was evaluated as one assessment area (AA) that encompasses the entire constructed wetland. The AA was rated as a Category III wetland with 59.44 percent of the total possible points and 8.9 functional units. Ratings for general wildlife habitat, production export/food chain support, and uniqueness decreased in 2015 as a result of the change in disturbance rating from low to moderate. The AA was given a moderate disturbance rating due to the observation of moderate grazing that had occurred earlier in the spring of 2015. The site received high ratings for short/long term surface water storage, sediment/nutrient/toxicant removal, groundwater discharge/recharge and recreation/education potential, and

moderate ratings for MTNHP species habitat, general wildlife habitat, flood attenuation, and production export/food chain support.

Table 17. Wetland assessment (MWAM) results for the FNW-Treasure County Line Wetland Mitigation Site.

Function and Value Parameters from the 2008 Montana Wetland Assessment Method	2013	2014	2015
Listed/Proposed T&E Species Habitat	Low (0.0)	Low (0.0)	Low (0.0)
MTNHP Species Habitat	Mod (0.6)	Mod (0.6)	Mod (0.6)
General Wildlife Habitat	Mod (0.7)	High (0.9)	Mod (0.7)
General Fish/Aquatic Habitat	NA	NA	NA
Flood Attenuation	NA	Mod (0.4)	Mod (0.4)
Short and Long Term Surface Water Storage	High (0.8)	High (0.8)	High (0.8)
Sediment/Nutrient/Toxicant Removal	High (1.0)	High (0.9)	High (0.9)
Sediment/Shoreline Stabilization	NA	NA	NA
Production Export/Food Chain Support	Mod (0.4)	Mod (0.7)	Mod (0.5)
Groundwater Discharge/Recharge	High (1.0)	High (1.0)	High (1.0)
Uniqueness	Low (0.3)	Mod (0.4)	Low (0.3)
Recreation/Education Potential (bonus points)	High (0.15)	High (0.15)	High (0.15)
Actual Points/Possible Points	**4.95 / 8**	**5.85 / 8**	**5.35 / 9**
% of Possible Score Achieved	**61.9%**	**73.1%**	**59.4%**
Overall Category	**III**	**II**	**III**
Total Acreage of Assessed Wetlands within Site Boundaries	**1.50**	**1.50**	**1.67**
Functional Units (acreage x actual points)	**7.4**	**8.8**	**8.9**

Three infestations of Canadian thistle (*Cirsium arvense*), a Priority 2B noxious weed, were identified within this site in 2015. The size of infestations ranged from less than 0.1-acre to 1 acre with a cover class that ranged from low (1 to 5 percent) to moderate (6 to 25 percent). No woody vegetation or man-made water control structures were installed at this site. The fence surrounding the mitigation area was in good working order when inspected in 2015. Evidence of cattle grazing that occurred earlier in the year was observed during the 2015 field survey. CCI personnel informed MDT regarding this observation immediately after the 2015 field survey.

2.4.4 FNW – West (Glendive District, Year 3)

The West mitigation site is a 13.71 acre site owned by MDT and located at the mouth of East Spring Coulee in the floodplain of Big Porcupine Creek. The West site is approximately 1,000 feet from the East site, at mile marker 260 on Montana Highway 12. The site is intended to provide 10.38 acres of compensatory wetland mitigation. Approximately 1.29 acres of pre-existing wetlands will be preserved at this site. Proposed mitigation actions included the following:

- Excavation of new wetland areas with undulating bottoms
- Create emergent wetlands by placing salvaged wetland sod and hydrophytic vegetation within the excavated wetlands and seeding with wetland grass mix
- Construct a water retention dike on the east end of the project site

The targeted wetland community types included emergent, scrub-shrub, and forested classes dominated by herbaceous hydrophytes, willows, and cottonwoods. Site construction was completed in summer 2012 and the revegetation was completed from August through October 2012.

Approximately 6.01 aquatic habitat acres consisting of approximately 1.29 acres of pre-existing wetland habitat and 4.72 acres of recently created wetlands were delineated in 2015. Approximately 7.7 acres of upland habitat was mapped on the site in 2015. **Error! Reference source not found.** presents the calculated credit acres for individual mitigation types with appropriate credit ratios applied using the USACE crediting system. The FNW-West mitigation types and ratios included creation (1:1), preservation (4:1), and upland buffer (5:1). The credit acres accrued at the FNW-West site in 2015 totaled 6.58, 0.13 more credit acres than in 2014.

Table 18. Estimated credit summary for the FNW-West Site.

WETLAND	Ratio	2013 Delineated Acres	2013 Estimated Credit Acres	2014 Delineated Acres	2014 Estimated Credit Acres	2015 Delineated Acres	2015 Estimated Credit Acres
Preserved Wetland	4:1	1.29	0.32	1.29	0.32	1.29	0.32
Created Wetland	1:1	4.15	4.15	4.56	4.56	4.72	4.72
Upland Buffer	5:1	8.27	1.65	7.86	1.57	7.70	1.54
TOTAL		**13.71**	**6.13**	**13.71**	**6.45**	**13.71**	**6.58**

Results of the 2013, 2014, and 2015 functional assessments are summarized in Table 19. The FNW-West site was evaluated as one assessment area (AA-1) that encompassed 6.01 acres in 2015. The AA was rated as a Category II wetland in 2015 with 69.6 percent of the total possible points. Ratings for general wildlife habitat, general fish/aquatic habitat, sediment/nutrient/toxicant removal, and uniqueness increased from 2014 to 2015 as a result of less disturbance and higher vegetation cover. The site received a high rating for MTNHP Species habitat based on the presence of grand redstem (*Ammannia*

robusta) within the site, observed in 2013 and 2014. The site also received high ratings for short and long term surface water storage, production export/food chain support, and recreation/education potential. The site achieved 46 functional units (FU) in 2015, 6.5 more than in 2014, reflecting the increase in wetland acreage and the decrease in site disturbance as vegetation cover develops. The rating and functional units are expected to continue to improve as the site recovers from the recent excavation and develops increased vegetation cover.

Table 19. Wetland assessment (MWAM) results for the FNW-West Wetland Mitigation Site.

Function and Value Parameters from the 2008 Montana Wetland Assessment Method	2013	2014	2015
Listed/Proposed T&E Species Habitat	Low (0.0)	Low (0.0)	Low (0.0)
MTNHP Species Habitat	High (0.9)	High (0.9)	High (0.9)
General Wildlife Habitat	Mod (0.5)	Mod (0.7)	E (1)
General Fish/Aquatic Habitat	NA	NA	Mod (0.4)
Flood Attenuation	Mod (0.5)	Mod (0.5)	Mod (0.5)
Short and Long Term Surface Water Storage	High (1.0)	High (1.0)	High (1.0)
Sediment/Nutrient/Toxicant Removal	Mod (0.4)	Mod (0.4)	Mod (0.6)
Sediment/Shoreline Stabilization	Low (0.3)	Mod (0.7)	Mod (0.7)
Production Export/Food Chain Support	Mod (0.6)	High (0.9)	High (0.9)
Groundwater Discharge/Recharge	Mod (0.7)	High (1.0)	High (1.0)
Uniqueness	Mod (0.4)	Mod (0.5)	Mod (0.6)
Recreation/Education Potential (bonus points)	High (0.15)	High (0.15)	High (0.15)
Actual Points/Possible Points	**5.45 / 10**	**6.75 / 10**	**7.65 / 11**
% of Possible Score Achieved	**54.5%**	**67.5%**	**69.6%**
Overall Category	**III**	**III**	**II**
Total Acreage of Assessed Wetlands within Site Boundaries	**5.44**	**5.85**	**6.01**
Functional Units (acreage x actual points)	**29.6**	**39.5**	**46.0**

Infestations of four Priority 2B noxious weeds, including Canadian thistle (*Cirsium arvense*), leafy spurge (*Euphorbia esula*), field bindweed (*Convolvulus arvensis*), and salt-cedar (*Tamarix ramosissima*), were mapped in nineteen locations. Canadian thistle was identified in nine locations within the project area. The size of the infestations ranged from less than 0.1 acre to 1 acre with a cover class that ranged from trace (less than 1 percent) to high (26 to 100 percent). Field bindweed was identified in three locations of less than 0.1 acre in size with a trace cover class (less than 1 percent). The project area contained five infestations of leafy spurge that ranged from low (less than 0.1 acre) to moderate (0.1 to 1.0 acre) in size with cover classes of trace (less than 1 percent) to high (26 to 100 percent). Two infestations of salt-cedar, less than 0.1 acre in size with a trace (less than 1 percent) to low cover class (1 to 5 percent), were present in the project area. The MDT has an on-going weed control program that assesses and employs weed-control measures within their wetland mitigation sites on an annual basis.

The dike failure that occurred at the site during high flows in 2013 was repaired by MDT prior to the 2013 field survey and was intact when inspected in 2013.

However, the structure appeared to be inadequately stabilized and susceptible to future failure. An examination of this structure in June 2014 indicated that the structure did fail again during high spring flows, eroding a channel down to the elevation of the original ephemeral thalweg. The dike had not been repaired as of the 2015 site visit. Even though wetland acreage has increased on site, we recommend the structure be redesigned and the upstream and downstream ends of the dike be reinforced with rip-rap and/or fabric for protection against future washouts based on the high volume of water that flows from the coulees at the west end of the site. A dike with reinforced spillway that functions to impound surface water during the spring would result in an increase of wetland habitat throughout the eastern part of the site. MDT has retained a contractor to evaluate this recommendation, and a fix will be completed pending design review and USACE approvals. The fence around the perimeter of the monitoring areas was in good condition.

There were no quantitative performance measures or success criteria established for this wetland mitigation area. Monitoring requirements listed within the approved wetland mitigation plan are being satisfied. In general, the areas delineated as wetlands met the criteria for hydrophytic vegetation, hydric soil, and wetland hydrology. Noxious weed cover in 2015 was less than 10 percent site wide.

2.5 Kindsfater Wetland (Billings District, Year 3)

The Kindsfater Wetland Mitigation project is located in the northwest quarter of Section 6, Township 2 South, Range 25 East, Yellowstone County, Montana. The property is located approximately 3.0 miles northeast of Laurel, Montana, and is adjacent to 72nd Street West and Laurel Airport Road. The wetland mitigation site is intended to provide 43.8 acres of wetland mitigation credits to assist the MDT in meeting compensatory mitigation requirements for proposed construction projects in Watershed #13 (Upper Yellowstone). The Kindsfater project and proposed crediting as presented in the August 2012 Kindsfater wetland mitigation plan was approved by US Army Corps of Engineers (USACE) permit number NWO-2007-00824-MTB. The objectives of this project included the creation, restoration, enhancement, and preservation of wetland habitat within the historic Kindsfater gravel pit.

The Kindsfater site was previously a gravel mining operation, with mining operations ceasing in 1987. The excavations from mining exposed groundwater throughout the site and eventually the site evolved into a wetland complex including emergent, scrub/shrub, and forested wetland habitats. The site was identified in 2002 as a potential wetland restoration site and evaluated by Carter Burgess, Inc. (CB) to determine the practicality of developing wetland mitigation credits. A wetland delineation conducted by CB in 2002 identified 47.6 acres within the site. In 2006, Morrison-Maierle, Inc. (MMI) delineated wetlands within the site and identified 32.9 acres of emergent, scrub/shrub, and forested wetlands. In 2012, MMI re-delineated the site to verify the wetland acreage and identified a total of 25.9 acres of wetlands on the site. Based on these findings, approximately 22 acres of wetland habitat has converted to upland between 2002 and 2012.

The project design includes two phases of development, the Base Project and the Alternative Option. The Base Project would involve the creation, restoration, enhancement, and preservation of wetlands within the western half of the site. The Alternative Option would include the excavation and removal of gravel materials, and the construction of new wetlands within the eastern half of the site. Credits to be developed as a result of both phases would total 43.8 under full build-out. Currently, the Base project and a portion of the Alternative Option have been constructed. The 11.1 acres wetlands to be created within the gravel mining area were not completed, reducing the project's expected credits to 32.7.

Error! Reference source not found. summarizes the current estimated wetland credits based on the USACE approved credit ratios (MDT 2008) and the wetland delineation completed in July 2014. Mitigation areas delineated at the Kindsfater site in 2015 include 1.8 acres of creation, 7.9 acres of re-establishment, 0.9 acres of rehabilitation, 3.0 acres of enhancement, 21.3 acres of wetland preservation, and 4.6 acres (22.9 acres within 50-foot buffer) of upland buffer. Applying the USACE approved ratios to these values, a total of 21.2 acres of

mitigation credit have been estimated in 2015, a value well below the targeted 32.7 acres anticipated at this site. Although 2015 represents only the 3rd year of monitoring, the attainment of the full target value of 32.7 credit acres may prove difficult without an increase of groundwater or supplemental water into the mitigation area.

Table 20. Estimated credit summary for the Kindsfater Wetland Mitigation Site, 2015.

Compensatory Mitigation Type	Mitigation Area Description	Wetland Type (Cowardin)	Anticipated Mitigation Surface Area (Acres)	USACE Approved Mitigation Ratios	Anticipated Mitigation Credit (Acres)	2013 Delineated Acres	2013 Mitigation Credit (Acres)	2014 Delineated Acres	2014 Mitigation Credit (Acres)	2015 Delineated Acres	2015 Mitigation Credit (Acres)
Creation (Establishment)	Wetland Cells 7, 9, 13 & 14	Lacustrine emergent	4.6	1:1	4.6	1.8	1.8	1.8	1.8	1.8	1.8
Restoration (Re-establishment)	Wetland Cells 1-6 and partial Cell 18	Lacustrine emergent and Palustrine emergent, scrub-shrub	14.0	1:1	14.0	7.9	7.9	7.9	7.9	7.9	7.9
Restoration (Rehabilitation)	Areas adjacent to Wetland Cells 1-12	Palustrine emergent, scrub-shrub	9.2	1.5:1	6.1	0.9	0.6	0.9	0.6	0.9	0.6
Enhancement	Wetland Cells 10-12 & partial Cell 8	Palustrine emergent, scrub-shrub	3.1	3:1	1.0	3.0	1.0	3.0	1.0	3.0	1.0
Preservation	Existing Wetland Areas	Palustrine emergent, scrub-shrub	21.9	4:1	5.5	21.9	5.5	21.3	5.3	21.3	5.3
Upland Buffer	50-foot wide upland perimeter	N/A	7.3	5:1	1.5	22.9	1.46*	22.8	4.56**	22.9	4.6**
		Totals	**60.1**		**32.7**	**58.4**	**18.2**	**57.7**	**21.1**	**57.8**	**21.2**

*Estimated credit acres for upland buffer included the 1.46 acres anticipated in USACE-approved mitigation plan.

**Value calculated using GIS.

The 2008 MDT Montana Wetland Assessment Method (MWAM) (Berglund and McEldowney 2008) was used to evaluate two general assessment areas (AA) (**Error! Reference source not found.**). The AAs were generally separated by creation and pre-existing wetland areas are described below.

The Existing Wetland AA included 33.10 acres of pre-existing wetland habitat identified in the 2012 wetland delineation conducted by MMI. This AA included 21.31 acres of preservation wetland habitat, 8.80 acres of restoration habitat, and 2.99 acres of enhancement habitat. The Existing Wetland AA was rated as a Category III wetland, scoring 59 percent of the possible points and 155.57 functional units. Primary habitat for the Plains Spadefoot was observed in this AA, which also received high ratings for short and long term surface water storage, sediment/nutrient/toxicant removal and recreation/education potential.

The Created Wetlands AA encompassed 1.8 acres of constructed palustrine, emergent wetlands and included Cells 9, 13 and 14 and a portion of Cell 7. This AA rated as a Category III wetland with 49 percent of the possible score and a total of 7.02 functional units. The recent disturbance from construction was reflected in the 2015 evaluation. The score increased slightly between 2014 and 2015 due to modifications to the sediment/shoreline stabilization rating. The AA rated high for MTNHP species habitat owing to the documented primary habitat of the Plains Spadefoot (S3). High marks were also received for the recreation/education potential. The rating for this AA is expected to increase as the disturbed areas recover and develop a more extensive vegetation cover.

Table 21. Wetland assessment (MWAM) results for the Kindsfater Wetland Mitigation Site, 2013-2015.

Function and Value Parameters 2008 MDT Montana Wetland Assessment Method	2013 AA 1 (Existing Wetlands)	2014 AA 1 (Existing Wetlands)	2015 AA 1 (Existing Wetlands)	2013 AA 2 (Created Wetlands)	2014 AA 2 (Created Wetlands)	2015 AA 2 (Created Wetlands)
Listed/Proposed T&E Species Habitat	Low (0.0)	Low (0.0)	Low (0.0)	Low (0.0)	Low (0.0)	Low (0.0)
MTNHP Species Habitat	High (0.9)	High (0.9)	High (0.9)	High (0.9)	High (0.9)	High (0.9)
General Wildlife Habitat	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)
General Fish/Aquatic Habitat	NA	NA	NA	NA	NA	NA
Flood Attenuation	NA	NA	NA	NA	NA	NA
Short and Long Term Surface Water Storage	High (0.9)	High (0.9)	High (0.9)	Mod (0.6)	Low (0.3)	Low (0.3)
Sediment/Nutrient/Toxicant Removal	High (0.9)	High (0.9)	High (0.9)	Mod (0.5)	Mod (0.7)	High (1.0)
Sediment/Shoreline Stabilization	NA	NA	NA	NA	NA	NA
Production Export/Food Chain Support	Mod (0.6)	Mod (0.6)	Mod (0.6)	Low (0.3)	Low (0.3)	Low (0.3)
Groundwater Discharge/Recharge	Mod (0.7)	Mod (0.7)	Mod (0.7)	Mod (0.7)	Mod (0.7)	Mod (0.7)
Uniqueness	Low (0.2)	Low (0.2)	Low (0.2)	Low (0.2)	Low (0.2)	Low (0.2)
Recreation/Education Potential	High (0.20)	High (0.20)	High (0.20)	High (0.20)	High (0.20)	High (0.20)
Actual Points / Possible Points	**4.7 / 8**	**4.7 / 8**	**4.7 / 8**	**3.7 / 8**	**3.6 / 8**	**3.9 / 8**
% of Possible Score Achieved	**59%**	**59%**	**59%**	**46%**	**45%**	**49%**
Overall Category	**III**	**III**	**III**	**III**	**III**	**III**
Total Acreage of Assessed Wetlands within Site Boundaries (ac)	**33.7**	**33.1**	**33.1**	**1.8**	**1.8**	**1.8**
Functional Units (acreage x actual points)	**158.44**	**155.57**	**155.57**	**6.55**	**6.37**	**7.02**

Error! Reference source not found. provides a summary of the site conditions in relation to the established performance standards and success criteria. All wetlands delineated within the Kindsfater site in 2015 met the three criteria outlined in the 1987 Manual and 2010 GP Regional Supplement. Wetland creation areas exhibited more than 5 percent cover from noxious weeds. In total, restored, created, enhanced, and preserved wetlands exhibited less than 80 percent desirable hydrophytic vegetation cover during the 2015 monitoring event. These areas generally showed increased in overall vegetation cover and are anticipated to meet this criteria within 5 years post-construction. Approximately 35 percent of the planted woody vegetation survived through 2015. Fencing has been installed around the perimeter of the easement area to protect the site from disturbance. Within the upland buffer, noxious weed cover has exceeded 5 percent. The MDT implements weed control measures based on the results of field surveys to minimize and/or eliminate the intrusion of State Listed Noxious weed species within the site. Monitoring of this MDT mitigation site will be conducted for a minimum period of five years as determined by the USACE Montana Regulatory Office's review of annual monitoring reports for the site and attainment of wetland success criteria.

Table 22. Summary of performance standards and success criteria compared to existing site conditions at the Kindsfater site.

Performance Standards	Success Criteria	Criteria Achieved Y/N	Discussion
Wetland Characteristics	Meet the three parameter criteria for hydrology, vegetation, and soils as outlined in the 1987 Wetland Delineation Manual and 2010 Great Plains Region.	Y	Areas identified as wetland habitat within the mitigation site meet the three parameter criteria.
Wetland Hydrology	Soil saturation present for at least 12.5 percent of the growing season.	Y	Areas identified as wetland habitat within the mitigation site exhibit soil saturation for a minimum 12.5 percent of growing season.
Hydric Soil	Hydric soil conditions present or appear to be forming.	Y	The recently constructed wetland complex exhibits weak hydric soil development, including faint redoximorphic concentrations observed within several of the excavated depressions. Pre-existing hydric soil characteristics are present in several areas identified as wetland prior to project construction.
	Soil is sufficiently stable to prevent erosion.	Y	Disturbed soil is stable and does not exhibit signs of erosion.
	Soil is able to support plant cover.	Y	Plant cover has continued to develop across disturbed soils.
Hydrophytic Vegetation	Achieved when wetlands delineated as hydrophytic utilizing technical guidelines.	Y	Areas identified as wetland habitat within the mitigation site support a prevalence of hydrophytic vegetation (OBL, FACW, and FAC).
	Noxious weeds do not exceed 5 percent cover.	N	Although numerous noxious weed infestation have been mapped across this site, these infestations are generally located outside of excavated wetlands. Estimated noxious weed cover within delineated wetlands is above 5 percent.
	Hydrophytic vegetation success will include achieving a minimum overall vegetation cover of 80 percent in created wetland areas within 5 years following site construction.	Y	The majority of created wetlands exhibited more than 80 percent hydrophytic vegetation cover during the 2015 monitoring event. These areas generally showed increased vegetation cover, with hydophytic vegetation cover anticipated to increase in subsequent monitoring years.
Woody Plants	Plantings will be considered successful where they exceed 50 percent survival after 5 years.	N	Approximately 35 percent of the woody plantings observed were alive in 2015, not meeting the 50 percent survival criteria.
Herbaceous Plants	At the conclusion of the monitoring period, ocular coverage of desirable hydrophytic vegetation will be at least 80 percent.	N	In total, restored, created, enhanced, and preserved wetlands exhibited less than 80 percent desirable hydrophytic vegetation cover during the 2015 monitoring event. These areas generally showed increased overall vegetation cover and are anticipated to meet this criteria within 5 years post-construction.
Open Water Areas	Open water that is established within the designated wetland cells will be considered successful and creditable.	NA	Although inundation was observed during the 2015 monitoring event, no areas of open water were mapped within the Kindsfater wetland complex.
Upland Buffer	Success will be achieved when noxious weeds do not exceed 5 percenct cover within the buffer areas on site.	N	Numerous noxious weed infestations, including field bindweed, leafy spurge, gypsy-flower, Canadian thistle, and spotted knapweed, have been mapped within the site and displayed an increase between 2013 and 2015. MDT will need to continue to implement weed control measure to meet this criteria.
	Any area disturbed within creditable buffer zone must have at least 50 percent aerial cover of non-weed species by end of monitoring period.	Y	Upland buffers surround wetland areas within the site exhibited greater than 50 percent aerial cover of non-weed species.
Weed Control	Success will be achieved where <5 percent absolute cover of noxious weed species occurs across the site.	N	Although the estimated coverage of noxious weeds within the constructed wetlands is below 5 percent, state-listed noxious weed species across the entire site has been estimated at greater than 5 percent absolute cover in 2015.
Fencing	Install wildlife-friendly fencing along the easement boundaries.	Y	Wildlife-friendly fencing has been installed around the easement boundaries and is in good condition.
Monitoring	Monitor the site for a minimum period of five years or longer as determined by the US Army Corps.	N	Comprehensive site monitoring has been on-going for 3 years.

No man-made water control structures were installed within the Kindsfater wetland mitigation site. The perimeter fence installed around the site was in good-working order at the time of the 2015 investigation. Two bluebird boxes were installed on the site. The two trees that the bird boxes were mounted had fallen over prior to the 2015 survey rendering the boxes unusable. This site appears to be used by a high number of people for a diversity of recreational activities and there is some refuse that should be cleaned up to protect the integrity of the site.

As noted in the vegetation section of this report, thirty-five infestations of Montana Listed Priority 2B noxious weeds were mapped at the Kindsfater wetland mitigation site. Ten infestations of Canadian thistle (*Cirsium arvense*), eight areas of gypsy-flower (houndstongue, *Cynoglossum officinale*), five areas of spotted knapweed (*Centaurea stoebe*), five infestations of leafy spurge (*Euphorbia esula*), and seven areas of field bindweed (*Convolvulus arvensis*) were identified at infestation sizes less than 1.0 acre and less than 25 percent cover. The size and number of infestations appear to have spread from 2014 to 2015.

A weed contractor with MDT treated this site in 2012 prior to construction. Eight acres of the site were treated again in July 2015, with treatment concentrated in areas of infestation by the five noxious weed species observed on site. The MDT has an ongoing weed control program for their mitigation sites that includes an annual assessment of weeds identified at each location and treatment to contain and control identified populations.

2.6 *McGinnis Meadows (Missoula District, Year 6)*

The McGinnis Meadows MDT wetland mitigation project is located in Section 33, Township 26 North, Range 28 West, Lincoln County, Montana. McGinnis Meadows is located approximately seven miles south of the US Highway 2 corridor on two parcels encompassing 33 acres of a historic hay field and pasture. McGinnis Creek, a tributary to the Fisher River, bisects the parcels. This project lies within the Kootenai River Basin (Watershed 1).

Wetlands developed at this location provide compensatory mitigation for wetland impacts associated with transportation projects in the Missoula District. The McGinnis Meadows site was selected after an extensive search of potential wetland and stream restoration sites by MDT within the Kootenai River Watershed in cooperation with a consortium of Conservation Districts known as Montana Watersheds Incorporated (MWI). The consortium consisted of the Lincoln, Sanders, and Flathead County Conservation Districts with technical assistance from the USDA Natural Resource Conservation Service Centers (NRCS) in Bozeman, Kalispell, Libby, and Eureka. The wetland and stream restoration project will ultimately aid in improving the flood storage, stream length, and fisheries habitat of McGinnis Creek, and improve the overall wildlife, riparian, and wetland habitats impacted by past agricultural practices within the McGinnis Creek watershed.

Goals established in 2009 for the McGinnis Meadows mitigation project included the restoration of approximately 0.8 acres of riparian/stream habitat on McGinnis Creek and 17.3 acres of degraded wetlands. Credit was to be awarded for creation of 2.9 acres of emergent wetlands and enhancement of 1.74 acres of existing emergent wetland and an intermittent drainage. Preservation of 0.3 acres of existing riparian communities along the abandoned McGinnis Creek corridor and maintenance of 2.2 acres of upland buffer provided additional wetland credits. **Error! Reference source not found.** details the project credit ratios approved by the USACE and the calculated credit acreages from 2010 to 2015. Total wetland mitigation credits calculated for the McGinnis Meadows site in 2015 were 20.48 credit acres, an increase of 0.9 credit acres since 2014.

The acreage of the created wetland cells has exceeded the anticipated 2.90 acres proposed in the 2009 MDT Mitigation Plan by 5.7 acres. The credit for the excavated wetland depressions was estimated at 8.6 credit acres 2015 based on a 1:1 creation to impact credit ratio.

Approximately 16.6 acres of wetland were delineated within the restoration (rehabilitation) AA in 2015, a 1.49-acre decrease since 2014. The decrease is primarily due to the correction of wetland area considered restoration. The restored area included the pre-existing impaired reed canary grass and field meadow foxtail of wetland community type 7 – *Phalaris/Alopecurus* as well as several restored wetland cells characterized by community type 19 – Carex spp. The estimated credit acres for the restoration areas was 11.07 in 2015.

Table 23. Estimated credit summary for the McGinnis Meadows Wetland Mitigation Site, 2010-2015.

Proposed Mitigation Activity	Compensatory Mitigation Type	COE Mitigation Ratios	Proposed Acres	Final Credit Estimate (Acres)	2010 Delineated Acreage	2010 Credit (acres)	2011 Delineated Acreage	2011 Credit (acres)	2012 Delineated Acreage	2012 Credit (acres)	2013 Delineated Acreage	2013 Credit (acres)	2014 Delineated Acreage	2014 Credit (acres)	2015 Delineated Acreage	2015 Credit (acres)
Creation of palustrine emergent depression wetlands through shallow excavation.	Creation	1:1	2.90	2.90	0.20	0.20	6.42	6.42	6.42	6.42	6.42	6.42	6.42	6.42	8.60	8.60
Restoration/Re-establishment of the McGinnis Creek Channel and wetland fringe.	Restoration (Re-Establishment)	1:1	0.80	0.80	0.75*	0.75*	0.75*	0.75*	0.75*	0.75*	0.75*	0.75*	0.75*	0.75*	0.75*	0.75*
Rehabilitation of existing impaired wet meadow wetlands.	Restoration (Rehabilitation)	1.5:1	17.30	11.53	16.57	11.05	12.60	8.40	17.08	11.39	17.34	11.56	18.09	12.06	16.60	11.07
Enhancement of existing emergent wetland upgradient of channel restoration.	Enhancement	3:1	1.74	0.58	1.74	0.58	1.32	0.44	1.32	0.44	1.32	0.44	1.74	0.58	0.90	0.30
Preservation of existing wetlands within abandoned McGinnis Creek reaches.	Preservation	4:1	0.30	0.08	0.30	0.08	0.30	0.08	0.30	0.08	0.30	0.08	0.30	0.08	0.30	0.08
Maintenance of upland buffer averaging 50 feet in length on site perimeter.	Upland Buffer	5:1	2.20	0.44	2.20	0.44	2.20	0.44	2.20	0.44	2.20	0.44	2.20	0.44	2.20	0.44
Total				**16.33**	**21.01**	**12.34**	**22.84**	**15.78**	**27.32**	**18.77**	**27.58**	**18.94**	**28.75**	**19.58**	**28.60**	**20.48**

*Stream Credit being sought for McGinnis Creek, acreage excluded from total.

The approved 0.30 acreage presented in the Mitigation Plan was used to calculate the preservation credit estimate. Preservation credits were 0.08 acre in 2015 based on a 4:1 preservation to impact ratio.

The enhancement AA included the existing emergent wetland located along the south and southwest boundary of the property, upgradient from the channel restoration area. The 2015 wetland delineation identified 0.90 acres within the enhancement AA. This number is lower than previous years due to corrections made to the area identified as the enhancement AA based on the georeferenced conceptual plan. The 2011 through 2013 wetland delineation identified 1.32 acres of wetland within this AA. The wetland delineation in 2014 defined 1.74 wetland acres in this AA. However, after overlaying the delineated wetland map onto the georeferenced Conceptual Plan it was found that a portion of the wetland that had been applied to the Enhancement credit scheme actually fell within the Creation credit area. Applying the USACE approved 3:1 credit ratio to this area netted 0.3 acre of wetland credit in 2015, a decrease of 0.28 acre since 2014. The remaining portion of the wetland acres were applied to the Creation credit acres.

The restored McGinnis Creek channel encompassed 0.75 acre of riverine habitat bisecting the site. The MDT seeks to obtain approximately 8,835 stream credits for the restoration of 2,850 linear feet of McGinnis Creek associated with the area below the OHWM of the channel. This acreage was excluded from the wetland credit totals. The MDT and USACE will calculate the stream credits separately once monitoring has been concluded.

Functional assessments were completed on four AAs from 2010 to 2015 using the 2008 MWAM (**Error! Reference source not found.**). The four AAs were divided into creation (excavated cells – 6.42 acres), restoration (re-establishment and rehabilitation – 18.09 acres), enhancement (existing emergent wetland – 1.74 acres), and preservation (existing riverine wetlands – 0.30 acres). Due to correction of the AAs to reflect the original plans the acreage of the Creation AA increased to 8.6 in 2015 from 6.42 acres in 2014. The acreage of the Restoration AA decreased from 18.09 acres in 2014 to 16.6 acres in 2015 and the acreage of the Enhancement AA decreased from 1.74 acres in 2014 to 0.9 acres in 2015.

The original onsite wetlands were impacted historically from grazing, leveling, channel straightening, and hydrological alterations, according to the 2005 baseline site evaluation. The wetland conservation easement area has been fenced and grazing has been excluded. David, Evans & Associates rated the historic waters of the US as Category III wetlands using the 1999 MDT Wetland Assessment Method.

Approximately 8.6 acres of wetlands have developed within the created cells that were located in areas identified as uplands in the baseline delineation. The cover of wetland vegetation within the footprint of the excavated cells developed rapidly from 2010 to 2015 as documented in the site photographs. The

improvement in percent cover resulted in a corresponding increase in the function and value ratings. The creation AA received 79.0 percent of the total possible points in 2013, 2014, and 2015 an increase from 69.0 percent in 2012. This AA achieved a total of 67.94 functional units in 2015. The increase of 17.22 functional units since 2014 can be primarily attributed to the increase in area attributed to the created AA area.

The area of the restoration AA was 16.6 acres in 2015. The restoration/rehabilitation of the existing wet meadow received 81.8 percent of the total possible points and attained 149.4 functional units, 13.4 fewer than in 2014. The decrease in functional units occurred primarily to the correction of the acreage considered restoration in 2015. A portion of the acreage previously reported as restoration has been included in 2015 creation AA. The restoration AA received excellent ratings for general wildlife habitat and production export/food chain support. The AA received high ratings for MTNHP species habitat, short and long-term surface water storage, sediment/nutrient/toxicant removal, sediment/shoreline stabilization, groundwater discharge/recharge, and recreation/education potential.

The 0.9-acre enhancement AA received 45.0 percent of the total possible points in 2015, an increase of 4.4 percent since 2011. Many of the woody plants installed in this area with the intention of enhancing structural diversity did not survive. This AA attained 4.05 functional units in 2015. The wetland area that was considered as enhancement credit acres was corrected using GIS in 2015. In addition, the score for General Fish Habitat was corrected to Not Applicable due to the lack of connection to any channel or fish habitat. The correction of the acreage and removal of General Fish Habitat resulted in a lower score than what was reported in 2014.

The preservation AA for the existing riverine wetlands along the former channel of McGinnis Creek was defined in the USACE-approved mitigation plan as 0.30 acres in size. The wetland fringe along the former channel of McGinnis Creek currently encompasses 0.51 acres as a result of increased water levels once the former channel of McGinnis Creek was plugged in 2010. The additional 0.21 acres has been included in the creation AA in this monitoring report to maintain congruence between the approved mitigation plan and original credit ratios. The Preservation AA evaluated only the 0.30 acres abutting the plugged former channel of McGinnis Creek. This AA received 79.0 percent of the total points and 2.37 functional units in 2013 through 2015. The AA received excellent ratings in general wildlife habitat and high ratings for flood attenuation, short and long term surface water storage, sediment/nutrient/toxicant removal, sediment/shoreline stabilization, groundwater discharge/recharge, and recreation/education potential.

Table 24. Wetland assessment (MWAM) results for the McGinnis Meadows Wetland Mitigation Site, 2010-2015.

Function and Value Parameters 2008 MDT Montana Wetland Assessment Method[1]	2010 Creation (Excavated Cells)	2011 Creation (Excavated Cells)	2012 Creation (Excavated Cells)	2013 Creation (Excavated Cells)	2014 Creation (Excavated Cells)	2015 Creation (Excavated Cells)	2010 Restoration (Re-establishment and Rehabilitation-Existing wet meadow)	2011 Restoration (Re-establishment and Rehabilitation-Existing wet meadow)	2012 Restoration (Re-establishment and Rehabilitation-Existing wet meadow)	2013 Restoration (Re-establishment and Rehabilitation-Existing wet meadow)	2014 Restoration (Re-establishment and Rehabilitation-Existing wet meadow)	2015 Restoration (Re-establishment and Rehabilitation-Existing wet meadow)
Listed/Proposed T&E Species	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)
MTNHP Species Habitat	Low (0.1)	Low (0.1)	Low (0.2)	Mod (0.6)	Mod (0.6)	Mod (0.6)	Mod (0.6)	Mod (0.6)	Mod (0.6)	Mod (0.7)	High (1.0)	High (1.0)
General Wildlife Habitat	Low (0.3)	High (0.9)	Exc. (1.0)	Exc. (1.0)	Exc (1.0)	Exc (1.0)	Mod (0.7)	High (0.9)	Exc. (1.0)	Exc. (1.0)	Exc (1.0)	Exc (1.0)
General Fish/Aquatic Habitat	NA	NA	NA	NA	NA	NA	Mod (0.7)	High (0.8)	High (0.8)	High (0.8)	Mod (0.7)	Mod (0.7)
Flood Attenuation	Mod (0.6)	Mod (0.6)	Mod (0.6)	Mod (0.6)	Mod (0.6)	Mod (0.6)	Mod (0.5)	High (0.8)	Mod (0.5)	Mod (0.5)	Mod (0.5)	Mod (0.5)
Short and Long Term Surface Water Storage	Low (0.3)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)
Sediment/Nutrient/Toxicant Removal	Mod (0.7)	Mod (0.7)	Mod (0.7)	High (1.0)	High (1.0)	High (1.0)	High (0.9)	High (0.9)	High (0.9)	High (0.9)	High (0.9)	High (0.9)
Sediment/Shoreline Stabilization	NA	Mod (0.7)	Mod (0.7)	High (1.0)	High (1.0)	High (1.0)	Low (0.3)	Mod (0.7)	High (1.0)	High (1.0)	High (1.0)	High (1.0)
Production Export/ Food Chain Support	Low (0.3)	High (0.8)	High (0.8)	High (0.8)	High (0.8)	High (0.8)	High (0.9)	Exc. (1.0)	Exc. (1.0)	Exc. (1.0)	Exc (1.0)	Exc (1.0)
Groundwater Discharge/Recharge	Mod (0.7)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)
Uniqueness	Low (0.1)	Mod (0.4.)	Mod (0.4.)	Mod (0.4.)	Mod (0.4)	Mod (0.4)	Low (0.3)	Mod (0.4)	Mod (0.4)	Mod (0.4)	Mod (0.4)	Mod (0.4)
Recreation/Education Potential (bonus points)	Low (0.05)	High (0.15)	High (0.20)	High (0.20)	High (0.20)	High (0.20)	Low (0.05)	High (0.15)	High (0.20)	High (0.20)	High (0.20)	High (0.20)
Actual Points / Possible Points	**3.45/9**	**6.65 / 10**	**6.90 / 10**	**7.90 / 10**	**7.90 / 10**	**7.90 / 10**	**7.25/11**	**8.55 / 11**	**8.70 / 11**	**8.80 / 11**	**9.0 / 11**	**9.0 / 11**
% of Possible Score Achieved	**38.3**	**66.5**	**69.0**	**79.0**	**79.0**	**79.0**	**65.9**	**77.7**	**79.1**	**80.0**	**81.8**	**81.8**
Overall Category	**III**	**II**	**II**	**II**	**II**	**II**	**III**	**II**	**II**	**II**	**I**	**I**
Acreage of Assessed Aquatic Habitats within Easement (ac)	**0.20**	**6.42**	**6.42**	**6.42**	**6.42**	**8.60**	**16.57**	**12.60**	**17.08**	**17.34**	**18.09**	**16.60**
Functional Units (acreage x actual points).	**0.69**	**42.69**	**44.30**	**50.72**	**50.72**	**67.94**	**120.13**	**107.73**	**148.60**	**152.59**	**162.81**	**149.40**

Function and Value Parameters 2008 MDT Montana Wetland Assessment Method[1]	2010 Enhancement (Existing emergent wetland)	2011 Enhancement (Existing emergent wetland)	2012 Enhancement (Existing emergent wetland)	2013 Enhancement (Existing emergent wetland)	2014 Enhancement (Existing emergent wetland)	2015 Enhancement (Existing emergent wetland)	2010 Preservation (Existing riverine wetlands)	2011 Preservation (Existing riverine wetlands)	2012 Preservation (Existing riverine wetlands)	2013 Preservation (Existing riverine wetlands)	2014 Preservation (Existing riverine wetlands)	2015 Preservation (Existing riverine wetlands)
Listed/Proposed T&E Species	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)
MTNHP Species Habitat	Low (0.1)	Low (0.1)	Low (0.2)	Mod (0.6)	Mod (0.6)	Mod (0.6)	Low (0.1)	Low (0.1)	Low (0.2)	Mod (0.6)	Mod (0.6)	Mod (0.6)
General Wildlife Habitat	Mod (0.5)	Mod (0.5)	High (0.9)	High (0.9)	High (0.9)	High (0.9)	Mod (0.7)	High (0.9)	Exc. (1.0)	Exc. (1.0)	Exc (1.0)	Exc (1.0)
General Fish/Aquatic Habitat	NA	NA	NA	NA	Mod (0.7)	NA	NA	NA	NA	NA	NA	NA
Flood Attenuation	Mod (0.6)	Mod (0.6)	Mod (0.6)	Mod (0.6)	Mod (0.6)	Mod (0.6)	High (0.9)	High (0.9)	High (0.9)	High (0.9)	High (0.9)	High (0.9)
Short and Long Term Surface Water Storage	Low (0.3)	Low (0.1)	Low (0.1)	Low (0.1)	Low (0.1)	Low (0.1)	Mod (0.4)	High (0.8)	High (0.8)	High (0.8)	High (0.8)	High (0.8)
Sediment/Nutrient/Toxicant Removal	High (1.0)	High (0.8)	High (0.8)	High (0.8)	High (0.8)	High (0.8)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)
Sediment/Shoreline Stabilization	NA	NA	NA	NA	NA	NA	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)
Production Export/ Food Chain Support	Mod (0.4)	Low (0.3)	Mod (0.5)	Mod (0.5)	Mod (0.5)	Mod (0.5)	Mod (0.5)	Mod (0.7)	Mod (0.7)	Mod (0.7)	Mod (0.7)	Mod (0.7)
Groundwater Discharge/Recharge	Mod (0.7)	NA	NA	Low (0.1)	Low (0.1)	Low (0.1)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)
Uniqueness	Low (0.3)	Mod (0.4)	Mod (0.4)	Mod (0.4)	Mod (0.4)	Mod (0.4)	Low (0.3)	Mod (0.4)	Mod (0.4)	Mod (0.4)	Mod (0.4)	Mod (0.4)
Recreation/Education Potential (bonus points)	Low (0.05)	High (0.15)	High (0.20)	High (0.20)	High (0.20)	High (0.20)	Low (0.05)	High (0.15)	High (0.2)	High (0.2)	High (0.2)	High (0.2)
Actual Points / Possible Points	**4.25/9**	**3.25 / 8**	**4.0 / 8**	**4.5 / 9**	**5.2 / 9**	**4.5 / 9**	**6.25/10**	**7.25 / 10**	**7.50 / 10**	**7.90 / 10**	**7.90 / 10**	**7.90 / 10**
% of Possible Score Achieved	**47.2**	**40.6**	**50.0**	**50.0**	**57.8**	**45.0**	**62.5**	**72.5**	**75.0**	**79.0**	**79.0**	**79.0**
Overall Category	**III**	**III**	**III**	**III**	**II**	**II**	**III**	**II**	**II**	**II**	**II**	**II**
Acreage of Assessed Aquatic Habitats within Easement (ac)	**1.74**	**1.32**	**1.32**	**1.32**	**1.74**	**0.90**	**0.30**	**0.30**	**0.30**	**0.30**	**0.30**	**0.30**
Functional Units (acreage x actual points).	**7.40**	**4.29**	**5.28**	**5.94**	**9.05**	**4.05**	**1.88**	**2.18**	**2.25**	**2.37**	**2.37**	**2.37**

[1]Berglund and McEldowney 2008 MDT MWAM.

Error! Reference source not found. provides a summary of the site's performance against approved success criteria. All wetlands delineated within the site in 2015 satisfied the criteria for wetland hydrology, hydrophytic vegetation, and hydric soils. The cover of wetland plants increased significantly from 60 percent in 2010 to nearly 100 percent in 2015. The success criteria stipulating 70 percent cover of wetland plants was met site-wide in 2012 and has continued to increase into 2015. Vegetation cover within the disturbed areas of the upland buffer also exceeded 50 percent by 2012. The cover of state-listed noxious weed species in the site wetlands has remained less than five percent, satisfying the performance standard. MDT continues to monitor and control noxious weeds within this mitigation site. The woody plants installed in 2011 exhibited high mortality immediately following installation with approximately 20 percent survival. The majority of woody plants that initially survived have continued to develop. The success criterion for 50 percent survival of the woody vegetation has not been met. An increase in natural recruitment of quaking aspen and speckled alder was observed in 2013 through 2015. Supplemental plantings of shrubs/trees should be considered at this site to meet this criterion. The McGinnis Creek restoration success criterion pertaining to well-vegetated banks with a majority of deep-rooting riparian and wetland plant species has been satisfied. The stream banks of McGinnis Creek were minimally disturbed during construction and are primarily vegetated with field meadow-foxtail, common spikerush, Baltic rush, sedges and reed canary grass.

Five bird boxes were installed onsite in fall 2012 and were unused in 2015. The mitigation site design relied on the excavation of shallow depressions to intercept groundwater, an increase in hydrologic connectivity with McGinnis Creek and the adjacent floodplain, and the passive increase in the local water table. Consequently, water control structures were not a part of the design. The majority of fencing surrounding the perimeter of the site was intact in 2015. A dead tree has fallen on the fence near Photo Point 6. The top wire of the fence is down near the pullout along the east boundary. In addition, the fencing is compromised along the southwest boundary and evidence (e.g., ATV trail use) that the adjacent neighbor is accessing the site in this area was found.

Table 25. Summary of success criteria and site performance at McGinnis Meadows.

Performance Standards	Success Criteria	Criteria Achieved Y/N	Discussion
Wetland Characteristics	All restored, created, enhanced, and preserved wetlands within the project limits will meet the three parameter criteria for hydrology, vegetation, and soils as outlined in the 1987 Wetland Delineation Manual and 2010 Mountains, Valleys, Coast Region.	Y	Areas identified as wetland habitat within the mitigation site meet the three parameter criteria.
Wetland Hydrology	Soil saturation present for at least 12.5 percent of the growing season.	Y	Areas identified as wetland habitat within the mitigation site exhibit soil saturation for a minimum 12.5 percent of growing season.
Hydric Soil	Hydric soil conditions present or appear to be forming.	Y	Hydric soil characteristics, including redoximorphic concentrations and depleted matrix, have developed throughout a majority of the constructed wetlands.
	Soil is sufficiently stable to prevent erosion.	Y	Disturbed soil is stable and does not exhibit signs of erosion.
	Soil is able to support plant cover.	Y	Plant cover across disturbed soils is near 100 percent.
Hydrophytic Vegetation	Achieved where aerial cover of facultative or wetter species is greater than or equal to 70 percent.	Y	Areas identified as wetland habitat within the mitigation site support a prevalence of hydrophytic vegetation (OBL, FACW, and FAC) at greater than 70 percent cover.
	Montana State-listed noxious weeds do not exceed 5 percent cover.	Y	Montana State-listed noxious weed cover within wetland areas of the site is estimated at 2 to 3 percent.
Woody Plants	Plantings will be considered successful where they exceed 50 percent survival after 5 years.	N	The percentage of living woody vegetation (including natural recruitment of *Alnus* among the former channel) is well below the 50 percent target.
Open Water	Open water will be considered successful and creditable.	Y	Open water appears to be perennial in several of the excavated cells. These areas exhibit vegetation cover generally greater than 20 percent.
McGinnis Creek Channel	Revegetation along the new McGinnis Creek channel corridor will be considered successful when banks are vegetated with a majority of deep-rooting riparian and wetland plant species.	Y	Vegetation along the constructed McGinnis Creek support robust vegetation with high root-stability indices and predominantly includes reed canarygrass.
	The intent of the stream restoration is to allow the stream to migrate naturally within the floodplain and to give it enough room to move and stabilize itself within the site.	Y	The stream has plenty of room to migrate within the boundary of the mitigation site.
Upland Buffer	Noxious weeds do not exceed 5 percent cover within upland buffer area.	Y	Noxious weed cover is less than 5 percent within the upland buffer.
	Any area disturbed within creditable buffer zone must have at least 50 percent aerial cover of non-weed species by end of monitoring period.	Y	Disturbed areas are well-vegetated (~100 percent) by non-weed species.
Weed Control	Based upon annual monitoring of the site to determine weed species and degree of infestation within the site. Control measures, based upon the monitoring results, will be implemented by MDT to minimize and/or eliminate the intrusion of State-listed noxious weed species within the site.	Y	State-listed noxious weed species across the site have been mapped yearly. Maps of weed infestations have been provided to MDT for evaluation and control measures have been employed.
Fencing	Install wildlife-friendly fencing along the easement boundaries.	Y	Wildlife-friendly fencing has been installed around the easement boundaries. A tree has fallen on the western fence near Photopoint 6 and repairs are needed.

2.7 *Redstone East and West (Glendive District, Year 3)*

The Redstone-E&W wetland mitigation project is located 2.2 miles southeast of Redstone, along US Highway 5, in Sheridan County, Montana. The site is situated within Watershed 12, the Lower Missouri River Basin. The Redstone-East and West (E&W) wetland mitigation site was developed to mitigate for impacts associated with the Redstone-E&W highway reconstruction project. The mitigation wetlands were constructed in 2012 concurrent with the road project impacts.

The MDT staff completed the initial baseline delineation and Montana Wetland Assessment of the site in June 2002. The project site was agricultural land and had been historically farmed for grass and alfalfa production. A perennial stream known as Big Muddy Creek borders the project on the north and is hydraulically connected to the site via groundwater. The mitigation goal was to create and preserve 0.34 acres of new palustrine emergent/depressional wetland habitat in an existing upland area adjacent to Big Muddy Creek. Aside from the creation of 0.34 wetland acres, this onsite, permittee-responsible, wetland mitigation site does not have any defined performance standards or success criteria. The MDT will hold the site in "Fee Title" as part of a long term management plan and will use MDT personnel and/or contractors to inspect and perform maintenance activities to ensure this aquatic resource is properly established and protected.

The proposed mitigation acreages and credit ratios were discussed in the February 2010 Wetland Mitigation Site Monitoring Plan. The USACE permit authorized a 2:1 ratio for mitigating unavoidable impacts associated with the construction of the Redstone-E&W highway reconstruction project. The approved mitigation plan proposed the concurrent creation of 0.34 acres of new, created wetland area.

Error! Reference source not found. summarizes the calculated credit acreages based on the results of the 2015 mitigation monitoring efforts. The wetland acreage at the Redstone E&W site totaled 0.96 acre, including approximately 0.69 acres of pre-existing wetlands and 0.27 acres of created wetland area. Using the mitigation ratios provided by the USACE Montana Regulatory Program for creation (2:1), preservation (4:1), and upland buffer (5:1), a total of 0.37 credit acres has been estimated for the Redstone site in 2015. No performance standards or success criteria to evaluate the achievement of wetland mitigation were presented within the approved on-site wetland mitigation plan. Therefore, all areas exhibiting wetland and aquatic conditions have received full credit.

The 2008 MWAM (Berglund and McEldowney) was used to evaluate the functions and values and calculate functional units of the site. The boundary between the existing and created wetlands was indistinguishable and inundated with contiguous surface water, therefore the total wetland area (0.96 acre) identified within the Redstone-E&W wetland mitigation site was evaluated as a single assessment area (AA). The MWAM results are presented in Table 27.

Table 26. Estimated credit summary for the Redstone-E&W Wetland Mitigation Site, 2013 to 2015.

Compensatory Mitigation Type	USACE Mitigation Credit Ratio	Proposed Mitigation Acres	2013 Delineated Acres	2013 Credit Acres	2014 Delineated Acres	2014 Credit Acres	2015 Delineated Acres	2015 Credit Acres
Creation (Establishment)	2:1	0.34	0.27	0.14	0.27	0.14	0.27	0.14
Preservation (Protection)	4:1	*	0.69	0.17	0.69	0.17	0.69	0.17
Upland Buffer	5:1	*	0.30	0.06	0.30	0.06	0.30	0.06
Total		**0.34**	**1.26**	**0.37**	**1.26**	**0.37**	**1.26**	**0.37**

*Approved mitigation plan does not include acreage for these mitigation types.

Table 27 Wetland assessment (MWAM) results for the Redstone-E&W Wetland Mitigation Site, 2013 to 2015.

Function and Value Parameters from the 2008 Montana Wetland Assessment Method	2013 AA Created & Existing	2014 AA Created & Existing	2015 AA Created & Existing
Listed/Proposed T&E Species Habitat	Low (0.0)	Low (0.0)	Low (0.0)
MTNHP Species Habitat	Low (0.1)	High (1.0)	High (1.0)
General Wildlife Habitat	Mod (0.5)	Mod (0.7)	High (0.9)
General Fish/Aquatic Habitat	Low (0.3)	Low (0.3)	Low (0.3)
Flood Attenuation	Mod (0.6)	Mod (0.6)	Mod (0.6)
Short and Long Term Surface Water Storage	High (0.8)	High (0.8)	High (0.8)
Sediment/Nutrient/Toxicant Removal	Mod (0.7)	Mod (0.7)	Mod (0.7)
Sediment/Shoreline Stabilization	High (1.0)	High (1.0)	High (1.0)
Production Export/Food Chain Support	Mod (0.6)	Mod (0.4)	Mod (0.4)
Groundwater Discharge/Recharge	High (1.0)	High (1.0)	High (1.0)
Uniqueness	Low (0.2)	Low (0.3)	Low (0.4)
Recreation/Education Potential (bonus points[3])	NA	NA	NA
Actual Points/Possible Points	**5.8 / 11**	**6.8 / 11**	**7.1 / 11**
% of Possible Score Achieved	**52.7%**	**61.8%**	**64.6%**
Overall Category	**III**	**II**	**II**
Total Acreage of Assessed Wetlands within Site Boundaries	**0.96**	**0.96**	**0.96**
Functional Units (acreage x actual points)	**5.57**	**6.53**	**6.82**

The Redstone E&W wetlands were rated as a Category II wetland with 64.6 percent of the total possible score and 6.8 functional units in 2015. The percent possible score increased from 2013 to 2015 as a result of increases in the general wildlife rating from 0.5 to 0.9 and the uniqueness rating from 0.2 to 0.4. Additionally, the S1 species *Schoenoplectus heterochaetus* was identified on the site in 2014 and 2015, boosting the MTNHP rating from low (0.1) to high (1.0) and improving the overall category from III to II. An improvement in the disturbance rating yielded a higher score in the uniqueness function. The site received high ratings for short and long term surface water storage, sediment/shoreline stabilization and groundwater discharge/recharge, and moderate ratings for flood attenuation, sediment/nutrient/toxicant removal, and production export/food chain support.

There are no man-made diversion structures installed at the site. Two bluebird boxes were installed at the site, but only one was observed and in use during the 2015 visit. One bluebird box should be reinstalled at PP-3. Two infestations of Canadian thistle (*Cirsium arvense*), a Priority 2B noxious weed, were observed along the south edge of the site. The largest infestation covered between 0.1 acres and 1 acre with a moderate cover class of 6 to 25 percent, while the smaller infestation was less than 0.1 acres with less than 0.1 percent cover. Less than 0.1 acres of field bindweed (*Convolvulus arvensis*) with 1 to 5 percent cover was observed in 2015. The infestation was located at the southeast boundary of the mitigation site. The MDT will use the annual monitoring results to determine appropriate weed control efforts. The fence installed around the perimeter of the site was in good working order when inspected during the 2015 field survey.

2.8 *Rostad Ranch (Butte District, Year 2)*

The Rostad Ranch Wetland Mitigation project is located in the southwest quarter of Section 12, Township 8 North, Range 11 East, Meagher County, Montana. The property is located approximately 0.6 miles northeast of Martinsdale, Montana. The wetland site was constructed to provide MDT with an estimated 39.70 acres of wetland mitigation credits on a private ranch that has been historically utilized for grazing cattle and hay production. Long-term protection of the wetland mitigation site is provided by a MDT Wetland Conservation Easement with the land owner and encompasses the entire 60-acre mitigation monitoring area. The site is demarcated by a newly installed fence along the boundaries of the MDT Conservation Easement.

The wetland mitigation site is located within Watershed 10 – Musselshell River Basin. Wetlands were developed at this location to provide compensatory mitigation for wetland impacts associated with future transportation projects in the Musselshell River Basin. The Ranch site was selected based on site evaluations and project feasibility assessments initiated by MDT in 2002.

The project objectives include:

- Provide 39.70 acres of wetland mitigation credits resulting from restoration, creation, rehabilitation, and preservation within the site
- Establish three types of wetland vegetation communities, including
  1.) Palustrine, emergent, wet meadow
  2.) Palustrine, scrub/shrub
  3.) Lacustrine, littoral – emergent zones around the open water areas around the perimeter of wetlands

The Lennep 6 WSW weather station is located near the site (approximately 11 miles southwest) with a period of record extending from August 1959 through August 2015. Based on data recorded from the Lennep Station for the January through August time period, precipitation totals for this region were 12.56 inches (long-term average), 16.32 inches (2011), 9.42 inches (2012), 12.3 inches (2013), 14.27 inches (2014), and 11.77 inches (2015). The data following construction indicate below average precipitation in 2012 and 2015, near average precipitation in 2013, and above average precipitation in 2014.

The hydrology for this wetland mitigation site is supplied from multiple sources, including a shallow seasonal groundwater table, groundwater emerging from a natural spring located near the narrow-leaf willow (*Salix exigua*) stand in south portion of the site, direct precipitation, and surface runoff. Construction included excavating and grading to fill drainage ditches, distributing water across the mitigation site, creating open water areas, and installing a diversion structure in the south end of the site to direct irrigation water to the mitigation site. The MDT has secured water rights to use surface water as a secondary source of hydrology to supplement the groundwater and ensure long-term viability of the wetland mitigation site.

During the 2015 field survey, approximately 45 percent of the wetland area was inundated, including one wetland depression impounded by a constructed dike in the north half of the site, and one excavated depression located in the south half of the site. Although the irrigation structure was not flowing at the time of the site visit, recent evidence of use was observed (saturated soil and flow lines) within the constructed channel immediately downstream from the diversion. Water depths ranged from 0.25 to 3.5 feet and averaged 0.5 feet. Vegetation around the perimeter of the open boundary increased since the 2014 monitoring event. Areas not inundated exhibited seasonal soil saturation to the ground surface.

Table 28 summarizes the estimated wetland credits based on the USACE-approved credit ratios and the wetland delineation completed in July 2015. Proposed mitigation credits from the 2007 Rostad Ranch Mitigation Plan included the re-establishment of 27.11 wetland acres, rehabilitation of 2.63 wetland acres, creation of 9.84 wetland acres, preservation of 0.25 wetland acres, and maintenance of 6.76 acres of upland buffer. The wetland acreages delineated in 2015 included 9.91 acres of re-established wetlands, 1.56 acres of rehabilitated wetland, 3.18 acres of created wetland, and 0.25 acres of preservation wetland (community Type 3). The total mitigation credit estimated in 2015, including the upland buffer credit and the deduction for the 0.41-acre wetland impact incurred during mitigation construction, totaled 15.13 credit acres, an increase of 0.5 credit acres since 2014.

Table 28. Estimated credit summary for the Rostad Ranch Wetland Mitigation Site, proposed, 2013-2015.

Compensatory Mitigation Type	Wetland Type (Cowardin)	Approved Migiation Ratios*	Anticipated Mitigation Area (acres)	Anticipated Mitigation Credit (acres)	2013 Delineated Mitigation Areas (acres)	2013 Estimated Mitigation Credit (acres)	2014 Delineated Mitigation Areas (acres)	2014 Estimated Mitigation Credit (acres)	2015 Delineated Mitigation Areas (acres)	2015 Estimated Mitigation Credit (acres)
Restoration (Re-establishment)	Palustrine Emergent	1:1	27.11	27.11	10.89	10.89	9.91	9.91	9.91	9.91
Creation (Establishment)	Palustrine Emergent	1:1	9.84	9.84	1.07	1.07	2.68	2.68	3.18	3.18
Restoration (Rehabilitation)	Palustrine Emergent	1.5:1	2.63	1.75	1.53	1.02	1.56	1.04	1.56	1.04
Preservation	Palustrine, Scrub/shrub	4:1	0.25	0.06	0.25	0.06	0.25	0.06	0.25	0.06
Upland Buffer	N/A	5:1	6.76**	1.35	6.76	1.35	6.76	1.35	6.76	1.35
Permanent Wetland Impact	N/A	1:1	N/A	-0.41	N/A	-0.41	N/A	-0.41	N/A	-0.41
	Totals		**46.59**	**39.70**	**20.5**	**13.98**	**21.16**	**14.63**	**21.66**	**15.13**

*Mitigation credit ratios utilized were from the Montana Corps Regulatory Programs 2005 Wetland Credit Ratios (USACE 2005).
**Anticipated upland buffer credit utilized until wetland areas expand to full enxtent.

The 1999 MDT MWAM (Berglund 1999) was used to evaluate the three existing wetlands identified within the site in 2004. The 2008 MWAM (Berglund and McEldowney 2008) has been used to evaluate the site from 2013 through 2015. All wetlands identified in 2013 through 2015 were evaluated as one AA. The results of the 2004, 2013, 2014, and 2015 assessments are summarized in Table 29.

The 2004 assessment identified a total of 3.4 acres of Category III wetlands. The majority of the existing wetlands within the site prior to construction consisted of man-made drainage and irrigation ditches constructed to drain and disperse water throughout the site. The only remnants of the historic wetlands are a willow thicket and roadside drainage ditch. The pre-existing wetlands averaged 34 percent of the possible score and attained a total of 12.46 functional units.

Due to the complex boundaries of the proposed mitigation credits within the site, the Rostad Ranch mitigation wetland was assessed as one AA. The functional ratings displayed a decrease between 2013 and 2014, primarily due to re-evaluation of the water regime within the site from perennial to seasonal. The AA was rated as moderately disturbed in 2015 as a result of increased vegetation growth and time following disturbance from construction and/or grazing/cultivation. In 2015, wetland vegetation had successfully established on approximately 94 percent of the wetland areas, resulting in high ratings for sediment/shoreline stabilization and sediment/nutrient/toxicant removal. The AA also received a high rating for MTNHP species habitat due to the documented primary habitat for the Great Basin calico-flower (*Downingia laeta*), observed on site in 2013 to 2015. There was a slight increase (0.5 acres) in the extent of wetland within the site in 2015 which influenced the acreage used to calculate the functional units score. The AA was rated as a Category III wetland in 2015, scoring 63.9 percent of the possible points and attaining 85.7 functional units, an increase of 18.7 functional units since 2014. The ratings and functional units are expected to increase as the constructed areas continue to recover from disturbance and desirable wetland vegetation becomes more established within the developing wetland communities.

Table 29. Wetland assessment (MWAM) results for the Rostad Ranch Wetland Mitigation Site, baseline, 2013 to 2015.

Function and Value Parameters from the Montana Wetland Assessment Method	2004* W-1-04	2004* W-2-04	2004* W-3-04	2013**	2014**	2015**
Listed/Proposed T&E Species Habitat	Low (0.0)	Low (0.0)	Low (0.0)	Low (0.0)	Low (0)	Low (0)
MTNHP Species Habitat	Low (0.2)	Low (0.2)	Low (0.2)	High (0.9)	High (0.9)	High (0.9)
General Wildlife Habitat	Low (0.3)	Low (0.3)	Low (0.3)	Mod (0.5)	Low (0.3)	Mod (0.5)
General Fish/Aquatic Habitat	NA	NA	NA	NA	NA	NA
Flood Attenuation	NA	NA	NA	NA	NA	NA
Short and Long Term Surface Water Storage	Low (0.2)	Low (0.2)	Low (0.2)	High (0.8)	Mod (0.6)	Mod (0.6)
Sediment/Nutrient/Toxicant Removal	Mod (0.6)	Mod (0.6)	Mod (0.6)	Mod (0.7)	Mod (0.7)	High (1.0)
Sediment/Shoreline Stabilization	Mod (0.6)	Mod (0.6)	NA	NA	Mod (0.6)	High (0.9)
Production Export/Food Chain Support	Mod (0.7)	Mod (0.7)	Low (0.3)	High (0.9)	Mod (0.6)	High (0.8)
Groundwater Discharge/Recharge	High (1.0)	High (1.0)	NA	High (1.0)	Mod (0.7)	Mod (0.7)
Uniqueness	Low (0.2)	Low (0.2)	Low (0.2)	Mod (0.4)	Low (0.2)	Low (0.3)
Recreation/Education Potential (bonus points)	Low (0.1)	Low (0.1)	Low (0.1)	Low (0.05)	Low (0.05)	Low (0.05)
Actual Points/Possible Points	**3.9 / 10**	**3.9 / 10**	**1.9 / 8**	**5.25 / 8**	**4.65 / 9**	**5.75 / 9**
% of Possible Score Achieved	**39.0%**	**39.0%**	**24.0%**	**65.6%**	**51.7%**	**63.9%**
Overall Category	**III**	**III**	**III**	**II**	**III**	**III**
Total Acreage of Assessed Wetlands within Site	**1.2**	**1.8**	**0.4**	**13.74**	**14.40**	**14.90**
Functional Units (acreage x actual points)	**4.68**	**7.02**	**0.76**	**72.1**	**67.0**	**85.7**

*1999 MWAM form (Berglund, 1999)

**2008 MWAM form (Berglund and McEldowney, 2008)

Error! Reference source not found. provides a summary of the approved performance standards and success criteria based on site conditions documented in 2015. All wetlands delineated at the Rostad Ranch mitigation site in 2015 satisfied the three criteria of wetland hydrology, hydrophytic vegetation, and hydric soils. Willow stakes planted within the site exhibited a 75 percent survival rate during the third year of planting, the same survival rate observed in 2014. Although the site was recently disturbed from construction efforts in 2012, vegetation is successfully establishing, with aerial coverage by desirable plants estimated at greater than 90 percent. The coverage of state-listed noxious weeds in the upland buffer exceeded 5 percent in 2015. The cover of noxious weeds within the delineated wetlands was less than 5 percent. The extent of the open water surveyed in 2015 comprised approximately 6 percent of the total wetland acreage, which is below the cap of 10 percent stipulated in the USACE-approved performance criteria. The percentage of open water may continue to decrease as additional emergent wetlands develop on site. The entire 60-acre easement area has been fenced to exclude grazing.

Table 30. Summary of performance standards and success criteria for Rostad Ranch wetland mitigation site.

Performance Standards	Success Criteria	Criteria Achieved Y/N	Discussion
Wetland Characteristics	Meet the three parameter criteria for hydrology, vegetation, and soils as outlined in the 1987 Wetland Delineation Manual and 2010 Great Plains Region.	Y	Areas identified as wetland habitat within the mitigation site meet the three parameter criteria.
Wetland Hydrology	Soil saturation present for at least 12.5 percent of the growing season.	Y	Areas identified as wetland habitat within the mitigation site exhibit soil saturation for a minimum 12.5 percent of growing season.
Hydric Soil	Hydric soil conditions present or appear to be forming.	Y	The recently constructed wetland complex exhibits weak hydric soil development in areas originally identified as upland prior to construction. Pre-existing hydric soil characteristics are present in several areas identified as wetland prior to project construction.
	Soil is sufficiently stable to prevent erosion.	Y	Disturbed soil is stable and does not exhibit signs of erosion.
	Soil is able to support plant cover.	Y	Plant cover has continued to develop across disturbed soils.
Hydrophytic Vegetation	Achieved where combined absolute cover of facultative or wetter species is greater than or equal to 70 percent.	Y	Areas identified as wetland habitat within the mitigation site support a prevalence of hydrophytic vegetation (OBL, FACW, and FAC).
	Noxious weeds do not exceed 5 percent cover.	Y	Numerous noxious weed infestations have been mapped across this site, primarily outside of site wetlands. Estimated noxious weed cover within delineated wetlands is below 5 percent.
Woody Plants	Plantings will be considered successful where they exceed 50 percent survival after 5 years.	Y	Approximately 75 percent of the woody plantings observed were alive in 2015, exceeding the 50 percent survival rate.
Herbaceous Plants	At the conclusion of the monitoring period, ocular coverage of desirable hydrophytic vegetation will be at least 80 percent.	Y	Created wetlands generally exhibited greater than 90 percent vegetation cover during the 2015 monitoring event and showed increased vegetation cover from 2013.
Open Water Areas	Open water that is established within the designated wetland cells will be considered successful and creditable if it does not exceed 10 percent of the total wetland acreage.	Y	Open water was mapped within 6% of the total wetland acreage in 2015. These areas are exhibiting emergent vegetation development and are anticipated to continue to develop aquatic macrophyte communities within the 5 year monitoring period.
Upland Buffer	Success will be achieved when noxious weeds do no exceed 5 percenct cover within the buffer areas on site.	N	Numerous noxious weed infestations, including field bindweed, gypsy-flower, Canadian thistle, spotted knapweed, common tansy, and hoary alyssum were mapped within the site in 2015. It is currently estimated that noxious weeds cover greater than 5 percent of the upland buffer within the conservation easement area. MDT will need to continue to implement weed control measures to meet this criteria.
	Any area disturbed within creditable buffer zone must have at least 50 percent aerial cover of desirable upland plant species by end of monitoring period.	Y	Upland buffers surround wetland areas within the site exhibited greater than 50 percent aerial cover of non-weed species in 2015.
Weed Control	Implement weed control measures to minimize and/or eliminate infestations of state-listed noxious weed species within the site.	N	State-listed noxious weed species across the site have been estimated at greater than 5 percent absolute cover in 2015.
Fencing	Install wildlife-friendly fencing along the easement boundaries.	Y	Wildlife-friendly fencing has been installed around the easement boundaries and is in good condition.

Priority 2B noxious weeds identified within the Rostad Ranch mitigation site included hoary alyssum, spotted knapweed, Canadian thistle, gypsy-flower, field bindweed, and common tansy. A total of 30 infestation areas were mapped in 2015, ranging in size from less than 0.1 acre to greater than 1 acre in size. The majority of the infestations, with cover classes ranging from trace (less than 1

percent) to moderate (6 to 25 percent), were located at the edge of the constructed wetlands in upland community Type 1. Many of the infestations appear to have established on the site prior to mitigation construction, while eight new infestations were observed and documented during the field survey in 2014 and five additional infestations in 2015. A weed contractor with MDT treated two acres of the site in July 2015, with treatment concentrated in areas of infestation by the six noxious weed species observed on site. The MDT has an ongoing weed control program for their mitigation sites that includes an annual assessment of weeds identified at each location and treatment to contain and control identified populations.

The wildlife-friendly fence installed around the easement area was intact during the 2015 site visit. Seven bluebird boxes were installed around the site perimeter in 2012 and were in good condition in 2015. Swallows occupied all seven bird boxes during the 2015 site visit. The irrigation headgate structure was in good condition during the 2015 site visit. A small amount of fine sediment was beginning to accumulate in the stilling pool but didn't appear to be inhibiting hydrology or the function of the structure. During future monitoring efforts, it would be good to inspect this structure and stilling pool to ensure proper functionality. Also, there were no indicators of hydrology observed in the northwestern portion of the site during the 2015 monitoring event. Therefore, it is recommended that MDT consider implementing adaptive management techniques to supply hydrology to the northwestern corner of the site for development of wetland habitat in this area.

2.9 *Schrieber Lake (Missoula District, Year 1)*

The Schrieber Lake Wetland Mitigation 2015 Monitoring Report presents the results of the first year of post-construction monitoring at the Schrieber Lake mitigation area. The site was acquired by Montana Department of Transportation (MDT) in 2010 to provide compensatory mitigation for both stream and wetland impacts associated with the proposed Swamp Creek – East projects along the US Highway 2 corridor and to serve as a mitigation bank for future transportation projects within Watershed # 1 – Kootenai River basin.

The MDT Schrieber Lake mitigation project is located adjacent to the US Highway 2 corridor in Sections 12 and 13, of Township 27 North, Range 30 West, Lincoln County. The 104.6-acre site lies within the boundaries of Watershed #1 – Kootenai River Basin. This site is situated directly downstream and adjacent to the 141-acre MDT owned Schrieber Meadows aquatic mitigation project. The property is bisected by Coyote Creek, which drains into Schrieber Lake which eventually drains into the Fisher River. Schrieber Lake is situated within a narrow valley corridor bordered on the west and north sides by the Kootenai National Forest. The US Highway 2 corridor bounds the area to the east.

Prior to the construction of the Schrieber Lake Mitigation Project, the area consisted of hay grounds and historic wetlands that had been filled, graded, leveled, and drained. The stream channel had been channelized to promote and maximize hay production and grazing opportunities for livestock, as well as to flood irrigate the adjacent hay pastures. Historically, the project site was likely a large floodplain and beaver pond complex of mixed riparian scrub/shrub and emergent wetlands associated with both Coyote and Schrieber Creeks.

The goals of the mitigation project include preservation, restoration and creation of wetland and riparian habitats. Specifically MDT plans to restore the hydrology to approximately 19 acres of drained wetlands through the excavation and creation of depressional wetland cells; protect the existing 10.2 acres of fen-carr shrub land wetland vegetation community; restore previously developed agricultural areas into native wetland and upland plant communities through seeding, plantings; relocate and reconstruct approximately 3,500 linear feet of Schrieber Creek from the adjacent Schrieber Meadows site to its historic channel and outfall into Schrieber Lake; and to relocate and restore approximately 1,500 linear feet of channelized Coyote Creek to its historic channel and outfall into Schrieber Lake.

The MDT anticipates the development of 13.4 wetland credit acres from the Schrieber Lake wetland and stream restoration project. The plan included creation, restoration (rehabilitation and enhancement), and upland buffer credits. The entire Schrieber Lake mitigation project encompassed the creation of additional depression wetland cells and buffer areas within upland and degraded wetlands, enhancement of scrub/shrub palustrine wetlands, and reconstruction of

the Coyote and Schrieber Creek channels. The crediting objectives of the full Schrieber Lake stream and wetland restoration project include the following:

Wetland Mitigation

- **Creation**: Create 3.06 wetland credit acres through the excavation of shallow seasonal depressional wetland cells within the upland portions along the edges of the site. These areas will be seeded with a native wetland plant seed mix, and it is anticipated that volunteer seeds within the soil bank will colonize as well within these sites.
- **Restoration (Re-establishment)**: Provide approximately 1.69 wetland credit acres through the excavation of shallow depressions in the portions of the lower hay meadow. These shallow depressions were constructed to diversify the vegetation community, by removing non-native pasture grass sod within the site. These depressions will be flat between 1 to 2 feet deep to promote re-vegetation and establishment of *Carex* species.
- **Enhancement**: Provide 1.51 wetland credit acres will be derived from the 4.46 acres of area that will be enhanced within the site. Enhancement will be a primary tool for much of the mitigation efforts within the lower hay meadow that will provide for the natural succession of the fen-carr wetland community to expand beyond its current limitations due to haying operations. It is expected that the succession of woody species will continue along the northern edge of the fen-carr shrubland out into the former hay meadow once haying has ceased. Further enhancements within these areas will include seeding and woody plantings.
- **Preservation**: Provide approximately 6.4 wetland preservation credit acres. Approximately 25.6 acres of the property will be preserved, primarily due to the unique fen-carr areas that are present within the site.
- **Upland Buffers**: Approximately 0.76 upland buffer credits are being requested for those created wetland cells located at the northern end and within the interior of the property. These upland buffers are separated from the proposed riparian buffers for the new stream channels. The upland buffer areas will be re-seeded and planted with shrubs/trees in an effort to diversity the vegetation communities adjacent to these created wetlands.
- **Open water**: The open water area of Schrieber Lake will be protected and maintained as open water and is not considered as part of the preservation credit calculation.

Stream Mitigation

For the purposes of obtaining stream mitigation credits for the proposed Schrieber Lake mitigation project, the proposed stream restoration areas concerning Schrieber and Coyote Creeks have been divided into seven distinct reaches; Coyote Creek two reaches, Schrieber four reaches and the combined Coyote Creek/Schrieber Creek channel as the final reach.

- Restore approximately 4,505.9 linear feet of stream channel of both Coyote and Schrieber Creeks ;
- Develop approximately 36,741.85 stream mitigation credits with the restoration of Coyote and Schrieber Creeks for use within Watershed #1 – Kootenai River Basin.

Climate data from the Libby 30 SSE, Montana (245020) weather station recorded an average total annual precipitation rate of 23.79 inches from 1950 to 2014 (WRCC 2015). Annual precipitation for 2010, 2011, 2012, 2013, and 2014 was 21.93, 22.64, 27.2, 19.18 inches, and 25.75 inches respectively. Average monthly precipitation totals from January to August for the period of record was 14.99 inches. Precipitation totals recorded from January to August were 15.05 inches (2011), 16.45 inches (2012), 12.67 inches (2013), 15.9 inches (2014), and 11.14 inches (2015). In general, the region surrounding the project area exhibited above-average precipitation in 2011, 2012, and 2014 and below-average precipitation in 2013 and 2015 prior to and during the growing season.

During the July 2015 investigation, the average depth of surface water across the site was estimated at 2 feet with a range of depths from 1 to 3 feet. Approximately 80 percent of the assessment area was inundated. The surface water depth at the emergent vegetation and open water boundary was estimated at 1.1 feet. Direct precipitation also contributes to wetland hydrology, but the high seasonal groundwater table provides the majority of water driving wetland hydrology within this site.

Wetland Mitigation Credit

It is anticipated that a total of approximately 13.4 wetland credit acres will be generated from the full build-out of the Schrieber Lake project. Proposed mitigation credits from the 2014 Schrieber Lake Mitigation Plan included the creation of 3.06 wetland acres, re-establishment of 2.53 wetland acres, enhancement of 4.53 acres of the fen-carr shrubland expansion, preservation of 25.6 acres of existing fen-carr Carex areas, and the creation of a 50 foot upland buffer (3.81 acres).

Table 31 summarizes the estimated wetland credits based on the pending USACE-approved credit ratios and the wetland delineation completed in July 2015. The 2015 wetland delineation indicates that when Schreiber Lake, riparian buffer and other uncreditable areas, 37.65 acres of wetland habitat exist within the mitigation site. The wetland acreages delineated in 2015 included 4.8 acres of created wetland, 2.42 acres of re-established wetlands, 4.77 acres of

enhanced wetlands, 25.66 acres of preserved wetlands, and 8.42 acres of upland buffer. The 2015 estimated credit acres for this site have exceeded the proposed credit acres. A total of 16.09 credit acres have developed at this site following mitigation construction.

Table 31. Summary of Wetland Credits at the Schrieber Lake Wetland Mitigation Site in 2015.

Mitigation Type	Total Proposed Acreage	Ratio +	Proposed Credit Acres	2015 Delineated Acreage	2015 Credit Acres
Creation	3.06	1:1	3.06	4.80	4.80
Restoration (Re-establishment)	2.53	1.5:1	1.69	2.42	1.62
Enhancement areas- Carr Shrubland expansion	4.53	3:1	1.51	4.77	1.59
Preservation-Existing Fen-Carr-Carex Areas	25.60	4:1	6.40	25.66	6.42
Upland Buffer (50 feet)*	3.81	5:1	0.76	8.42	1.68
Permanent Project Impacts	0.20	None	-0.20	-0.02	-0.02
Total Mitigation Acreage	**39.51**		**13.40**	**46.05**	**16.09**

*Assuming a standard 50 foot upland buffer around the perimeter of the delineated wetland.

**No credits are being requested for the existing Schrieber Lake.

***Riparian buffer areas used to calculate stream and riparian credits.

Wetland acreages within riparian buffer subracted from wetland credit total; riparian buffer does not include upland buffer acreage.

+ Ratios utilized are from Column A of the Montana Regulatory Program Wetland Compensatory Mitigation Ratios April, 2005.

Stream Mitigation Credit

The goal of the stream mitigation component of the Schrieber Lake project includes the restoration of approximately **2,130 linear feet** of Schrieber Creek, **1,397 feet** of Coyote Creek, and **978 feet** of Schrieber Creek below the Schrieber / Coyote Creek confluence, resulting in an overall increase of **3,108 linear feet** of stream length. When combined with establishment and protection of a riparian buffer of varying width on both sides of the restored channels, the project is expected to generate a total of **36,741.87** stream and riparian credits (Table 32). The stream mitigation project has been separated into seven distinct reaches, including:

1. **Coyote Creek, Reach 1A**, which involves re-constructing a new channel through the lower hay meadow between the MDT-owned Schrieber Meadows property line to its confluence with an existing, relic segment of Coyote Creek (974.5 feet),

2. **Coyote Creek, Reach 1B**, which consists of a relic segment of Coyote Creek that has been reactivated as a result of this project (423.0 feet),

3. **Schrieber Creek, Reach 1**, which consists of a newly constructed channel configuration extending from the existing channel downstream to Reach 2A (531.6 feet),

4. **Schrieber Creek, Reach 2A**, which consists of a newly constructed channel configuration extending from the downstream end of Reach 1 to the upstream end of Reach 2B (544.5 feet),

5. **Schrieber Creek, Reach 2B**, which consists of a newly constructed channel configuration that transitions between Reach 2A and Reach 3 (121.4 feet),

6. **Schrieber Creek, Reach 3**, which consists of a newly constructed channel configuration that extends from Reach 2B to the confluence with Coyote Creek (932.9 feet),

7. **Schrieber Creek, Reach 7**, which consists of a relic channel that extends from the confluence of Schrieber and Coyote Creeks to Schrieber Lake (978 feet).

Table 32. Anticipated riparian and stream credits generated from the Schrieber Lake Mitigation Site.

Channel Segment	Reach	Side	Predicted Credits
Coyote Creek	1A	A	4,141.63
		B	4,141.63
	1B	A	1,586.25
		B	1,692.00
Schrieber	1	A	2,392.20
		B	2,392.20
	2A	A	2,722.50
		B	2,722.50
	2B	A	576.65
		B	576.65
	3	A	3,964.83
		B	3,964.83
	7	A	2,934.00
		B	2,934.00
Total			**36,741.87**

The 2008 MDT MWAM was used to evaluate the site in 2015 (Table 33). The functional assessment completed in 2015 incorporated the created, restored and preserved wetlands into one AA. The MWAM AA included all the delineated wetlands, including the creditable wetlands (37.12 ac), the wetlands within the riparian buffers of Schreiber and Coyote creeks (3.9 ac) and the open water within Schrieber Lake (8.26 ac) and those portions of Schreiber and Coyote

creeks that flow through the wetland areas (0.65 ac), and the wetlands on USFS lands (1.25 ac). The wetlands in the AA received a Category I rating with 88 percent of the total possible points in 2015. The 51.7-acre AA rated as a Category I wetland, scoring Excellent for General Wildlife Habitat and Production Export/Food Chain Support and scoring high for Listed/Proposed T&E Species Habitat, Short and Long Term Surface Water Storage, Sediment/Nutrient/Toxicant Removal, Sediment/shoreline Stabilization, Groundwater/Discharge/Recharge, and Uniqueness.

Table 33. Functions and Values of Schrieber Lake wetlands in 2015.

Function and Value Parameters from the 2008 MDT Montana Wetland Assessment Method[1]	2015
Listed/Proposed T&E Species Habitat	H(0.8)
MTNHP Species Habitat	M(0.6)
General Wildlife Habitat	E (1.0)
General Fish/Aquatic Habitat	M (0.7)
Flood Attenuation	M (0.6)
Short and Long Term Surface Water Storage	H (1.0)
Sediment/Nutrient/Toxicant Removal	H (1.0)
Sediment/Shoreline Stabilization	H (1.0)
Production Export/ Food Chain Support	E (1.0)
Groundwater Discharge/Recharge	H (1.0)
Uniqueness	H (0.9)
Recreation/Education Potential	M (0.1)
Actual Points / Possible Points	**9.7/11**
% of Possible Score Achieved	**88.2**
Overall Category	**I**
Acreage of Assessed Aquatic Habitats	**51.7**
Functional Units (acreage x actual points)	**501.49**

[1]Berglund and McEldowney 2008.

The current site conditions documented in 2015 are compared to the approved performance standards and success criteria in Table 34. The wetlands delineated in 2015 met the performance standards approved for this site, which included meeting the three parameter criteria for hydrology, vegetation, and soils. Hydrophytic vegetation success has been achieved based on the absolute cover of facultative or wetter species being greater than or equal to 70 percent. The open water area of Schrieber Lake were given no credit based on the stated goal of the project to maintain already existing open water in Schrieber Lake. Weed cover site wide and within the upland buffers did exceed 5 percent and did not met the success criteria. Isolated weed infestations were mapped throughout the mitigation site and are controlled by MDT as mandated by the performance

standards. The upland buffer success criteria have not been achieved as these areas have at least 50 percent aerial cover of non-weed species and noxious weeds do exceed 5 percent cover.

Table 34. Summary of Performance Standards and Success Criteria at Schrieber Lake in 2015.

Performance Standards	Success Criteria	Criteria Achieved Y/N	Discussion
Wetland Characteristics	Meet the three parameter criteria for hydrology, vegetation, and soils as outlined in the 1987 Wetland Delineation Manual and 2010 Mountains, Valleys, Coast Region.	Y	Areas identified as wetland habitat within the mitigation site meet the three parameter criteria.
Wetland Hydrology	Soil saturation present for at least 12.5 percent of the growing season.	Y	Areas identified as wetland habitat within the mitigation site exhibit soil saturation for a minimum 12.5 percent of growing season.
Hydric Soil	Hydric soil conditions present or appear to be forming.	Y	Hydric soil characteristics have developed throughout a majority of the constructed wetlands.
	Soil is sufficiently stable to prevent erosion.	Y	Disturbed soil is stable and does not exhibit signs of erosion.
	Soil is able to support plant cover.	Y	Plant cover is well-established across disturbed soils.
Hydrophytic Vegetation	Achieved where combined absolute cover of facultative or wetter species is ≥70 percent	Y	Areas identified as wetland habitat within the mitigation site support a prevalence of hydrophytic vegetation (OBL, FACW, and FAC).
	Montana State-listed noxious weeds do not exceed 5 percent absolute cover.	Y	Montana State-listed noxious weeds is estimated well below 5 percent absolute cover within wetland areas.
	Woody plants exceed 50% survival after 5 years.	N	It has only been 1 year since construction.
Open Water	It is the intent of the project to provide open water during the spring and early summer within excavated depressions. Open water with emergent, submerged and/or floating vegetation will therefore be considered successful and creditable.	Y	Excavated depression within the upper reach of the site site experience seasonal drawdown and rooted hydrophytic vegetation development has been observed; the lower depressions appear to support perennial inundation with established aquatic macrophyte community.
Channel Restoration Success	Revegetation along the new Coyote and Schrieber Creek channel corridors will be considered successful when banks are vegetated with a majority of deep-rooting riparian and wetland herbaceous and woody plant species with a root stability indexes greater than 6.	N	Three of the five reaches of Schrieber Creek are ephemeral in nature and have yet to develop vegetation along the banks. As a result, these reaches (SC1, SC2A, and SC2B) do not currently meet the performance criteria. The downstream reaches of Schrieber Creek (Reaches SC3, and SC7) and both reaches of Coyote Creek (CC1A and CC1B) are dominated by reed canary grass, which has a root stability index of 9.
	New stream channels will be allowed to naturally migrate within the established floodplain/riparian areas and to give it enough room to move and stabilize itself within the site	Y	No lateral migration has been documented along either Schrieber or Coyote Creek to date.
Bank Restoration Success	Rates of success will be determined by the following rates: i.) Rate of less than 0.5 ft of erosion annually= Functioning ii.) Rate of less than 1.0 ft /year = Functioning ii.) Rate of less then 1.5 feet/year = Functioning at Risk iv.) Rate of less than 2.5 ft/yr = Functioning at Risk v.)Rate of greater than 2.5 ft/year= Functioning at Risk or Not Functioning vi.)Rate of less than 3 ft/year = Not Functioning	N/A	Baseline data collected during 2015 monitoring event; no lateral migration documented yet
	Ratings for the streambank will be based upon the Proper Functiong Condition rating that determine if the area is supporting a healthy and stable bank area adjacent to the stream: I.) Funtioning - supporting a healthy and stable bank area adjacent to the river. ii.) Functioning at Risk - One of more functions of the streambank are adjusting to changes in the design within the reach area, more monitoring needed. ii.) Not Functioning - Measurements of the functions indicate that the site is not achieving functional goals and is not supporting a healthy and stable bak reach.	N/A	Will be collected during the third and fifth monitoring years
Riparian Buffer Success	Creditable buffer areas must have at least 50 percent aerial cover of non-noxious weed species by the end of the monitoring period.	Y	All riparian vegetation transects exhibited 50% or greater areal cover of non-noxious weed species along both Schrieber and Coyote Creek
	Achieved where combined aerial cover of riparian and stream bank vegetation communities is ≥70 percent.	Y*	Combined areal cover of riparian and stream bank vegetation along Schrieber Creek is 56%; however two cross sections indicated a total weighted percent cover below 70%. Combined areal cover of riparian and stream bank vegetation along Coyote Creek is 100%.
	Noxious weeds do not exceed 5 percent cover within the riparian buffer areas.	Y*	Noxious weed cover along Schrieber Creek is estimated at 8%. Noxious weed cover along Coyote Creek is 2%.
	Planted trees and shrubs will be considered successful where they exhibit 50 percent survival after 5 years.	Y*	Planted trees and shrubs along Schrieber Creek exhibit 79% survival to date. Planted trees and shrubs along Coyote Creek exhibit a 43% survival rate to date
Upland Buffer	Noxious weeds do not exceed 5 percent cover within upland buffer area.	N	Noxious weed cover is more than 5 percent within the upland buffer.
	Any area disturbed within creditable buffer zone must have at least 50 percent aerial cover of non-weed species by end of monitoring period.	Y	Disturbed areas have established greater than 50 percent cover by non-weed species.
Weed Control	Will be based upon annual monitoring of the site to determine weed species and degree of infestation within the site, and control measures based upon the monitoring results will be implemented by MDT to minimize and/or eliminate the intrusion of State Listed Noxious weed species within the site.	Y	State-listed noxious weed species across the site have been monitored and mapped during each post-construction monitoring event. MDT administers an on-going weed-control program.

* The majority of monitoring transects met performance criteria for this category

This 2015 monitoring report for the Schrieber Lake Mitigation Site provides a first year, baseline assessment of the site's condition less than one year following the project's completion. As a result of the relatively short timeframe between the completion of the project and the first monitoring event, much of the area had yet to revegetate, particularly in the ephemeral upper reaches of Schrieber Creek that were constructed through upland meadows. Reaches 1, 2A, and 2B of Schrieber Creek have yet to meet performance criteria established for 1) the establishment of bank-stabilizing vegetation communities, and 2) percent cover of noxious weeds within the riparian corridor. Reaches 3 and 7 of Schrieber Creek and Reaches 1A and 1B of Coyote Creek are currently meeting all success criteria, and are expected to generate the predicted credits outlined in the monitoring plan. Future monitoring of the site will determine whether vegetation establishment within Reaches 1, 2A and 2B of Schrieber Creek results in achieving the success criteria and generation of all anticipated credits.

Two nest boxes were installed at the site and were in good repair and were occupied. Noxious weed management will be an ongoing issue at this site. MDT completed noxious weed spraying at the Schrieber Lake site on July 20th, 2015. No other maintenance needs were identified. Priority 2B noxious weeds identified within the Schrieber Lake mitigation site included spotted knapweed (*Centaurea stoebe*), Canada thistle (*Cirsium arvense*), Gypsy-flower (*Cynoglossum officinale*), St. Johnswort (*Hypericum perforatum*), oxeye daisy (*Leucanthemum vulgare*), dalmatian toadflax (*Linaria dalmatica*), whitetop (*Lepidium draba*), and yellow toadflax (*Linaria vulgaris*). A total of 38 infestation areas were mapped in 2015, ranging in size from less than 0.1 acre to greater than 1 acre in size. The most common weed species found on the site were yellow toadflax (7), spotted knapweed (9), and Canada thistle (17).

2.10 *Schrieber Meadows (Missoula District, Year 5)*

The Montana Department of Transportation Schrieber Meadows mitigation project is located adjacent to the US Highway 2 corridor in Sections 11, 12, and 13, of Township 27 North, Range 30 West, MPM, Lincoln County. The 147-acre site lies within the boundaries of Watershed #1 – Kootenai River Basin. Schrieber Meadows is situated within a narrow valley corridor bordered on the western and northern edges by the Kootenai National Forest and the US Highway 2 corridor and on the south by private property. The majority of the site is situated on an MDT-owned parcel of land that consisted of hay fields, pastures, and clear-cut forest slopes. The remainder of the site is within a 16-acre easement area in the Kootenai National Forest adjacent to the MDT parcel. The property is bisected by Coyote Creek, which eventually drains into Schrieber Lake and the Fisher River.

Based on the nature of the peat and lacustrine soils identified within the project area, the MDT Geotechnical Section indicated that construction of a new stream channel and wetlands within Schrieber Meadows could potentially affect stability of US Highway 2. In 2007, a pilot wetland project to excavate several shallow depressional wetland cells within these peat and lacustrine soils was completed in an effort to determine constructability within these soil types. Three shallow wetland cells were created in 2007 and initially monitored in 2010.

Based on the results of the pilot project, this wetland and stream restoration project was scaled back from the original design. A 300-foot buffer was established by the MDT Geotechnical Section from the edge of roadway, limiting potential areas of development for the new stream channel and depressional wetland areas within the project area. The existing Coyote and Schrieber Creek channels were relocated to the west away from the highway corridor in order to allow for natural channel migration and overbank flooding. The elevation of the restored channels was raised to promote access to the floodplain and increase the localized water table throughout this meadow. A series of wetland cells (depressions) were excavated throughout the floodplain to increase flood storage and provide for a diversity of wetland habitat. The existing drainage ditch along the eastern boundary of the site was plugged to prevent excessive drainage and create pockets of surface water.

There are two components to this mitigation site and include both wetland and stream habitat development and improvement. The objectives of the Schrieber Meadows wetland and stream restoration project are listed below:

Wetland Mitigation

- Create an additional 6.53 wetland credit acres of new seasonally inundated emergent depressional wetlands within portions of the existing upland hay fields on both the USFS and MDT properties with a variety of herbaceous wetland communities
- Provide approximately 1.56 wetland credit acres through the restoration (rehabilitate) of 2.36 acres of degraded wetlands (at 1.5:1 ratio) that are dominated by tame pasture grasses such as meadow foxtail (*Alopecurus* sp.), reed canary grass (*Phalaris arundinacea*), timothy (*Phleum pretense*) and other hay species through the permanent restoration of hydrology, land surface manipulation (excavating shallow depressions), and re-vegetation with wetland plant seed
- Provide approximately 4.41 wetland credit acres through the enhancement of 13.22 acres of existing wetlands (at 3:1 ratio) located between the proposed stream mitigation portion of the project area and the US Highway 2 corridor
- Provide approximately 1.70 wetland credit acres through the development of upland buffers totaling 8.50 acres (at 5:1 ratio) around the created, restored and enhanced wetland areas and stream riparian corridors
- Establish an overall total of 17.84 acres of wetland mitigation credits to mitigate wetland impacts associated with MDT projects within Watershed #1 – Kootenai River Basin
- Impact approximately 0.08 acres of wetlands through the installation of ditch plugs along the channelized perennial reaches of Coyote and Schrieber Creeks to divert the flows into the new stream channel.

Stream Mitigation

- Restore approximately 7,756 linear feet of new stream channel to both Coyote and Schrieber Creeks resulting in an overall increase of 3,327 linear feet of stream length to both creek corridors through restoration of sinuosity, floodplains and natural stream migration within the project site
- Develop approximately 35,551 stream mitigation credits with the restoration of Coyote and Schrieber Creeks for use within Watershed #1 – Kootenai River Basin

Wetland Mitigation Credit

The pilot project constructed in 2007 generated approximately 3.72 mitigation credit acres including 2.38 credit acres of wetland creation, 0.75 credit acres of restoration (rehabilitation) of existing wetlands (1.12 acres restored), and 0.59 credit acres of upland (2.96 acres maintained) buffer around the wetlands. The pilot project was engulfed by the larger project constructed by MDT in 2011. Table 35 provides the credits generated at the Schrieber Meadows mitigation site for the approximate 57-acre full-scale project with no differentiation between the pilot project and full build-out of the Schrieber Meadows project.

Table 35. Summary of wetland mitigation credits at the Schrieber Meadows Mitigation Site in 2010 and 2012 through 2015.

Mitigation Type	Total Proposed Acreage	Ratio	Proposed Credit Acres	2012 Delineated Acreage	2012 Credit Acres	2013 Delineated Acreage	2013 Credit Acres	2014 Delineated Acreage	2014 Credit Acres	2015 Delineated Acreage	2015 Credit Acres
Creation - USFS/MDT Property	8.91	1:1	8.91	22.40	22.40	22.43	22.43	22.43	22.43	22.43	22.43
Restoration on USFS/MDT Property	3.46	1.5:1	2.31	3.46	2.31	3.46	2.31	3.46	2.31	3.46	2.31
Enhancement of wetlands inside geotechnical limits adjacent to US 2 (MDT/USFS)	13.22	3:1	4.41	13.22	4.41	13.22	4.41	13.22	4.41	13.22	4.41
Riparian Buffer*	-	-	-	8.30	**	8.30	**	8.30	**	8.30	**
Upland Buffer	8.50	5:1	1.70	8.50	1.70	12.39***	2.48	12.39***	2.48	12.39***	2.48
Project Impacts	-0.08	None	-0.08	-0.08	-0.08	-0.08	-0.08	-0.08	-0.08	-0.08	-0.08
Total Mitigation Acreage	**34.01**		**17.24**	**55.80**	**30.73**	**59.72**	**31.54**	**59.72**	**31.54**	**59.72**	**31.54**

*Riparian buffer areas used to calculate stream and riparian credits.

**Wetland acreages within riparian buffer subracted from wetland credit total; riparian buffer does not include upland buffer acreage.

***Acreage includes 50-foot buffer around wetlands within MDT and USFS property and outside of the riparian buffer.

It was anticipated that a total of approximately 17.24 wetland credit acres would be generated from the full build-out of the Schrieber Meadows project, including the approved credits from the 2007 pilot project. The proposed wetland credits shown on Table 35 are described below. It was predicted that approximately 8.91 acres of wetlands would be created through the excavation of cells 1 to 11. The 2013 through 2015 delineated acreages indicated that 22.43 acres of wetland habitat have been created within this mitigation site. It should be noted that water levels have substantially increase as a result of the newly constructed channel of Coyote Creek and abundant surface and ground water flowing through the valley. The high groundwater elevations found on the site are due to a combination of restoration efforts to plug existing drain ditches and channels as well as the subsidence of the histosol soil elevations over time. All wetlands within the 25-foot riparian buffer (8.30 acres) used to calculate stream mitigation credits were subtracted from total wetland habitat to avoid double calculation of total mitigation credits at this site.

A total of 2.31 acres of wetland credit was to be generated from the restoration of 3.46 acres of wetlands located within a small portion of the USFS property and a portion of MDT property in wetland cells 4, 5, 8, 9, 10, and 11. A total of 4.41 acres of wetland credit has been generated through the hydrologic enhancement of 13.22 acres of existing wetlands located between the stream mitigation portion of the project area and the US Highway 2 corridor.

Approximately 2.48 acres of mitigation credit have been generated by preserving 50-foot upland buffers around the perimeter of the wetland boundary. Upland buffer credit was giving to areas located on MDT and USFS property and outside of the 25-foot riparian buffer. The development of this mitigation site resulted in impacts to 0.08 acres of wetland through the installation of the ditch plugs. The 0.08 acres was debited from the estimated credit acreages. Overall, the proposed credit acres of 17.24 have been surpassed by the development of 31.54 acres, creating a surplus of 14.30 credit acres.

The 2015 estimated credit acres for this site have exceeded the proposed credit acres as a result of the rise in the water table following the abandonment of the former Coyote Creek channel and of the subsequent increase in site wide wetland hydrology. A total of 31.54 credit acres have developed at this site following mitigation construction.

Stream Mitigation Credit

The goal of the stream mitigation component of the Schrieber Meadows project was the restoration of approximately **7,756 linear feet** of new stream channel in both Coyote and Schrieber Creeks, resulting in an overall increase of **3,327 linear feet** of stream length with the development of approximately **35,551** stream mitigation credits. The stream mitigation project has been separated into five distinct segments, including:

1. **Upper Coyote Creek** is the segment from the edge of the forested areas on and through the USFS parcel onto the MDT-owned parcel. It is

considered a seasonally intermittent stream. This segment of stream does not become perennial again until it reaches the spring area on the MDT property.

2. **Coyote Creek Spring Area** is the area between the USFS restored segment of stream and the access road into the MDT site. There is a large spring emanating from this location and MDT did not manipulate this area except to plant the adjacent riparian zones with woody shrubs and trees.
3. **Middle Coyote Creek** begins at the culverts under the access road and extends to its connection with Schrieber Creek. The stream is perennial due to groundwater flows emanating from the spring area.
4. **Perennial Spring Channel Ditch** was originally a drainage ditch constructed to relocate flows from a natural spring emanating from the hillside in the south central portion of the site. At the suggestion of the MFWP fisheries biologist for this region, the ditch was reconstructed into a natural channel and connected to Coyote Creek to contribute perennial flow to Coyote Creek.
5. **Merged Coyote/Schrieber Creeks** is the segment of stream at the southeast portion of the MDT property where Schrieber Creek merges with Coyote Creek to form Schrieber Creek and then continues beyond the property boundary. The stream flow is perennial through this segment.

The completed restoration of sinuosity and stream length to both Coyote Creek and Schrieber Creek was intended to create a new channel length of approximately 7,756 linear feet, an overall increase of 3,327 linear feet from the previously channelized length of 4,429 linear feet. As part of the Montana Stream Mitigation Procedure (2010), the calculation of stream mitigation credits includes the summation of both riparian (Table 36) and stream credits (Table 37).

With the exception of the Coyote Creek spring area, which was undisturbed during construction activities, a net improvement factor of 0.25 for each side of the stream for the entire site was utilized for the riparian credit calculation. This value was based on the minimum creditable riparian width of 25 feet on either side of the new stream channel (50 feet total) to minimize conflict with proposed wetland credit areas. A protection factor of 0.20 was utilized based on the federal and state agency ownership of the site and executed conservation easement. A mitigation timing factor of 0.10 was used based on the development of the stream credits prior to any impact debits. Both Coyote and Schrieber Creeks are considered 1st Order streams by the approved mitigation plan. These streams become 2nd Order when they merge at the lower end of the project area. For determining the comparative stream order factor for each segment, a same order factor of 0.20 was used. As the developed mitigation credits will likely be used to offset impacts within the watershed >0.5 mile away, the off-site factor of 0.10 was used.

Table 36. Determination of Riparian Mitigation Credits for Schrieber Meadows

Riparian						
Factors		**Upper Coyote Creek (USFS)**	**Coyote Creek Spring Area**	**Middle Coyote Creek (MDT)**	**Perennial Spring Channel**	**Merged Coyote/ Schrieber Creeks**
Net Improvement	Stream Side A	0.25	0.40	0.25	0.25	0.25
Net Improvement	Stream Side B	0.25	0.40	0.25	0.25	0.25
Type of Protection		0.20	0.20	0.20	0.20	0.20
Mitigation Timing		0.10	0.10	0.10	0.10	0.10
Comparative Stream Order		0.20	0.20	0.20	0.20	0.20
Location		0.10	0.10	0.10	0.10	0.10
Sum of Factors	M=	1.10	1.40	1.10	1.10	1.10
Linear Feet	L=	1,725	190	3,179	400	2,425
Reach Multiplier	RM=	1.25	1.25	1.25	1.25	1.25
Total Riparian Credits	M x L x RM=	**2,409**	**332**	**4,371**	**550**	**3,334**
TOTAL RIPARIAN CREDITS = 10,996						

Table 37. Determination of Stream Mitigation Credits for Schrieber Meadows.

Stream					
Factors	**Upper Coyote Creek (USFS)**	**Coyote Creek Spring Area**	**Middle Coyote Creek (MDT)**	**Perennial Spring Channel**	**Merged Coyote/ Schrieber Creeks**
Net Improvement	2.50	0.00	2.50	2.50	2.50
Stream Status	0.05	0.05	0.05	0.05	0.05
Type of Protection	0.20	0.20	0.20	0.20	0.20
Mitigation Timing	0.10	0.10	0.10	0.10	0.10
Comparative Stream Order	0.20	0.20	0.20	0.20	0.20
Location	0.10	0.10	0.10	0.10	0.10
Sum of Factors (M)	3.15	0.65	3.15	3.15	3.15
Linear Feet (L)	1,752	190	3,179	400	2,425
Total Stream Credits (M x L)	**5,519**	**123**	**10,014**	**1,260**	**7,639**
TOTAL STREAM CREDITS = 24,555					
Total Mitigation Credits (Riparian + Stream) = 10,996 + 24,555 = 35,551					

In determining stream credits for the Coyote and Schrieber Creek corridors, many of the same factors used in the riparian credit calculations were repeated. The only exception was the net improvement factor for stream credits, where a factor of 2.5 for substantial improvement was assigned. No net improvement factor for the Coyote Creek spring area was included, as this area was not constructively changed.

Stream credits reported here are based upon the designed stream lengths, as presented in the Mitigation Plan. With the exception of woody plant survival criteria, the site has achieved the riparian buffer success and channel restoration success criteria to date. Both the stream channel and creditable buffer areas have greater than 70 percent aerial cover by deep-rooting vegetation and less than 10 percent cover by Montana State-listed noxious weeds. The construction technique employed for creating the new channels did not disturb the stream banks, which are predominantly covered by reed canary grass (plant stability

rating of 9). The riparian success criteria pertaining to woody plant survival of greater than 50 percent after five years has not been achieved. An approximate 5 percent survival rate for the planted woody species was estimated in 2015. The 35,551 stream credits calculated for this site following construction achieves the goals for the stream mitigation component of the Schrieber Meadows project.

The 2008 MDT MWAM was used to evaluate the site in 2010 and 2012 through 2015. The functional assessment completed in 2010 incorporated the three constructed wetland cells and enhanced wetlands into one AA. These wetlands received a Category II rating with 68 percent of the total possible points in 2010. In 2012, the acreage of the project area increased to include the additional constructed wetlands cells, restored wetlands, and enhanced wetlands. These additions resulted in the assessment of three separate AAs from 2012 to 2015 (Table 38). The score for Listed/Proposed T&E Species Habitat function was increased to high due to the presence of grizzly bears in the area as reported by MFWP and USFWS biologists in 2015.

The 2012 to 2015 **restoration AA** included 3.46 acres of pre-existing wetlands within the footprint of the excavated cells. The AA includes both aquatic bed and emergent wetland habitats. The assessment score increased by eight percentage points to 82 percent and the functional units totaled 28.37. The AA was rated as a Category I wetland, scoring excellent for General Wildlife Habitat and Production Export/Food Chain Support, and high for Listed/Proposed T&E species habitat, MTNHP Species Habitat, Short and Long Term Surface Water Storage, Sediment/Shoreline Stabilization, Groundwater/Discharge/Recharge, and Recreation/Education Potential. Production Export/Food Chain Support shifted from a moderate to excellent rating in 2015 as a result of the observation of an unrestricted water surface outlet to Coyote Creek. General Wildlife Habitat shifted from a high to excellent rating for this AA in 2015 as a result of the change in disturbance rating from moderate to low.

The 13.22-acre **enhancement AA** included existing wetlands located between the stream mitigation portion of the project area and the US Hwy 2 corridor. The AA achieved 87 percent of the possible score in 2015, up from 80 percent in 2014. Due to a confirmed sighting of a grizzly bear in the project area the score for Listed/Proposed T&E Species Habitat was increased to a high rating. The AA received a Category I rating and 115 functional units. High ratings were assessed for Listed/Proposed T&E Species Habitat, General Wildlife Habitat, MTNHP Species Habitat, Short and Long Term Surface Water Storage, Sediment/Nutrient/Toxicant Removal, Sediment/Shoreline Stabilization, Groundwater/Discharge/Recharge, and Recreation/Education Potential. Production Export/Food Chain Support shifted from a high to excellent rating in 2015 as a result of the observation of a restricted water surface outlet.

Table 38. Functions and Values of Schrieber Meadows Mitigation Site in 2010 and 2012 through 2015.

		ENHANCEMENT AA				CREATION AA				RESTORATION AA			
Function and Value Parameters from the 2008 MDT Montana Wetland Assessment Method[1]	**2010 Creation/ Enhancement AA**	**2012**	**2013**	**2014**	**2015**	**2012**	**2013**	**2014**	**2015**	**2012**	**2013**	**2014**	**2015**
Listed/Proposed T&E Species Habitat	Low (0.1)	Low (0.3)	Low (0.3)	Low (0.3)	High (0.8)	Low (0.3)	Low (0.3)	Low (0.3)	High (0.8)	Low (0.3)	Low (0.3)	Low (0.3)	High (0.8)
MTNHP Species Habitat	High (0.9)	High (0.9)	High (0.9)	High (0.9)	High (0.9)	High (0.9)	High (0.9)	High (0.9)	High (0.9)	High (0.9)	High (0.9)	High (0.9)	High (0.9)
General Wildlife Habitat	Mod (0.7)	High (0.9)	Exc (1.0)	High (0.9)	High (0.9)	High (0.9)	High (0.9)	High (0.9)	High (0.9)	High (0.9)	High (0.9)	High (0.9)	Exc (1.0)
General Fish/Aquatic Habitat	NA	NA	NA	NA	NA	Mod (0.6)	High (0.8)	High (0.8)	Mod (0.6)	NA	NA	NA	NA
Flood Attenuation	NA	Mod (0.6)	Mod (0.6)	Mod (0.6)	Mod (0.6)	Mod (0.6)	Mod (0.6)	Mod (0.6)	Mod (0.6)	Mod (0.6)	Mod (0.6)	Mod (0.6)	Mod (0.5)
Short and Long Term Surface Water Storage	Mod (0.6)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (0.8)	High (0.8)	High (0.8)	High (0.8)
Sediment/Nutrient/Toxicant Removal	Mod (0.7)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	Mod (0.7)	Mod (0.7)	Mod (0.7)	Mod (0.6)
Sediment/Shoreline Stabilization	Mod (0.6)	NA	NA	High (1.0)	High (1.0)	Mod (0.7)	Mod (0.7)	High (1.0)	High (1.0)	Low (0.3)	Low (0.3)	High (1.0)	High (1.0)
Production Export/ Food Chain Support	Mod (0.5)	High (0.8)	High (0.8)	High (0.8)	Excel (1.0)	High (0.8)	High (0.8)	High (0.8)	Excel (1.0)	Mod (0.7)	Mod (0.7)	Mod (0.7)	Excel (1.0)
Groundwater Discharge/Recharge	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)
Uniqueness	Low (0.3)	Mod (0.4)	Mod (0.4)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Mod (0.4)
Recreation/Education Potential	Low (0.5)	High (0.2)	High (0.2)	High (0.2)	High (0.2)	High (0.2)	High (0.2)	High (0.2)	High (0.2)	High (0.2)	High (0.2)	High (0.2)	High (0.2)
Actual Points / Possible Points	**5.45 / 8**	**7.1/9**	**7.2/9**	**8.0/10**	**8.7/10**	**8.3/11**	**8.5/11**	**8.8/11**	**9.3/11**	**6.7/10**	**6.7/10**	**7.4/10**	**8.2/10**
% of Possible Score Achieved	**68%**	**79%**	**80%**	**80%**	**87%**	**75%**	**77%**	**80%**	**85%**	**67%**	**67%**	**74%**	**82%**
Overall Category	**II**	**II**	**II**	**I**	**I**	**II**	**II**	**II**	**I**	**II**	**II**	**II**	**I**
Acreage of Assessed Aquatic Habitats within Easement (ac)	**4.84**	**13.22**	**13.22**	**13.22**	**13.22**	**22.40**	**22.43**	**22.43**	**22.43**	**3.46**	**3.46**	**3.46**	**3.46**
Functional Units (acreage x actual points)	**26.38**	**93.86**	**95.18**	**105.76**	**115.01**	**185.92**	**190.66**	**197.38**	**208.60**	**23.18**	**23.18**	**25.60**	**28.37**

[1]Berglund and McEldowney 2008.

The 2012 to 2015 **creation AA** included all wetland areas within the site that were not identified as wetland habitat during the baseline delineation and that were located outside of the riparian buffer area along the constructed channels. An increase of wetlands, above the anticipated target of 6.53 acres, has developed onsite as a result of the substantially increased water table elevation observed site wide. This 22.43-acre AA was rated as a Category I wetland in 2015 with 85 percent of the possible points, an increase of 5 percent since 2014, and 208.6 functional units. This AA received high ratings in Listed/Proposed T&E Species Habitat, MTNHP Species Habitat, General Wildlife Habitat, Short and Long Term Surface Water Storage, Sediment/Nutrient/Toxicant Removal, Sediment/Shoreline Stabilization, Groundwater/Discharge/Recharge, and Recreation/Education Potential. General Fish/Aquatic Habitat shifted from a high to moderate rating as a result of no fish species observed during the 2015 survey. Production Export/Food Chain Support shifted from a high to excellent rating in 2015 as a result of the observation of restricted surface and subsurface water outlets.

The current site conditions documented in 2015 are compared to the approved performance standards and success criteria in Table 39. The wetlands delineated in 2015 met the performance standards approved for this site, which included meeting the three parameter criteria for hydrology, vegetation, and soils. Hydrophytic vegetation success has been achieved based on the absolute cover of facultative or wetter species being greater than or equal to 70 percent. Open water areas were given full credit based on the stated goal of the project to provide open water within the excavated depressions during the spring and early summer. Weed cover site wide and within the upland buffers did not exceed 5 percent and met the success criteria. Isolated weed infestations were mapped throughout the mitigation site and are controlled by MDT as mandated by the performance standards. The upland buffer success criteria have been achieved as these areas have at least 50 percent aerial cover of non-weed species and noxious weeds do not exceed 5 percent cover.

Table 39 provides a summary of performance standards and success criteria for the constructed streams and riparian buffers. The restored channel has met the defined success criteria by supporting deep-rooted vegetation along the stream banks and a floodplain capable of supporting lateral migration within the site. The riparian buffer has achieved the success criteria associated with the development of greater than 70 percent vegetation cover while supporting less than 10 percent cover by noxious weeds. However, the success criteria indicating 50 percent survival of planted trees and shrubs after 5 years has not been achieved. Higher-than-expected water levels across the site and perennial inundation appear to inhibit the survival and development of woody species within the site. No woody communities were identified within the site in 2015 and approximately 60 plants were observed during the field survey. Robust reed canary grass made it difficult to see small shrubs located throughout much of the site.

Table 39. Summary of Performance Standards and Success Criteria at Schrieber Meadows in 2015.

Performance Standards	Success Criteria	Criteria Achieved Y/N	Discussion
Wetland Characteristics	Meet the three parameter criteria for hydrology, vegetation, and soils as outlined in the 1987 Wetland Delineation Manual and 2010 Mountains, Valleys, Coast Region.	Y	Areas identified as wetland habitat within the mitigation site meet the three parameter criteria.
Wetland Hydrology	Soil saturation present for at least 12.5 percent of the growing season.	Y	Areas identified as wetland habitat within the mitigation site exhibit soil saturation for a minimum 12.5 percent of growing season.
Hydric Soil	Hydric soil conditions present or appear to be forming.	Y	Hydric soil characteristics have developed throughout a majority of the constructed wetlands.
	Soil is sufficiently stable to prevent erosion.	Y	Disturbed soil is stable and does not exhibit signs of erosion.
	Soil is able to support plant cover.	Y	Plant cover is well-established across disturbed soils.
Hydrophytic Vegetation	Achieved where combined absolute cover of facultative or wetter species is ≥70 percent	Y	Areas identified as wetland habitat within the mitigation site support a prevalence of hydrophytic vegetation (OBL, FACW, and FAC).
	Montana State-listed noxious weeds do not exceed 5 percent absolute cover.	Y	Montana State-listed noxious weeds is estimated well below 5 percent absolute cover within wetland areas.
Riparian Buffer Success	Achieved when woody and riparian vegetation becomes established	N	No woody-dominated communities have formed along the established riparian buffer; riparian vegetation (primarily reed canarygrass) has established.
	Noxious weeds do not exceed 10 percent cover within the riparian buffer areas.	Y	Montana State-listed noxious weeds is estimated at 1 to 3 percent absolute cover within riparian buffer.
	Creditable buffer areas must have at least 50 percent aerial cover of non-noxious weed species by the end of the monitoring period.	Y	Non-noxious vegetation consist of nearly 100 percent of total vegetation cover within riparian buffer.
	Achieved where combined aerial cover of riparian and stream bank vegetation communities is ≥70 percent.	Y	Riparian and stream bank vegetation communities support nearly 100 percent cover.
	Planted trees and shrubs will be considered successful where they exhibit 50 percent survival after 5 years.	N	Following plantings, the majority of the site supported standing water and likely drowned out 90% of the plantings by the end of the 2nd growing season. Approximatley 3 percent survival was noted in 2014. No replanting efforts have been completed.
Channel Restoration Success	Revegetation along the new Coyote and Schrieber Creek channel corridors will be considered successful when banks are vegetated with a majority of deep-rooting riparian and wetland herbaceous and woody plant species.	Y	The majority of stream bank vegetation along the constructed Coyote and Schrieber Creek channel corridors is dominated by reed canarygrass, which has a stability rating of 9.
	The intent of the stream restoration is to allow for the stream to naturally migrate within the floodplain and to give it enough room to move and stabilize itself within the site.	Y	The stream has plenty of space within the floodplain for natural migration. The stream currently appears stable with no lateral adjustment observed following construction.
Stream Bank Vegetation	Considered successful when banks are vegetated with a majority of deep-rooting riparian plant species having root stability indexes ≥6 .	Y	Reed canarygrass and foxtail (*Alopecurus* sp.) dominate the stream banks. Reed canarygrass has a root stability index of 9; no index value is provided for foxtail, assume this value is 6 or greater.
Open Water	It is the intent of the project to provide open water during the spring and early summer within excavated depressions. As the growing season progresses and the groundwater levels recede, it is anticipated that vegetation will germinate within the majority of the depressions. Open water with submerged and/or floating vegetation will therefore be considered successful and creditable.	Y	Excavated depression within the upper reach of the site site experience seasonal drawdown and rooted hydrophytic vegetation development has been observed; the lower depressions appear to support perennial inundation with established aquatic macrophyte community.
Upland Buffer	Noxious weeds do not exceed 5 percent cover within upland buffer area.	Y	Noxious weed cover is less than 5 percent within the upland buffer.
	Any area disturbed within creditable buffer zone must have at least 50 percent aerial cover of non-weed species by end of monitoring period.	Y	Disturbed areas have established greater than 50 percent cover by non-weed species.
Weed Control	Will be based upon annual monitoring of the site to determine weed species and degree of infestation within the site, and control measures based upon the monitoring results will be implemented by MDT to minimize and/or eliminate the intrusion of State Listed Noxious weed species within the site.	Y	State-listed noxious weed species across the site have been monitored and mapped during each post-construction monitoring event. MDT administers an on-going weed-control program.

Eleven infestations of Montana Listed Priority 2B noxious weeds, Canadian thistle and ox-eye daisy, and one infestation of Montana Listed Priority 2A noxious weed, orange hawkweed, were mapped across the Schrieber Meadows mitigation site in 2015. Nine infestations of Canadian thistle, two infestations of ox-eye daisy, and one infestation of orange hawkweed were identified in areas less than 1.0 acre in size with cover classes ranging from trace (less than 1 percent) to moderate (6 to 25 percent). Weed spraying has been conducted annually within the site to eliminate Canadian thistle infestations, with documented weed control activities completed on June 22 and August 5, 2013 and June 20 and August 20, 2014. A weed contractor with MDT treated nearly four acres of the site in July 2015, with treatment concentrated in areas of infestation by the three noxious weed species observed on site. The MDT has an ongoing weed control program for their mitigation sites that includes an annual assessment of weeds identified at each location and treatment to contain and control identified populations.

No man-made water control structures were installed on the property. Two nest boxes were in place on the fence posts at the site entrance gate. The boxes were in good condition with signs of continued use.

2.11 *Silicon Mountain (Butte District, Year 1)*

The Silicon Mountain Aquatic Resource Mitigation 2015 Monitoring Report presents the results the first year of post-construction monitoring at the Silicon Mountain mitigation area. Butte Silver Bow County (BSBC) and the Montana Department of Transportation (MDT) partnered in 2011 to provide compensatory mitigation for both stream and wetland impacts associated with the BSBC proposed Silicon Mountain Tech Park and Port road realignment project and to serve as a mitigation bank for future transportation projects within Watershed #2 – Upper Clark Fork of the Columbia River.

The MDT Silicon Mountain mitigation project is located south of Interstate I-90 and west of Interstate I-15, approximately five miles west of Butte, MT within Township 3 North, Range 9 West, Section 24 Silver Bow County, Montana. The 50.1-acre site lies within the boundaries of Watershed #2 – Upper Clark Fork of the Columbia River. In 2011, BSBC purchased land Parcels 1 (18.91 acres) and 2 (26.1 acres) from the Ueland family, located north of the new roadway alignment. BCBS partnered with MDT and placed the property under a perpetual conservation easement to protect the wetland and stream resource attributes established and restored within the site. This conservation easement was extended to include approximately 0.96 acres of property previously owned by BCBS, in the immediate vicinity of the new roadway alignment.
The goals of the mitigation project include preservation, restoration and establishment of wetland, riparian, and upland habitats. Specifically, the mitigation goals include the following:

- establish 6.77 acres of emergent and scrub-shrub wetland through the excavation and creation of six wetland cells;
- protect the existing 10.06 acres of emergent and scrub-shrub wetland;
- restore upland, wetland, and riparian areas impacted by the new roadway alignment through seeding and planting of mostly native graminoids, shrubs, and trees;
- restore and reconstruct approximately 3,250 linear feet of the Sand Creek channel to its historic natural condition;
- relocate and restore approximately 650 linear feet of the Sand Creek channel on privately owned property south of the realignment project.
- Restore approximately 4,400 linear feet of the Sand Creek channel

2.11.1 *Wetland Mitigation Credits*

Table 40 summarizes the current estimated wetland credits based on the USACE approved credit ratios (USACE 2005) and the wetland delineation completed in June 2015. A total of 27.2 creditable acres were delineated at the Silicon Mountain site in 2015, including 6.2 acres of wetland creation, 10.2 acres of wetland preservation, and 13.8 acres of upland buffer. Applying the USACE approved ratios to these values, a total of 10.9 acres of mitigation credit have been estimated in 2015, a value very close to the targeted 11.45 acres anticipated at this site. The attainment of the full target value of 11.45 credit

acres is likely in subsequent monitoring years, as wetland vegetation and hydrology develop further within the site. Accounting for the 4.33 credit acres that Butte Silverbow is seeking from the project, a net of approximately 6.6 credit acres are available for MDT to utilize as mitigation reserve within Watershed # 2 - Upper Clark Fork River basin.

Table 40. Wetland mitigation credits estimated for the Silicon Mountain Mitigation Site in 2015.

Compensatory Mitigation Type	Mitigation Area Description	Wetland Type (Cowardin)	Anticipated Mitigation Surface Area (Acres)	USACE Approved Mitigation Ratios	Anticipated Mitigation Credit (Acres)	2015 Delineated Acres	2015 Mitigation Credit (Acres)
Creation (Establishment)	Wetland Cells 1, 2, 3, 4 & 5	Palustrine emergent, aquatic bed	6.77	1:1	6.77	6.19	6.19
Preservation	Existing Wetland Areas	Palustrine emergent, scrub-shrub	10.06	4:1	2.52	10.24	2.56
Upland Buffer	50-foot wide upland perimeter	N/A	10.80	5:1	2.16	10.8*	2.16
		Totals	**27.6**		**11.45**	**16.43**	**10.91**

*Actual delinated acres exceeded the creditable acres therefore only the requested acreage is reported.

2.11.2 *Stream Mitigation Credit*

Anticipated mitigation credits produced by the Silicon Mountain Aquatic Resource Mitigation Project were calculated following guidelines provided in the USACE 2010 *Montana Stream Mitigation Procedure* (MTSMP). Approximately 4,300 feet of Sand Creek was addressed as part of the project, and MDT is seeking to obtain credit for 3,900 feet as outlined in Table 41. MDT is not seeking to obtain mitigation credits for 400 of the 4,300 feet of channel addressed within the project reach, including 100 feet that lies within the railroad right-of-way, and 300 feet that was riprapped under the newly constructed bridge. MDT anticipates a total of 12,369.5 stream and riparian mitigation credits if all success criteria are met.

Table 41. Summary of anticipated stream mitigation credits from the Silicon Mountain Aquatic Resource Mitigation Project.

Mitigation Reach	Linear Feet	Sum of Mitigation Factors[1]	Mitigation Credits
Reach 1	3,250	3.20	10,400
Reach 2	650	3.03	1,969.5
Total	**3,900**		**12,369.5**

[1] From Table 7 of Silicon Mountain Aquatic Resource Mitigation Project Mitigation Plan

To date, the project is meeting the two success criteria established for stream mitigation components of the project. Stream mitigation criteria include channel restoration and vegetation along the stream banks. Subsequent monitoring

events will document whether the site continues to achieve success as defined by these standards, or if additional maintenance is needed.

The 2008 MDT MWAM was used to evaluate the functional values of the created wetlands in 2015. Two assessment areas (AA) were assessed in 2015 that included created wetland cells 2, 3, and 4, and created wetland cells 1 and 5 (Table 42). The created wetland cells were classified into separate AAs based on perennial hydrology and open water observed during the 2015 site visit in cells 1 and 5, and seasonal hydrology and saturation observed in cells 2, 3, and 4. As hydrology stabilizes at the site, these AAs will likely shift in subsequent monitoring years.

The AA for created wetland cells 2, 3, and 4 encompassed 3.1 acres of excavated wetland cells, characterized by wetland community Type 6 – *Puccinellia nuttalliana/Deschampsia caespitosa*. This AA was rated as a Category III wetland with 47 percent of the total possible points in 2015. The AA received a high functional rating for sediment/nutrient/toxicant removal and moderate ratings for short and long term surface water storage, production export/food chain support, groundwater discharge/recharge, and MTNHP species habitat. The rating for this AA is expected to increase as the disturbed areas recover when desirable vegetation cover increases and hydrology stabilizes at the site.

The AA for created wetland cells 1 and 5 encompassed 3.1 acres of excavated wetland cells, characterized by wetland community Type 7 – Open Water/Aquatic Macrophytes. This AA was rated as a Category III wetland with 54.5 percent of the total possible points in 2015. The AA received high functional ratings for short and long term surface water storage and groundwater discharge/recharge. Moderate ratings for were assessed for sediment/nutrient/toxicant removal, flood attenuation, production export/food chain support, general wildlife habitat, and MTNHP species habitat. The rating for this AA is expected to increase as the disturbed areas recover and as desirable vegetation cover increases.

Table 42. Functions and Values of the Silicon Mountain Mitigation Site in 2015.

Function and Value Parameters 2008 MDT Montana Wetland Assessment Method[1]	2015 AA 1 (Created Wetland Cells 2, 3, and 4)	2015 AA 2 (Created Wetland Cells 1 and 5)
Listed/Proposed T&E Species Habitat	Low (0.0)	Low (0.0)
MTNHP Species Habitat	Mod (0.5)	Mod (0.5)
General Wildlife Habitat	Low (0.3)	Mod (0.5)
General Fish/Aquatic Habitat	NA	NA
Flood Attenuation	NA	Mod (0.6)
Short and Long Term Surface Water Storage	Mod (0.6)	High (0.8)
Sediment/Nutrient/Toxicant Removal	High (0.8)	Mod (0.7)
Sediment/Shoreline Stabilization	NA	Low (0.3)
Production Export/Food Chain Support	Mod (0.7)	Mod (0.7)
Groundwater Discharge/Recharge	Mod (0.7)	High (1.0)
Uniqueness	Low (0.1)	Low (0.3)
Recreation/Education Potential	Low (0.05)	Low (0.05)
Actual Points / Possible Points	**3.75 / 8**	**5.45 /10**
% of Possible Score Achieved	**47%**	**55%**
Overall Category	**III**	**III**
Total Acreage of Assessed Wetlands within Site Boundaries (ac)	**3.1**	**3.1**
Functional Units (acreage x actual points)	**11.63**	**16.90**

[1]Berglund and McEldowney 2008

Table 43 provides a summary of the site conditions in relation to the established performance standards and success criteria. This site meets the established performance standards with the exception of the success criteria that measure soil stability and its ability to support vegetation cover, and noxious weed cover. Although hydrophytic vegetation criteria are being met, the side slopes of wetland cell 5 currently exhibit low cover of species that provide soil stability which has caused some rilling to occur along the shoreline. All wetlands delineated within the Silicon site in 2015 met the three criteria outlined in the 1987 Manual and 2010 Regional Supplement. Upland buffer areas exhibited more 10 percent cover of noxious weed infestations. The MDT implements weed control measures based on the results of field surveys to minimize and/or eliminate the intrusion of State Listed Noxious weed species within the site. MDT will initiate weed control measures in 2016 based upon the findings of this monitoring report. Comprehensive site monitoring has occurred for one year and will be conducted for a minimum period of five years as determined by the USACE Montana Regulatory Office's review of annual monitoring reports for the site and attainment of wetland and stream success criteria.

Table 43. Summary of Performance Standards and Success Criteria at the Silicon Mountain mitigation site in 2015.

Performance Standards	Success Criteria	Criteria Achieved Y/N	Discussion
Wetland Characteristics	Meet the three parameter criteria for hydrology, vegetation, and soils as outlined in the 1987 Wetland Delineation Manual and 2010 Mountains, Valleys, Coast Region.	Y	Areas identified as wetland habitat within the mitigation site meet the three parameter criteria.
Wetland Hydrology	Soil saturation present for at least 12.5 percent of the growing season.	Y	Areas identified as wetland habitat within the mitigation site exhibit soil saturation for a minimum 12.5 percent of growing season.
Hydric Soil	Hydric soil conditions present or appear to be forming.	Y	Hydric soil characteristics are developing throughout a majority of the constructed wetlands.
	Soil is sufficiently stable to prevent erosion.	N	Disturbed soil is not yet stable and does exhibit minor signs of erosion around wetland cell 5.
	Soil is able to support plant cover.	N	Plant cover is establishing slowly across recently disturbed soils.
Hydrophytic Vegetation	Achieved where combined absolute cover of facultative or wetter species is ≥70 percent	Y	Created wetland cells support 70% or greater cover of hydrophytic vegetation (OBL, FACW, and FAC).
	Montana State-listed noxious weeds do not exceed 10 percent absolute cover.	Y	Montana State-listed noxious weeds is estimated below 10 percent absolute cover within wetland areas.
Channel Restoration Success	Revegetation along the new Sand Creek channel corridor will be considered successful when banks are vegetated with a majority of deep-rooting riparian and wetland herbaceous and woody plant species.	Y	The majority of stream bank vegetation along the constructed Sand Creek channel corridor is dominated by vegetation communities with stability ratings greater than 6.
	The intent of the stream restoration is to allow for the stream to naturally migrate within the floodplain and to give it enough room to move and stabilize itself within the site.	Y	The stream has plenty of space within the floodplain for natural migration. The stream currently appears stable with no lateral adjustment observed following construction.
Stream Bank Vegetation	Considered successful when banks are vegetated with a majority of deep-rooting riparian plant species having root stability indexes ≥6 .	Y	The majority of stream bank vegetation along the constructed Sand Creek channel corridor is dominated by vegetation communities with stability ratings greater than 6.
Open Water	It is the intent of the project to provide seasonal open water during the spring and early summer within excavated depressions. As the growing season progresses and the groundwater levels recede, it is anticipated that vegetation will germinate within the majority of the depressions. Open water with submerged and/or floating vegetation will therefore be considered successful and creditable.	Y	Wetland Cells 2, 3, and 4 experience seasonal drawdown and rooted hydrophytic vegetation development has been observed, while Wetland Cells 1 and 5 appear to support perennial inundation and a developing aquatic macrophyte community.
Upland Buffer	Noxious weeds do not exceed 10 percent cover within upland buffer area.	N	Noxious weed cover is more than 10 percent within the upland buffer.
	Any area disturbed within creditable buffer zone must have at least 50 percent aerial cover of non-weed species by end of monitoring period.	Y	Disturbed areas have established greater than 50 percent cover by non-weed species.
Weed Control	Will be based upon annual monitoring of the site to determine weed species and degree of infestation within the site, and control measures based upon the monitoring results will be implemented by MDT to minimize and/or eliminate the intrusion of State Listed Noxious weed species within the site.	Y	State-listed noxious weed species across the site have been monitored and mapped during each post-construction monitoring event. MDT administers an on-going weed-control program.

Thirty-six infestations of Montana Listed Priority 2B noxious weeds were mapped at the Silicon Mountain mitigation site. Seven infestations of spotted knapweed, 14 infestations of Canadian thistle, 14 infestations of leafy spurge, and one infestation of butter-and-eggs (*Linaria vulgaris*) were identified in areas less than 1.0 acre in size with cover classes ranging from trace (less than 1 percent) to high (greater than 26 percent). The MDT has an ongoing weed control program for their mitigation sites that includes an annual assessment of weeds identified at each location and treatment to contain and control identified populations.

There are no diversions or nesting structures currently installed at the site. Fences installed around the site were in good condition at the time of the 2015 investigation. Wetland Cell #6 does not appear to be developing wetland characteristics. No wetland vegetation communities or supporting hydrology were noted in this area. The likely cause is lack of groundwater intercept from too shallow an excavation, but MDT may wish to investigate further.

The straw/coir erosion control blanket installed on the east side of the bridge embankment wasn't secured well and the soil beneath the blanket does not appear to be revegetating successfully. It is possible wind has stripped away any seeds applied to this area. Securing a new layer of fabric may be necessary to prevent soil erosion in this area.

To date, willow sprig survival is excellent, with approximately 95 percent of stems showing new root, stem, shoots and leaf growth. MDT may wish to consider trimming approximately 75 percent of the new growth, a practice recommended by NRCS to reduce leaf production and allow the plant to focus its energy primarily on producing roots during the next two growing seasons.

2.12 *US 93 North – Peterson (Missoula District, Year 7)*

The US 93 North mitigation sites were developed to mitigate wetland impacts associated with eight MDT segments of the US 93 Evaro to Polson highway reconstruction project along US Highway 93. A total of five mitigation sites were developed along this corridor. The 2015 monitoring effort documented the seventh year at Peterson. Bouchard, Mission Creek, Mud Creek, and Jocko Spring Creek were not monitored in 2014 or 2015. All five mitigation sites are located in Lake County in Watershed #3 (Lower Clark Fork) north of Arlee, Montana between Mileposts 20 and 50.

The 30 acre Peterson mitigation site is located south of Milepost 36 in Section 2 of Township 16 North and Range 20 West. The Peterson site consists of a riparian wetland corridor associated with an unnamed perennial tributary to Post Creek and is dominated by herbaceous vegetation. Site hydrology is provided by an unnamed perennial tributary to Post Creek. 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
- 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, Nebraska sedge (*Carex nebrascensis*), and Baltic rush (*Juncus balticus*) communities. Revegetation work at this site was completed in October 2006.

The wetland acreage delineated in 2015 totaled 3.2 acres, an increase of 0.11 acres since 2014. **Error! Reference source not found.** summarizes the 2015 estimated credits for the Peterson 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 for the USACE system and creation and secondary restoration for 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 45. 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 = (8.6 – 5.3) / 5.3; Enhancement factor = 0.62
Enhancement ratio = 1/ 0.62 = 1.61

The site has earned 2.73 USACE credit acres and 1.25 CSKT credit acres to date. These 2015 credit estimates have exceeded the USACE projected credit for the project (2.39 credit acres) but still fall somewhat short of the CSKT projected credit (1.31 credit acres) for the mitigation site.

Table 44. Credit summary for 2009 to 2011, 2013, 2014, and 2015 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)		2011 Wetland (acre)	2011 Credit (acre)	
	USACE	CSKT	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	3.00	3.00	0.89
Rehabilitation/ secondary restoration	0.25	0.67	3.57:1 (2009) 2.50:1 (2010) 2.33:1 (2011)	1.86:1	1.25	0.35	0.67	1.25	0.50	0.67	1.25	0.54	0.67
Total	**2.39**	**1.31**	**--**	**--**	**3.71**	**2.81**	**1.40**	**4.18**	**3.43**	**1.54**	**4.25**	**3.54**	**1.56**

Targeted Mitigation Type	Credit Ratio		2013 Wetland (acre)	2013 Credit (acre)		2014 Wetland (acre)	2014 Credit (acre)		2015 Wetland (acre)	2015 Credit (acre)	
	USACE	CSKT		USACE	CSKT		USACE	CSKT		USACE	CSKT
Creation	1:1	3.36:1	1.84	1.84	0.55	1.84	1.84	0.55	1.95	1.95	0.58
Rehabilitation/ secondary restoration	2.12:1*(2013) 1.61:1*(2014) 1.61:1(2015)	1.86:1	1.25	0.59	0.67	1.25	0.78	0.67	1.25	0.78	0.67
Total	**--**	**--**	**3.09**	**2.43**	**1.22**	**3.09**	**2.62**	**1.22**	**3.20**	**2.73**	**1.25**

*Corrected enhancement ratio.

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 2015 met the three-parameter criteria for hydrology, vegetation, and soils, satisfying the indicated measure of success for this site.

Results of the 2004 (baseline), 2008 to 2011 and 2013 to 2015 functional assessment are summarized in Table 45. The total aquatic habitat developed to date within the 25-acre project area is 3.2 acres.

Table 45. Summary of 2004 (Baseline), 2008 to 2011 and 2013 to 2015 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)	2015 (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)	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)	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)	High (0.9)
General Fish/Aquatic Habitat	Low (0.1)	NA	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)	High (0.8)
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)	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)	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)	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)	High (0.8)
Groundwater Discharge/Recharge	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)
Uniqueness	Low (0.2)	Low (0.3)	Low (0.3)	Mod (0.4)	Mod (0.4)	Mod (0.4)	Mod (0.6)	Mod (0.4)
Recreation/Education Potential	Low (0.1)	Mod (0.5)	Mod (0.5)	High (1.0)	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**	**8.6 / 11**
% of Possible Score Achieved	**44%**	**61%**	**61%**	**67%**	**69%**	**71%**	**78%**	**78%**
Overall Category	**III**	**III**	**III**	**II**	**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**	**3.20**
Total Functional Units (acreage x actual points) **(fu)**	**6.68**	**25.23**	**25.23**	**30.93**	**32.30**	**24.10**	**26.57**	**27.52**
Net Acreage Gain (ac)	NA	**2.45**	**2.45**	**2.92**	**2.99**	**1.83**	**1.83**	**1.94**
Net Functional Unit Gain	NA	**18.55**	**18.55**	**24.25**	**25.62**	**17.42**	**19.89**	**20.84**

The Peterson Property was evaluated as one assessment area (AA-1) that increased to 3.2 acres in 2015 from 3.09 acres in 2013 and 2014. The AA was rated as a Category II wetland in 2015 with 78 percent of the total possible points and 27.52 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 2014 to 2015 was 0.95 FU. The decrease in total functional units between 2011 and 2015 corresponds with the overall decrease of wetland acreage at the Peterson mitigation site, presumably the result of multiple log crib structure failures. The majority of the crib failures occurred at the western end of the property. Functional ratings were high for listed/proposed T&E species habitat, general wildlife habitat, flood attenuation, 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.

In 2015 the rating for structural diversity was decreased from high to moderate because the site no longer has aquatic bed habitat, it is comprised of emergent and scrub-shrub vegetation. This change caused slight decreases in the ratings for Production Export/Aquatic Food Chain Support and Uniqueness. The rating for Flood Attenuation was increased in 2015 from previous year's scores based on the density of the cattail community effectively functioning like woody vegetation in the way it slows down floodwaters. Despite these slight modifications, the overall functional points (8.6) were the same in 2015 as in 2014.

The location of a Priority 2A noxious weed, pale-yellow iris (*Iris pseudacorus*), and Priority 2B noxious weeds, Canadian thistle (*Cirsium arvense*), oxeye daisy (*Leucanthemum vulgare*), and gypsy-flower (houndstongue – *Cynoglossum officinale*), observed during 2015 field monitoring were mapped on aerial photographs. The twelve Canadian thistle infestations were generally less than 0.1 acre in size in 2015. The percent cover ranged from trace (less than 1 percent) to moderate (6 to 25 percent). Gypsy-flower, oxeye daisy, and pale-yellow iris were found at trace (less than 1 percent) to low (1 to 5 percent) cover classes, on less than 0.1 acre. Extensive weed control has been conducted on this site every year since 2009. Weed control has been conducted at this site in late July since 2013. The MDT will continue to complete weed control measures based on the annual monitoring results.

MDT was notified by the CSKT in early July that cows were in the site, and visited the site. MDT found that some fences had failed along the western boundary, and that there had been a major cattle intrusion (250 cow/calf pairs) into the site, which required MDT staff to chase the cattle out and to make temporary repairs to the western boundary fence. MDT has issued a contract to repair and install a new fence around three quarters of the site for this fall. It will replace fence and posts along the north, west and south boundaries of the site. It will not replace the fence along US 93 as that is a relatively new fence. The

contract for this fence repair will occur in November 2015. Evidence of grazing can be observed by comparing the height of the vegetation in 2014 to 2015 photos of the transect ends and photo points.

In 2015 an increase in inundation was observed in the vicinity of Transect 1, suggesting that flow through the crib structures in this area was being more restricted than in the previous two years. However, the flow through crib structure #1 at the western site boundary was not impeded. Based on a conversation with MDT personnel in 2015, at least four of the original log crib structures that were constructed to mimic beaver dams have been undermined and have failed in their ability to impede water flows and spread these flows as designed across the landscape. Previous adaptive management attempts to prevent the failures using coir bio-logs have met with limited success as the identified failed structures indicate. MDT has proposed to the USACE to make permanent fixes in the spring of 2016 via the construction of woven willow beaver analog dam structures to repair the failing portions of the existing crib structures, to prevent future undermining by water flows

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Appendix A

Summary Information for MDT Wetland Mitigation Sites

MDT Wetland Mitigation Monitoring
2015 Executive Summary

Site	Year Built	Major Montana Watershed Basin	Pre Project Wetland Acreage & MDT Category	Target Wetland Credit	2015 Wetland / Open Water Acreage and MDT Category	Upland Acrege, Ratio	Total Acreage Credit and Functional Unit as of 2015	SITE NOTES:
MISSOULA DISTRICT:								
McGinnis Meadows Libby	2009	1- Kootenai River	20.14 ac Category III	16.33 ac	26.4 ac Category I / II	2.20 ac 5:1	Creation - 8.6 ac Enhancement - 0.3 ac Rehabilitation - 11.07 ac Preservation - 0.08 ac Upplland Buffer - 0.44 ac 223.76 FU	2015 was the sixth monitoring event. Goals for the site included the restoration of 0.8 acres of riparian/stream habitat in McGinnis Creek, rehabilitation of 17.3 acres of degraded wetlands, creation of 2.9 acres of emergent wetlands, enhancement of 1.74 acres of emergent wetland, preservation of 0.3 acres of existing riparian communities along the abandonded McGinnis Creek corridor, and protection of 2.2 acres of upland buffer. See report for full credit breakdown. This site yielded 20.48 credit acres in 2015.
Schrieber Meadows South of Libby	Pilot - 2007 Full site - 2011	1- Kootenai River	13.22 ac Category Unknown	17.84 ac	39.11 ac Category I / I / I	8.5 ac 5:1	Creation - 22.4 ac Enhancement - 4.41 ac Restoration - 2.31 ac Upland Buffer - 2.48 ac 351.99 FU	2015 was the fourth monitoring event for the area of the pilot project, and the fifth monitoring event for the balance of the project which was completed in 2011. In addition to wetland credit acres, 35,551 stream credits are anticipated for this site. This site yielded 31.54 wetland credit acres and a total of 35,551 stream mitigation credits in 2015.
Schrieber Lake South of Libby	2014	1- Kootenai River	40.08 ac	14.19 ac	37.7 ac Category I	8.42 ac 5:1	Creation - 4.8 Restoration - 1.62 Enhancement - 1.59 Preservation - 6.42 Upland Buffer - 1.68 501.49 FU	2015 was the first monitoring event for the project area. Goals for the site included the creation of 3.06 acres, restoration of 2.53 acres, enhancement of 4.53 acres, and the preservation of 25.6 acres. This site yielded 16.09 wetland credit acres and a total of 5,059 acres of riparian credits and 13,071 stream restoration credits in 2015. Schrieber Lake is not included in the crediting scheme or totals.
US 93 North – Peterson North of St Ignatius	2006	3- Lower Clark Fork	1.26ac Category III 6.68 FU	USACE - 2.39 ac CSKT - 1.31 ac	3.2 ac Category II	NA	USACE - 2.73 ac CSKT - 1.25 ac 20.84 FU	2015 was the seventh monitoring event. Substantial decline in wetland area and credit acres were documented between 2011 and 2013. Failure of of log crib structures to impound water coupled with two years of drought were strong contributing factors. Credit is considered interim pending satisfaction of ultimate (end of monitoring period) performance standards. See report for full credit breakdown. This site yielded 1.25 CSKT credit acres and 2.73 USACE credit acres in 2015.
BUTTE DISTRICT:								
Easton Wilsall	2009	13- Upper Yellowstone	1.10 ac	27.41 ac	Create - 9.34 ac Category III Preserve - 1.10 ac Category II Restore - 1.56 ac Categorty III	11.5 ac 5:1	Preservation - 0.28 ac Re-establishment - 1.56 ac Creation - 9.34 ac Upland Buffer - 2.3 ac 68.33 FU	2015 was the sixth monitoring year. The project goal was to create 24.95 acres of palustrine, emergent and shrub/scrub wetlands, re-establish 1.56 acres of flood channel, preserve 1.10 acres of pre-existing wetland, and maintain 6.43 acres of upland buffer. This site yielded a total of 12.81 credit acres in 2015.
Silicon Mountain Silver Bow	2014	2 – Upper Clark Fork of the Columbia River	22.04 ac	11.45 ac	16.43 ac Category III	10.8 ac 5:1	Create - 6.2 ac Category III Preserve - 10.2 ac 28.53 FU	2015 was the first monitoring event for the project area. Anticipated wetland credit acreas included 6.77 acres of creation and 10.06 of preservation. Anticipated stream and riparian mitigation credits is 12,369.5. In 2015 the site yielded 10.91 wetland credit acres. and
Rostad Ranch Martinsdale	2012	10- Musselshell River	3.4 ac Category III	39.7 ac	14.90 ac Category III	6.76 ac 5:1	Creation - 3.18 ac Re-establishment - 9.91 ac Restoration - 1.04 ac Preservation - 0.06 ac Upland Buffer - 1.35 ac 85.7FU	2015 was the third monitoring year. The Rostad Ranch Mitigation Plan included the re-establishment of 27.11 acres, rehabilitation of 2.63 wetland acres, creation of 9.84 acres, preservation of 0.25 acres, and maintenance of a 6.76-acre upland buffer. This site yielded a total of 15.13 credit acres in 2015.

Site	Year Built	Major Montana Watershed Basin	Pre Project Wetland Acreage & MDT Category	Target Wetland Credit	2015 Wetland / Open Water Acreage and MDT Category	Upland Acreage, Ratio	Total Acreage Credit and Functional Unit as of 2015	SITE NOTES:
GLENDIVE DISTRICT:								
American Colloid Alzada	Constructed 2001 Repaired 2008	16- Little Missouri	0 ac	4.4 ac	0.61 ac emergent 2.97 open water Category II	11.42 ac 5:1	Created - 3.58 ac Upland Buffer - 2.28 ac Total - 5.86 ac 15.4 FU	The 2015 monitoring was the fifth annual monitoring event following repair of a dike breach that temporarily drained the site, and will be the final monitoring event for this site. The project goal was to mitigate for 4.4 acres of wetland impacts associated within the Alzada-West and Alzada-South projects in watershed 16. The site is primarily open water. Counting presumed open water and upland buffer, the site yielded 5.86 USACE credit acres in 2015.
Big Muddy Culbertson	2011	12- Lower Missouri	0.73 ac Category II/III	7.83 to 9.32 ac	<u>North Parcel</u> Preserve - 0.73 ac Category III Create - 7.39 ac Category II <u>South Parcel</u> Preserve - 1.83 ac Category III Create - 4.17 ac Category III	<u>North Parcel</u> 2.2.5 ac 5:1 <u>South Parcel</u> 1.25 ac 5:1	<u>North Parcel</u> Creation - 7.39 ac Preservation - 0.18 ac Upland Buffer - 0.5 ac 57.3FU <u>South Parcel</u> Creation - 4.17 ac Preservation - 0.46 ac Upland Buffer - 0.25 ac 36.05 FU Total - 12.95 ac	2015 was the fourth monitoring year. Wetlands developed at this site were to provide compensatory mitigation for impacts within the Glendive District including Brockton-East and Big Muddy-West. Total estimated credit acreage in 2015 was 8.07 credits for the North parcel and 4.88 credits for the South parcel, for a total of 12.95 credits site-wide. Credit estimates are pro-rated, scaled by estimated percent completion of performance standards.
Forsyth NW - East Forsyth	2012	14 - Middle Yellowstone	0 ac	1.07 ac	0.46 ac Category III	2.28 ac 5:1	Creation - 0.46 ac Upland Buffer - 0.46 ac	2015 was the third monitoring year. Together the four Forsyth NW project sites are intended to provide 8.98 acres to compensate for impacts from the Volborg – N & S and Forsyth – Northwest highway projects. The site yielded 0.92 credit acres in 2015.
Forsyth NW - Middle Forsyth	2012	14 - Middle Yellowstone	0 ac	0.34 ac	0.49 ac Category III	1.31 ac 5:1	Creation - 0.49 ac Upland Buffer - 0.26	2015 was the third monitoring year. Together the four Forsyth NW project sites are intended to provide 8.98 acres to compensate for impacts from the Volborg – N & S and Forsyth – Northwest highway projects. The site yielded 0.75 credit acres in 2015.
Forsyth NW - West Forsyth	2012	14 - Middle Yellowstone	1.29 ac	10.38 ac	6.01 ac Category III	7.7 ac 5:1	Creation - 4.72 ac Preservation - 0.32 ac Upland Buffer - 1.54 ac	2015 was the third monitoring year. Together the four Forsyth NW project sites are intended to provide 8.98 acres to compensate for impacts from the Volborg – N & S and Forsyth – Northwest highway projects. The site yielded 6.58 credit acres in 2015.
Forsyth NW - Treasure County Line Forsyth	1999	14 - Middle Yellowstone	0 ac	1.78 ac	1.67 ac Category III	4.22 ac 5:1	Creation - 1.67 ac Upland Buffer - 0.84 ac	2015 was the third monitoring year. Together the four Forsyth NW project sites are intended to provide 8.98 acres to compensate for impacts from the Volborg – N & S and Forsyth – Northwest highway projects. The site yielded 2.51 credit acres in 2015.
Redstone East and West Redstone	2012	12- Lower Missouri	0.69 ac	0.34 ac	0.96 ac Category II	0.30 ac 5:1	Creation - 0.14 ac Preservation - 0.17 ac Upland Buffer - 0.06 ac	2015 was the third monitoring year. The mitigation goal is to create and preserve 0.34 acres of new palustrine emergent/depressional wetland habitat in an existing upland area adjacent to Big Muddy Creek, developed to mitigate for impacts associated with the Redstone-E&W highway reconstruction project. The site yielded 0.37 credit acres in 2015.
BILLINGS DISTRICT:								
Kindsfater Wetland	2012	13- Upper Yellowstone	25.9 ac	32.7 ac As ultimately constructed	34.9 ac Category III	22.9 ac 5:1	Creation - 1.8 ac Re-establishment - 7.9 ac Rehabilitation - 0.6 ac Enhancement - 1.0 ac Preservation - 5.3ac Upland Buffer - 4.6 ac 162.59 FU	2015 was the third monitoring year. The project is intended to provide before-the-fact mitigation credits for proposed projects in Watershed 13. The site yielded 21.2 credit acres in 2015.