MONTANA DEPARTMENT OF TRANSPORTATION STATEWIDE WETLAND MITIGATION SITE MONITORING PROJECT

EXECUTIVE SUMMARY – 2016 MONITORING RESULTS



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TABLE OF CONTENTS

1.0 INTRODUCTION 1

2.0 INVIDUAL MITIGATION SITE DISCUSSIONS 4

2.1 AMERICAN COLLOID (GLENDIVE DISTRICT, SIXTH YEAR) 4

2.2 BIG MUDDY (GLENDIVE DISTRICT, YEAR 6) 7

2.3 EASTON RANCH (BUTTE DISTRICT, YEAR 7) 17

2.4 FORSYTH NORTHWEST (4 SITES) 27

2.4.1 FNW – East (Glendive District, Year 4) 27

2.4.2 FNW – Middle (Glendive District, Year 4) 29

2.4.3 FNW – Treasure County Line (Glendive District, Year 4) 31

2.4.4 FNW – West (Glendive District, Year 4) 32

2.5 JTX – TUNNICLIFF RANCH (BILLINGS DISTRICT, YEAR 1) 34

2.6 KINDSFATER WETLAND (BILLINGS DISTRICT, YEAR 3) 37

2.7 MCGINNIS MEADOWS (MISSOULA DISTRICT, YEAR 7) 42

2.8 REDSTONE EAST AND WEST (GLENDIVE DISTRICT, YEAR 4) 51

2.9 ROSTAD RANCH (BUTTE DISTRICT, YEAR 2) 56

2.10 SCHRIEBER LAKE (MISSOULA DISTRICT, YEAR 2) 62

2.11 SCHRIEBER MEADOWS (MISSOULA DISTRICT, YEAR 6) 72

2.12 SILICON MOUNTAIN (BUTTE DISTRICT, YEAR 2) 84

2.12.1 Wetland Mitigation Credits 84

2.12.2 Stream Mitigation Credit 86

2.13 US 93 NORTH – PETERSON (MISSOULA DISTRICT, YEAR 8) 91

3.0 REFERENCES 96

LIST OF TABLES

TABLE PAGE

1-1 Summary of Current Mitigation Wetland Site Monitoring Site Parameters 3

2-1 Credit Summary From 2012 Through 2016 for the American Colloid Site 5

2-2 Montana Wetland Assessment Method Summary for the American Colloid Site From 2011 Through 2016 6

2-3 Wetland Crediting and Performance Standard Summary for the Original Big Muddy Creek Site 9

2-4 Wetland Crediting and Performance Standard Summary for the Original Big Muddy Creek Site 11

2-5 Summary of Performance Standards for Big Muddy Credit Areas 13

2-6 Functions and Values of the Big Muddy Site From 2011 Through 2016 15

2-7 Credit Summary From 2010 Through 2016 for the Easton Ranch Site 19

2-8 Montana Wetland Assessment Method Summary for the Easton Ranch Site From 2010 Through 2016 20

2-9 Summary of Mitigation Goals for Easton Ranch Wetland Mitigation Site 24

LIST OF TABLES

TABLE PAGE

2-10 Summary of Performance Standards and Success Criteria for Easton Ranch Wetland Mitigation Site 25
2-11 Estimated Credit Summary for the FNW-East Wetland Mitigation Site 28
2-12 Montana Wetland Assessment Method Summary for the East Site From 2013 Through 2016 29
2-13 Credit Summary for the Middle Site 30
2-14 Montana Wetland Assessment Method Summary for the Middle Site From 2013 Through 2016 30
2-15 Credit Summary for the Treasure County Line Site 31
2-16 Montana Wetland Assessment Method Summary for the Treasure County Line Site From 2013 Through 2016 32
2-17 Credit Summary for the West Site 33
2-18 Montana Wetland Assessment Method Summary for the West Site From 2013 Through 2016 34
2-19 Wetland Mitigation Credits Estimated for the JTX – Tunnicliff Ranch Site in 2016 36
2-20 Wetland Mitigation Credits Estimated for the Kindsfater Site From 2013 Through 2016 38
2-21 Functions and Values of the Kindsfater Site From 2013 Through 2016 39
2-22 Summary of Performance Standards and Success Criteria Compared to Existing Site Conditions 41
2-23 Summary of Wetland Credits at the McGinnis Meadows Site From 2010 Through 2016 44
2-24 Functions and Values at the McGinnis Meadows Site From 2010 Through 2016 46
2-25 Summary of Performance Standards and Success Criteria Compared to Existing Site Conditions for the McGinnis Meadows Site 52
2-26 Summary of Wetland Credits From 2013 Through 2016 at the Redstone – East and West Site 55
2-27 Functions and Values of the Redstone – East and West Site From 2013 Through 2016 56
2-28 Summary of Wetland Credits at the Rostad Ranch Site From 2013 Through 2016 58
2-29 Functions and Values of the Rostad Ranch Site From 2004 and 2013 Through 2016 59
2-30 Summary of Performance Standards and Success Criteria 61
2-31 Summary of Wetland Credits at the Schrieber Lake Site in 2016 65
2-32 Anticipated Riparian and Stream Credits Generated From the Schrieber Lake Site 66
2-33 Functions and Values of the Schrieber Lake Site in 2016 67
2-34 Summary of Performance Standards and Success Criteria at the Schrieber Lake Site in 2016 68
2-35 Summary of Wetland Mitigation Credits at the Schrieber Meadows Mitigation Site in 2010 and 2012 Through 2016 74
2-36 Determination of Riparian Mitigation Credits for Schrieber Meadows 76
2-37 Determination of Stream Mitigation Credits for Schrieber Meadows 77
2-38 Functions and Values at the Schrieber Meadows Site From 2010 and From 2012 Through 2016 78

LIST OF TABLES

TABLE PAGE

2-39 Summary of Performance Standards and Success Criteria at Schrieber Meadows in 2016 82
2-40 Wetland Mitigation Credits Estimated for the Silicon Mountain Mitigation Site in 2015 and 2016 85
2-41 Summary of Anticipated Stream Mitigation Credits From the Silicon Mountain Mitigation Project 86
2-42 Functions and Values of the Silicon Mountain Site in 2015 and 2016 87
2-43 Summary of Performance Standards and Success Criteria at the Silicon Mountain Site in 2016 89
2-44 Credit Summary for the Peterson Site 92
2-45 Summary of 2004 (Baseline), 2008 Through 2011, and 2013 Through 2016 Wetland Function/Value Ratings and Functional Points at the Peterson Site 93

LIST OF APPENDICES

APPENDIX A. SUMMARY INFORMATION FOR MDT WETLAND MITIGATION SITES A-1

Cover: View looking west at a wetland sample point at the American Colloid site.

1.0 INTRODUCTION

This document summarizes the results of the 2016 monitoring efforts at 13 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 2016. The Forsyth Northwest project consisted of four sites. The following mitigation sites were monitored in 2016, and their locations are shown on Figure 1-1:

- American Colloid
- Big Muddy
- Easton Ranch
- Forsyth Northwest
- JTX – Tunnicliff
- 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 RESPEC wetlands personnel under contract to MDT during the months of June, July, and August 2016 in accordance with the US Army Corps of Engineers (USACE) wetland 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, stream cross-sectional survey, and nonengineering 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 of the MDT monitoring events performed before 2008, wetland delineation was conducted according to the 1987 *Corps of Engineers Weltands Delination Manual* (1987 Wetland Manual) [Environmental Laboratory, 1987]. In 2008, the USACE released regional supplements that modified the 1987 wetland delineation method for the Great Plains (GP) and Western Mountain Valleys and Coast (WMVC) regions of Montana. At that time, the USACE determined that the original 1987 Wetland Manual's methodology should continue to be used for 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 that were constructed during or after 2008. Sites that were evaluated using the WMVC supplement included Easton Ranch, McGinnis Meadows, Schrieber Lake, Schrieber Meadows, and Silicon Mountain. Sites that were evaluated with the GP version included American Colloid, Big Muddy, Forsyth Northwest (FNW), JTX – Tunnicliff, Kindsfater, Redstone East and West (Redstone E&W), and Rostad Ranch.

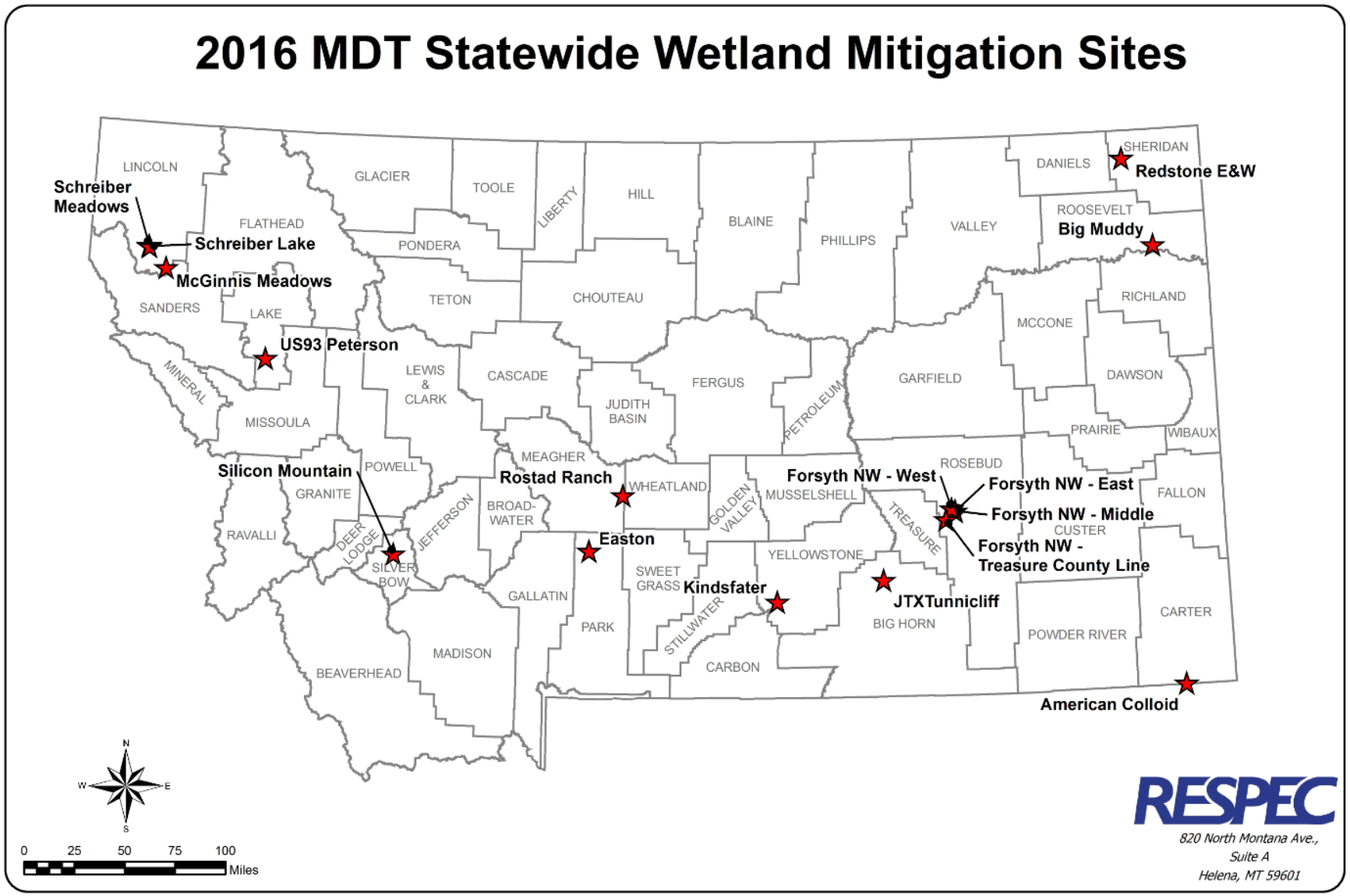


Figure 1-1. Location Map for All 13 Montana Department of Transportation Mitigation Sites Monitored in 2016.

Similarly, the methodology that is used to assess wetland function and values has evolved over time. From 2001 to 2007, wetland functional assessments were conducted at all of the monitoring sites using the 1999 MDT Montana Wetland Assessment Method (MWAM). In 2008, use of the 1999 method was discontinued for most projects because 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 US 93 Peterson. All other projects summarized here were evaluated for wetland function and values using the 2008 MDT MWAM method. Table 1-1 presents a summary of the monitoring methods used for each site, along with their total project area.

Table 1-1. Summary of Current Mitigation Wetland Site Monitoring Site Parameters

Project Site	Total Acres	USACE Delineation Method	MWAM Method
Missoula District			
US 93 North – Peterson	25.0	1987 (WMVC)	1999
McGinnis Meadows – Libby	32.7	WMVC	2008
Schrieber Meadows – Libby	59.6	WMVC	2008
Schrieber Lake - Libby	104.7	WMVC	2008
Butte District			
Easton – Wilsall	33.5	WMVC	2008
Rostad Ranch	67.0	GP	2008
Silicon Mountain - Silver Bow	50.1	WMVC	2008
Glendive District			
American Colloid – Alzada	6.4	GP	2008
Big Muddy – Culbertson	17.9	GP	2008
Redstone E&W	1.3	GP	2008
Forsyth NW – East	2.7	GP	2008
Forsyth NW – Middle	1.8	GP	2008
Forsyth NW – West	13.7	GP	2008
Forsyth NW-Treasure Co Line	5.9	GP	2008
Billings District			
JTX – Tunnicliff	50	GP	2008
Kindsfater Wetland	138	GP	2008

Monitoring summaries for all of the mitigation sites investigated in 2016 are presented in alphabetical order in Chapter 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 the following 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.

2.0 INVIDUAL MITIGATION SITE DISCUSSIONS

2.1 AMERICAN COLLOID (GLENDIVE DISTRICT, SIXTH 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 Watershed #16 – Little Missouri River Basin in the Glendive District.

The project elevation is approximately 3,518 feet above mean sea level. The site was mined for bentonite clay before the 1971 Open Cut Mining Act and is surrounded by topography that is typical of open-cut mining activities. A dike that is 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.

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 after the dike repair.

Below-average precipitation was recorded for the area from January to August in 2016. Approximately 3 acres of surface water ranged in depth from 0.0 to 2.7 feet. Hydrologic indicators that were observed during the investigation indicated that the water levels that were measured in June were less than the maximum elevation attained during spring runoff at the beginning of the growing season. The water surface was approximately 1.0 foot below the outlet elevation.

Table 2-1 presents the current credit summary for this site. A total of 3.58 acres of aquatic habitat, predominantly open water, was delineated in 2016. The calculation of estimated credit acres shown in Table 2-1 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 2016 totaled 5.86.

No formal goals or success criteria were required by the USACE for this project, which was constructed before the release of the 2008 USACE mitigation rule that requires such components. All MDT internal success criteria for the delineated wetlands and upland buffer have been achieved.

Table 2-1. Credit Summary From 2012 Through 2016 for the American Colloid Site

Compensatory Mitigation Type	USACE Mitigation Ratio	Proposed Acres	2012 Delineated Acres	2012 Credit Acres	2013 Delineated Acres	2013 Credit Acres	2014 Delineated Acres	2014 Credit Acres	2015 Delineated Acres	2015 Credit Acres	2016 Delineated Acres	2016 Credit Acres
Creation: Establishment (wetland)	1:1	5	1.23	1.23	0.38	0.38	0.71	0.71	0.61	0.61	0.61	0.61
Creation: Establishment (open water)	1:1		2.04	2.04	3.2	3.20	2.87	2.87	2.97	2.97	2.97	2.97
Preservation and Maintenance (upland buffer)	5:1	10 (2 credit acres)	11.73	2.35	11.42	2.28	11.42	2.28	11.42	2.28	11.42	2.28
Total		7	15.00	5.62	15.00	5.86	15.00	5.86	15.00	5.86	15.00	5.86

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 2-2 summarizes the function and value ratings of the AA from 2011 through 2016.

Table 2-2. Montana Wetland Assessment Method Summary for the American Colloid Site From 2011 Through 2016

Function and Value Parameters From the 2008 Montana Wetland Assessment Method	2011	2012	2013	2014	2015	2016
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	Low (0.1)	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)	High (0.9)
General Fish/Aquatic Habitat	N/A	N/A	N/A	N/A	N/A	N/A
Flood Attenuation	N/A	N/A	N/A	N/A	N/A	N/A
Short- and Long-Term Surface-Water Storage	High (1.0)	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)	Mod (0.7)
Sediment/Shoreline Stabilization	Low (0.3)	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)	High (0.9)
Groundwater Discharge/Recharge	Low (0.1)	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)	Mod (0.4)
Recreation/Education Potential (bonus points)	N/A	N/A	N/A	N/A	N/A	N/A
Actual Points/Possible Points	**3.5/9**	**3.9/9**	**3.8/9**	**3.8/9**	**4.3/9**	**4.4/9**
% of Possible Score Achieved	**39%**	**43%**	**42%**	**42%**	**48%**	**49%**
Overall Category	**III**	**III**	**III**	**III**	**II**	**II**
Total Acreage of Assessed Wetlands Within Site Boundaries	**3.27**	**3.27**	**3.58**	**3.58**	**3.58**	**3.58**
Functional Units (acreage × actual points)	**11.45**	**12.75**	**13.60**	**13.60**	**15.39**	**15.75**

The AA was rated as a Category II wetland with 49 percent of the total points possible in 2016. This AA achieved 15.75 functional units in 2016, which was an increase from 13.6 in 2014 and 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.

No nesting structures had been 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 2016 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. MDT administers an ongoing weed-control program that annually assesses the location and size of state-listed noxious weed infestations on each mitigation site and administers controls as necessary.

2.2 BIG MUDDY (GLENDIVE DISTRICT, YEAR 6)

The Big Muddy Creek Wetland Mitigation Project is located 4 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 Watershed #12 – the Lower Missouri River Basin. Wetlands that were developed at this location were intended to provide compensatory mitigation for wetland impacts associated with transportation improvement projects in the Glendive District, including Brockton-East and Big Muddy-West.

MDT initiated a feasibility study in August 2009 with the baseline delineation and Montana Wetland Assessment completed in 2010; approximately 0.73 acre of existing wetlands was found 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 US 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 US Highway 2 and included constructing 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 preexisting 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 the following:

- 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 US Highway 2
- Minimize site operation and maintenance requirements.

Table 2-3 provides a breakdown of the credit acreages (based on the 2016 delineation) listed for each category scaled according to the credit criteria listed in Table 2-4. Table 2-3 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 2-5 presents a summary of the site's progress in relation to the established performance standards. 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 2016 was 12.95 acres, which is an increase of 1.62 credit acres since 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 2016. 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 2016, which totaled 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 achieved 70 percent cover in 2016 with noxious weed cover observed at less than 5 percent. Preservation of 0.73 acre 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 5 percent.

Wetland creation within the southern parcel totaled 4.17 acres in 2016, the same as 2015. 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 credit. 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 5 percent noxious weed cover has been identified. Maintaining the upland buffer around the southern parcel generated an additional 0.25 credits in 2013 through 2016. Full credit at a 5:1 ratio was attained by meeting the success criteria for noxious weed cover below 5 percent within the upland buffer.

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

Table 2-3. Wetland Crediting and Performance Standard Summary for the Original Big Muddy Creek Site (Page 1 of 2)

	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
North Parcel	**Wetland Creation: Establishment (area between constructed cells in north parcel)**	1:1	0.44	70%	0.31	0.00	0%	0.00	1.76	70%	1.23
	Wetland Creation: Establishment (wetland cells in north parcel)	1:1	5.75	70%	4.03	5.76	70%	4.03	5.76	70%	4.03
	Wetland Preservation (north parcel)	4:1	0.73	100%	0.18	0.73	100%	0.18	0.73	100%	0.18
	Upland Buffer (north parcel)	5:1	3.70	100%	0.74	3.69	100%	0.74	2.37	100%	0.47
	North Subtotal		**10.62**	**–**	**5.26**	**10.18**		**4.95**	**10.62**		**5.92**
South Parcel	**Wetland Creation: Establishment (wetland cell in south parcel)**	1:1	–			4.55	70%	3.19	4.17	70%	2.92
	Wetland Preservation (south parcel)	4:1	–			1.83	100%	0.46	1.83	100%	0.46
	Upland Buffer (south parcel)	5:1	–			1.31	100%	0.26	1.25	100%	0.25
	South Subtotal					7.69		**3.90**	**7.25**		**3.63**
	Total		**10.62**		**5.26**	**17.87**		**8.86**	**17.87**		**9.55**

Table 2-3. Wetland Crediting and Performance Standard Summary for the Original Big Muddy Creek Site (Page 2 of 2)

	Compensatory Mitigation Type	2014 Delineated Acres	Scaled % Credit Standards	2014 Credit Acres	2015 Delineated Acres	Scaled % Credit Standards	2015 Credit Acres	2016 Delineated Acres	Scaled % Credit Standards	2016 Credit Acres
North Parcel	Wetland Creation: Establishment (area between constructed cells in north parcel)	1.76	100%	1.76	1.63	100%	1.63	1.63	100%	1.63
	Wetland Creation: Establishment (wetland cells in north parcel)	5.76	70%	4.03	5.76	100%	5.76	5.76	100%	5.76
	Wetland Preservation (north parcel)	0.73	100%	0.18	0.73	100%	0.18	0.73	100%	0.18
	Upland Buffer (north parcel)	2.37	100%	0.47	2.50	100%	0.50	2.50	100%	0.50
	North Subtotal	**10.62**		**6.45**	**10.62**		**8.07**	**10.62**		**8.07**
South Parcel	Wetland Creation: Establishment (wetland cell in south parcel)	4.17	100%	4.17	4.17	100%	4.17	4.17	100%	4.17
	Wetland Preservation (south parcel)	1.83	100%	0.46	1.83	100%	0.46	1.83	100%	0.46
	Upland Buffer (south parcel)	1.25	100%	0.25	1.25	100%	0.25	1.25	100%	0.25
	South Subtotal	**7.25**		**4.88**	**7.25**		**4.88**	**7.25**		**4.88**
	Total	**17.87**		**11.33**	**17.87**		**12.95**	**17.87**		**12.95**

Table 2-4. Wetland Crediting and Performance Standard Summary for the Original Big Muddy Creek Site (Page 1 of 2)

	Compensatory Mitigation Type	USACE Mitigation Credit Ratio[a]	Proposed Acres	Preliminary Credit Estimate (acres)	Performance Standard 1	Performance Standard 2	Performance Standard 3	Scaled % Credit Criteria[b]
North Parcel	**Creation: Establishment[c] (area between cells [1.76 acres] and passive creation in northern tip of site [1.03 acres])**	1:1	1.03–2.79	1.03–2.79	Satisfy 1987 Wetland Manual and 2010 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 north parcel)	1:1	6.53	6.53	Satisfy 1987 Wetland Manual and 2010 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 (north parcel)	4:1	0.73	0.18	Satisfy 1987 Wetland Manual and 2010 Regional Supplement Wetland Hydrology Wetland Soils Hydrophytic Vegetation Criteria	N/A	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 (north parcel)	5:1	0.43	0.09	N/A	N/A	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%

Table 2-4. Wetland Crediting and Performance Standard Summary for the Original Big Muddy Creek Site (Page 2 of 2)

	Compensatory Mitigation Type	USACE Mitigation Credit Ratio[a]	Proposed Acres	Preliminary Credit Estimate (acres)	Performance Standard 1	Performance Standard 2	Performance Standard 3	Scaled % Credit Criteria[b]
South Parcel	**Creation: Establishment (emergent marsh and open water in south parcel)[d]**	1:1	5.47	5.47	Satisfy 1987 Wetland Manual and 2010 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 (south parcel)[d]	4:1	1.83	0.46	Satisfy 1987 Wetland Manual and 2010 Regional Supplement Wetland Hydrology Wetland Soils Hydrophytic Vegetation Criteria	N/A	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 (south parcel)	5:1	NA	NA	N/A	N/A	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			**13.76–15.52 acres**				

(a) USACE, 2005.
(b) Percentages to be applied to credit estimate acres in Column 5.
(c) Incidentally created wetlands will be credited according to parameters listed under “Creation: Establishment.”
(d) Areas added in 2012 have been included in preliminary wetland crediting and performance standard summary approved by the USACE for the Big Muddy wetland mitigation project.

Table 2-5. Summary of Performance Standards for Big Muddy Credit Areas

	Compensatory Mitigation Type	Performance Standard 1	Performance Standard 2	Performance Standard 3	Discussion
North Parcel	**Creation: Establishment[a] (area between cells [1.76 acres] and passive creation in northern tip of site [1.03 acres])**	Satisfy 1987 Wetland Manual and 2010 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 north parcel)	Satisfy 1987 Wetland Manual and 2010 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 (north parcel)	Satisfy 1987 Wetland Manual and 2010 Regional Supplement Wetland Hydrology Wetland Soils Hydrophytic Vegetation Criteria	N/A	Noxious Weed Absolute Cover < 5%	Performance Standards 1 and 3 met. Full credit allocated.
	Upland Buffer (north parcel)	N/A	N/A	Noxious Weed Absolute Cover < 5%	Performance Standard 3 met. Full credit allocated.
South Parcel	***Creation: Establishment[b] (emergent marsh and open water in south parcel)**	Satisfy 1987 Wetland Manual and 2010 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 (south parcel)**	Satisfy 1987 Wetland Manual and 2010 Regional Supplement Wetland Hydrology Wetland Soils Hydrophytic Vegetation Criteria	N/A	Noxious Weed Absolute Cover < 5%	Performance Standards 1 and 3 met. Full credit allocated.
	Upland Buffer (south parcel)	N/A	N/A	Noxious Weed Absolute Cover < 5%	Performance Standard 3 met. Full credit allocated.

(a) Incidentally created wetlands will be credited according to parameters listed under "Creation: Establishment."
(b) Areas added in 2012 have been included in preliminary wetland crediting and performance standard summary approved by the USACE for the Big Muddy wetland mitigation project.

wetlands from 2011 through 2016, as shown in Table 2-6. Four AAs were assessed in 2016 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. This AA was rated as a Category II wetland with 72 percent of the total possible points in 2016, which is 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 because 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 2016, which is 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 acre since 2014.

The Preservation north parcel AA included 0.73 acre 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 2016. The total possible points and functional units achieved decreased within this AA in 2014 because of a reevaluation 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 2016 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 57.3 functional units in 2016.

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 2016, the same as 2015. 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 2016 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 2016. 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 2016.

Table 2-6. Functions and Values of the Big Muddy Site From 2011 Through 2016 (Page 1 of 2)

Function and Value Parameters From the 2008 Montana Wetland Assessment Method	2011 (Creation) AA-1	2011 (Preservation) AA-2	2012[a] (Creation) AA-1	2012[a] (Preservation) AA-2	2013 Creation North Parcel	2013 Preservation North Parcel	2013 Creation South Parcel	2013 Preservation South Parcel	2014 Creation North Parcel	2014 Preservation North 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)	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)	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)	High (0.9)	Mod (0.7)
General Fish/Aquatic Habitat	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
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)	Mod (0.5)	Mod (0.5)
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)	High (1.0)	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)	High (1.0)	High (1.0)
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)	High (1.0)	High (0.9)
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)	Mod (0.7)	Mod (0.4)
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)	High (1.0)	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)	Low (0.3)	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)	High (0.2)	High (0.2)
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**	**7.1/10**	**5.6/10**
% of Possible Score Achieved	**53.5%**	**65.5%**	**66.5%**	**70.5%**	**71.0%**	**66.0%**	**60.0%**	**58.0%**	**71.0%**	**56.0%**
Overall Category	**III**	**II**	**II**	**II**	**II**	**II**	**III**	**III**	**II**	**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**	**7.52**	**0.73**
Functional Units (acreage × actual points)	**33.12**	**4.78**	**68.56**	**18.05**	**53.39**	**4.82**	**25.02**	**10.61**	**53.39**	**4.09**

Table 2-6. Functions and Values of the Big Muddy Site From 2011 Through 2016 (Page 2 of 2)

Function and Value Parameters From the 2008 Montana Wetland Assessment Method	2014 Creation South Parcel	2014 Preservation South Parcel	2015 Creation North Parcel	2015 Preservation North Parcel	2015 Creation South Parcel	2015 Preservation South Parcel	2016 Creation North Parcel	2016 Preservation North Parcel	2016 Creation South Parcel	2016 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)	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)	Mod (0.5)	Mod (0.5)
General Wildlife Habitat	Mod (0.7)	Mod (0.7)	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	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Flood Attenuation	Mod (0.5)	Mod (0.4)	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 (0.9)	Low (0.3)	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 (0.9)	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 (0.9)	High (1.0)	High (1.0)	High (0.9)	High (0.9)	High (1.0)	High (0.9)	High (0.9)	High (0.9)	High (1.0)
Production Export/Food Chain Support	Mod (0.4)	Mod (0.7)	High (0.8)	Mod (0.4)	Mod (0.4)	Mod (0.7)	High (0.8)	Mod (0.4)	Mod (0.4)	Mod (0.7)
Groundwater Discharge/Recharge	Mod (0.7)	Mod (0.7)	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)	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)	High (0.2)	High (0.2)
Actual Points/Possible Points	**6.1/10**	**5.8/10**	**7.2/10**	**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	**61.0%**	**58.0%**	**72.0%**	**56.0%**	**61.0%**	**58.0%**	**72.0%**	**56.0%**	**61.0%**	**58.0%**
Overall Category	**III**	**III**	**II**	**III**	**III**	**III**	**II**	**III**	**III**	**III**
Total Acreage of Assessed Wetlands within Site Boundaries	**4.17**	**1.83**	**7.39**	**0.73**	**4.17**	**1.83**	**7.39**	**0.73**	**4.17**	**1.83**
Functional Units (acreage × actual points)	**25.44**	**10.61**	**53.21**	**4.09**	**25.44**	**10.61**	**53.21**	**4.09**	**25.44**	**10.61**

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

No diversion structures or nesting structures are currently installed at the site. Two infestations of Canadian thistle, which is 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, which is 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. 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.

2.3 EASTON RANCH (BUTTE DISTRICT, YEAR 7)

The MDT 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 3 miles east of US Highway 89 and 4 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 excavating 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:

- Reestablish 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
- Reestablish 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 palustrine 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 2-7 summarizes the current estimated wetland credits based on the USACE-approved credit ratios (MDT 2008) and the wetland delineation completed in June 2016. Proposed mitigation included creating 24.95 acres of emergent and shrub/scrub wetlands, reestablishing a 1.56-acre flood channel, preserving 1.10 acres of preexisting wetland, and maintaining 6.43 acres of upland buffer. Proposed wetland credits for the project site totaled 27.41 credit acres, which accounted for 0.67 acre of impacts associated with the construction of the mitigation wetland.

The 2016 delineation identified a total of 12.00 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 preexisting wetlands 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 2016, 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 2016, which is 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, 2015, and 2016, which limited 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, 2015, and 2016 field surveys were likely caused by a decrease in precipitation during those years. In 2016, irrigation water was released onto the eastern portion of the site twice during the spring and summer months. If water is not added to the site annually, the southern portion of the restored channel and the created wetland directly west of the channel will likely revert to non-wetland status, which could result in a loss of approximately 0.5 acre (0.5 estimated credit) of created and restored wetland area. Currently, a transition of hydrophytic vegetation to upland vegetation is occurring in several areas of the project area, which may result in the loss of even more wetland acres.

The 2008 MDT MWAM [Berglund and McEldowney, 2008] has been used to evaluate three AAs. The AAs were separated by Creation, Restoration, and Preservation areas of the mitigation site and are discussed below. Table 2-8 summarizes the function and value ratings of the AAs from 2010 through 2016.

The Creation AA encompassed 9.34 acres of constructed palustrine, emergent wetland cells and has generated 54.64 functional units. The overall rating for the Creation AA remained at a Category III wetland characterized by low disturbance in 2016. 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

Table 2-7. Credit Summary From 2010 Through 2016 for the Easton Ranch Site

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 Credit Estimated (Acres)	2012 Wetland Acreages	2012 Credit Estimated (Acres)	2013 Wetland Acreages	2013 Credit Estimated (Acres)	2014 Wetland Acreages	2014 Credit Estimated (Acres)	2015 Wetland Acreages	2015 Estimated Credit (Acres)	2016 Wetland Acreages	2016 Credit Estimated (Acres)
Creation of palustrine emergent wetland via shallow excavation	Creation	1:1	24.95	24.95	7.78	7.78	9.09	9.09	9.09	9.09	9.74	9.74	9.98	9.98	9.34	9.34	9.34	9.34
Reestablishment of relic flood channel	Restoration (Reestablishment)	1:1	1.56	1.56	1.45	1.45	1.45	1.45	1.45	1.45	1.56	1.56	1.56	1.56	1.56	1.56	1.56	1.56
Preservation of existing shrub/scrub and palustrine emergent wetland	Preservation	4:1	1.10	0.28	1.10	0.28	1.10	0.28	1.10	0.28	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	5:1	6.43	1.29	6.43[a]	1.29	6.43[a]	1.29	6.43[a]	1.29	6.43[a]	1.29	2.60[b]	0.52	11.5[b]	2.30	11.5	2.3
Project impacts			–0.67	–0.67	–0.67	–0.67	–0.67	–0.67	–0.67	–0.67	–0.67	–0.67	–0.67	–0.67	–0.67	–0.67	–0.67	–0.67
Total				**27.41**		**10.12**		**11.44**		**11.44**		**12.19**		**11.67**		**12.81**		**12.81**

(a) The upland buffer was expected to decrease as wetland areas expand within the mitigation boundary. The values presented in this table before 2014 (6.43 acres) represented the expected extent of upland buffer after maximum wetland acreage has been achieved.
(b) A 50-foot buffer was calculated with GIS in 2015.

excavated areas (community Type 13) transition to wetland habitat, provided sufficient wetland hydrology exists within the site. However, the current lack of hydrology on the area has caused a reduction of wetland acres and will not be sufficient to result in the expansion of wetland acreage.

Table 2-8. Montana Wetland Assessment Method Summary for the Easton Ranch Site From 2010 Through 2016 (Page 1 of 3)

Function and Value Parameters From the 2008 MDT Montana Wetland Assessment Method	2010 Creation	2011 Creation	2012 Creation	2013 Creation	2014 Creation	2015 Creation	2016 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)	Low (0.0)
MTNHP Species Habitat	Mod (0.6)	Mod (0.6)	Low (0.2)	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)	High (0.9)
General Fish/Aquatic Habitat	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Flood Attenuation	Mod (0.6)	Mod (0.5)	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)	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)	High (0.9)
Sediment/Shoreline Stabilization	Low (0.2)	Low (0.2)	Mod (0.6)	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)	High (0.8)
Groundwater Discharge/ Recharge	High (1.0)	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)	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)	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**	**5.85/10**
% of Possible Score Achieved	**52.5**	**57.5**	**57.5**	**57.5**	**56.5**	**56.5**	**58.5**
Overall Category	**III**	**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**	**9.34**
Functional Units (acreage × actual points)	**47.15**	**52.27**	**52.27**	**56.01**	**56.39**	**52.77**	**54.64**

Table 2-8. Montana Wetland Assessment Method Summary for the Easton Ranch Site From 2010 Through 2016 (Page 2 of 3)

Function and Value Parameters From the 2008 MDT Montana Wetland Assessment Method	2010 Restoration	2011 Restoration	2012 Restoration	2013 Restoration	2014 Restoration	2015 Restoration	2016 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)	Low (0.0)
MTNHP Species Habitat	Mod (0.6)	Mod (0.6)	Low (0.2)	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)	Mod (0.7)
General Fish/Aquatic Habitat	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Flood Attenuation	Mod (0.5)	Mod (0.6)	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)	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)	High (1.0)
Sediment/Shoreline Stabilization	Mod (0.6)	Mod (0.6)	Mod (0.6)	High (0.9)	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)	Mod (0.7)
Groundwater Discharge/Recharge	High (1.0)	Mod (0.7)	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)	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)	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**	**5.85/10**
% of Possible Score Achieved	**49.5**	**59.5**	**56.5**	**59.5**	**58.5**	**58.5**	**58.5**
Overall Category	**III**	**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**	**1.56**
Functional Units (acreage × actual points)	**7.18**	**8.63**	**8.19**	**9.28**	**9.13**	**9.13**	**9.13**

Table 2-8. Montana Wetland Assessment Method Summary for the Easton Ranch Site From 2010 Through 2016 (Page 3 of 3)

Function and Value Parameters From the 2008 MDT Montana Wetland Assessment Method	2010 Preservation	2011 Preservation	2012 Preservation	2013 Preservation	2014 Preservation	2015 Preservation	2016 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)	Low (0.0)
MTNHP Species Habitat	Mod (0.6)	Mod (0.6)	Low (0.2)	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)	High (0.9)
General Fish/Aquatic Habitat	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Flood Attenuation	Exc (1.0)	High (0.9)	Mod (0.6)	High (0.9)	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)	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)	High (1.0)
Sediment/Shoreline Stabilization	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Production Export/Food Chain Support	Mod (0.7)	Exc (1.0)	Exc (1.0)	Exc (1.0)	High (0.9)	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)	Mod (0.7)
Uniqueness	Mod (0.6)	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)	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**	**5.85/9**
% of Possible Score Achieved	**73.9**	**77.2**	**69.4**	**72.8**	**65.0**	**65.0**	**65.0**
Overall Category	**II**	**II**	**II**	**II**	**III**	**II**	**II**
Acreage of Assessed Aquatic Habitats Within Easement	**1.1**	**1.1**	**1.1**	**1.1**	**1.1**	**1.1**	**1.1**
Functional Units (acreage × actual points)	**7.32**	**7.65**	**6.88**	**7.21**	**6.44**	**6.44**	**6.44**

The Restoration AA consisted of 1.56 acres of reestablished 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 9.13 functional units in 2016.

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 reevaluated

in 2014 as supporting a seasonal/intermittent water regime, which was 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 6.44 functional units in 2016.

Table 2-9 summarizes the mitigation goals for the Easton Ranch. The Easton Ranch wetland mitigation site has shown continued progress toward achieving goals, although the targeted credit acreage has not been achieved in 2016 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, expanding 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 and store surface water during periods of high flow within the Shields River. These depressional wetlands have improved the water-storage capacity of the floodplain. Establishing hydrophytic vegetation communities; preserving existing scrub/shrub, forested, and emergent wetlands; and installing wildlife-friendly fencing around the site have improved wildlife habitat within the Easton Ranch site.

The summary of performance standards listed in Table 2-10 indicates that this site has not achieved the full suite of success criteria established in the mitigation plan for the Easton Ranch wetland mitigation site. All of the wetlands delineated within this site in 2016 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. Below-average precipitation in 2016 and the lack of water flow onto the site has decreased hydrology of the project area. Soils that were disturbed during construction have developed vegetation communities and are stable with no signs of active erosion. Areas that were 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 2016. 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 2-9. 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 have been created at this site to date. The beginnings of a dominance of hydrophytic trees and shrubs within created wetlands can be seen.
Reestablish a previously existing, relic floodplain channel and associated riparian and floodplain wetland areas that totals 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 that result in scour holes, riffles, and point bars. The fabric was exposed in minor areas, but bank erosion along this channel is minor 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.

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. Irrigation water was released onto the eastern portion of the site twice during the spring and summer of 2016. Water should 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 2016. Two of the bird boxes were occupied. All of the fences were intact. No maintenance was required for the man-made structures.

Twenty-eight infestations of Canadian thistle, which is 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 acre to between 0.1 and 1.0 acre. The cover classes ranged from a trace (< 1.0 percent) to moderate (6–25 percent) cover. Twelve infestations of gypsy-flower were observed on site, primarily in uplands. The size of the infestations was less than 0.1 acre with a trace (< 1.0 percent) to low (1–5 percent) cover. MDT has an ongoing weed-control program and contractors sprayed the site on July 1, 2016.

Table 2-10. Summary of Performance Standards and Success Criteria for Easton Ranch Wetland Mitigation Site (Page 1 of 2)

Performance Standards	Success Criteria	Criteria Achieved Y/N	Discussion
Wetland Characteristics	The three parameter criteria for hydrology, vegetation, and soils are met as outlined in the 1987 Wetland Manual and the 2010 Regional Supplement.	Y	Areas that were identified as wetland habitat within the mitigation site meet the three parameter criteria.
Wetland Hydrology	Soil saturation is present for at least 12.5 percent of the growing season.	Y	Areas that were identified as wetland habitat within the mitigation site exhibit soil saturation for a minimum 12.5 percent of the growing season.
	Groundwater wells will be left undisturbed within the site to monitor groundwater elevations during the growing season.	N	No groundwater wells remain on site. Because of 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.
	The constructed stream channel is stable.	Y	The constructed floodplain channel is stable with minimal bank erosion identified throughout the mitigation area.
Hydric Soil	Hydric soil conditions are 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	Wetlands are delineated as hydrophytic by using technical guidelines.	Y	Areas that were 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 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 the site shows signs of progression toward that goal at the end of the defined monitoring period.	Y	Approximately 13 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. The site appears to exhibit progress toward these 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	27.41 net credit acres are provided for the project area.	N	A total of 12.81 acres of wetland credit has been generated for the site. This total includes 9.34 acres of created wetland, 1.56 acres of restored wetland, 1.10 acres of preserved wetland, establishment of an 11.5-acre upland buffer, and 0.67-acre debit from project impacts.
	Emergent wetland habitat will be 70–75 percent of mitigation wetland.	N	Emergent wetland habitat comprises approximately 86 percent of total wetland areas delineated in 2016.

Table 2-10. Summary of Performance Standards and Success Criteria for Easton Ranch Wetland Mitigation Site (Page 2 of 2)

Performance Standards	Success Criteria	Criteria Achieved Y/N	Discussion
Wetland Acreage Development	Scrub/shrub wetland habitat will be 15–20 percent of wetland area.	N	Scrub/shrub wetland habitat comprises approximately 13 percent of total wetland areas delineated in 2016. The increase in woody plants is caused by the increased size/height and is more visible above the herbaceous vegetation.
	Open water will be less than 5 percent of wetland area.	Y	Aquatic macrophytes habitat composes approximately 1 percent of total wetland areas delineated in 2016, which is an 8.1 percent reduction compared to 2015 and was likely caused by lower stream flows and lower seasonal precipitation. These inundated areas (< 3 feet deep) seasonally fluctuate throughout the growing season and support diverse 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	Stability is achieved 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)	The area is visually inspected and photo-documented.	Y	The results of annual inspection and photographic documentation along the Shields River in the northwestern corner of the site are presented in the mitigation monitoring reports.
	Stability is 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 riprap installed along the bank are eroding near the northwest corner of 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 that was disturbed within the creditable buffer zone must have at least 50 percent aerial cover of nonweed species by the end of the monitoring period.	Y	Disturbed areas have established greater than 50 percent cover by nonweed species.
Weed Control	Less than 5 percent absolute cover of state-listed noxious weed species exists across the site.	Y	State-listed noxious weed species across the site is less than 5 percent absolute cover.
Fencing	Wildlife-friendly fencing is installed along the easement boundaries.	Y	Wildlife-friendly fencing has been removed from the western and southern portions of the easement boundaries in an effort to promote wildlife movement across the wetland and the Shield River riparian corridor. The remaining fences are in good condition.
Monitoring	Monitor the site for a minimum period of 5 years or longer as determined by the USACE.	Y	Comprehensive site monitoring has been ongoing for approximately 6 years, since construction activities were completed in 2009.

The east bank of the Shields River along the northwest corner of the Easton Ranch 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 floodwaters receded. The 2011 flood flows resulted in the formation of a wider base-flow channel caused by 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 (PP-4A), and several downed trees were removed from the cottonwood forest in the adjacent riparian zone. Removing 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 PP-4A. This erosion exposed the riprap that protected the reconstructed streambank, which undermined the riprap along an approximately 85-foot-long section that bank and also undermined the coir-wrapped soil lifts on that section, which caused significant loss of soil and willow cuttings. Photographs from PP-4A (found in the full report) document these changes.

Some reaccumulation of woody debris in the former log jam location was noted in 2014, but 2016 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 2016 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 4)

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 2016 totaled 0.43 acres, a decrease of 0.76 acres since 2014. This decrease was likely driven by the below-average precipitation received at the site during 2016. 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 2.31 acres within the FNW-East monitoring boundary. Applying standard wetland compensatory mitigation ratios (USACE, 2005), the site attained an estimated 0.89 credit acres, a decrease of 0.61 credit acre since 2014 (Table 2-11). There are no established performance standards for this site.

Table 2-11. 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	2016 Delineated Acres	2016 Estimated Credit Acres
Created Wetland	1:1	1.19	1.19	1.19	1.19	0.46	0.46	0.43	0.43
Upland Buffer	5:1	1.55	0.31	1.55	0.31	2.28	0.46	2.31	0.46
Total		**2.74**	**1.50**	**2.74**	**1.50**	**2.74**	**0.92**	**2.74**	**0.89**

Results of the 2013 through 2016 functional assessments are summarized in Table 2-12. The total aquatic habitat developed to date within the 2.74-acre project area is 0.43 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 through 2016. 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 2016 as a result of the decrease in water contained in the AA's wetlands subject to periodic flooding/ponding. The site achieved 1.9 functional units, a decrease of 3.2 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 2016.

Infestations of two Priority 2B noxious weeds, including field bindweed (*Convolvulus arvensis*) and salt-cedar (*Tamarix ramosissima*), were mapped in several 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.

Table 2-12. Montana Wetland Assessment Method Summary for the East Site From 2013 Through 2016

Function and Value Parameters From the 2008 Montana Wetland Assessment Method	2013	2014	2015	2016
Listed/Proposed T&E Species Habitat	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)
General Wildlife Habitat	Low (0.2)	Mod (0.4)	Mod (0.4)	Mod (0.4)
General Fish/Aquatic Habitat	N/A	N/A	N/A	N/A
Flood Attenuation	N/A	N/A	N/A	N/A
Short- and Long-Term Surface-Water Storage	Mod (0.6)	Mod (0.6)	Low (0.3)	Low (0.3)
Sediment/Nutrient/Toxicant Removal	Mod (0.7)	High (1.0)	High (1.0)	High (1.0)
Sediment/Shoreline Stabilization	Low (0.2)	Low (0.2)	Mod (0.6)	Mod (0.6)
Production Export/Food Chain Support	Low (0.2)	Low (0.3)	Low (0.3)	Low (0.3)
Groundwater Discharge/Recharge	Mod (0.7)	Mod (0.7)	Mod (0.7)	Mod (0.7)
Uniqueness	Low (0.1)	Low (0.2)	Low (0.2)	Low (0.2)
Recreation/Education Potential (bonus points)	N/A	N/A	N/A	N/A
Actual Points/Possible Points	**3.6/9**	**4.3/9**	**4.4/9**	**4.4/9**
% of Possible Score Achieved	**40.0%**	**47.8%**	**48.9%**	**48.9%**
Overall Category	**III**	**III**	**III**	**III**
Total Acreage of Assessed Wetlands Within Site Boundaries	**1.19**	**1.19**	**0.46**	**0.43**
Functional Units (acreage × actual points)	**4.3**	**5.1**	**2.0**	**1.9**

2.4.2 FNW – Middle (Glendive District, Year 4)

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:

- Excavate 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 2-13 shows the total delineated acres and credit acres estimated for the FNW-Middle site from 2013 through 2016. The 2016 wetland delineation identified 0.49 acre of created emergent wetlands and 1.31 acres of upland buffer, which were the same acreages identified in the 3 previous years. The site accrued 0.75 estimated credit acre in 2016. No performance standards were identified for this site. Four noxious weeds were identified within the mitigation site boundaries yet exhibited very low percent areal cover (1–5 percent). 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 2-13. Credit Summary for the Middle 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	2016 Delineated Acres	2016 Estimated Credit Acres
Created Wetland	1:1	0.49	0.49	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	1.31	0.26
Total		**1.80**	**0.75**	**1.80**	**0.75**	**1.80**	**0.75**	**1.80**	**0.75**

Results of the 2013 through 2016 functional assessments are summarized in Table 2-14. The FNW-Middle site was evaluated as one AA and encompassed 0.49 acre. The prominent factor that adversely impacted 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 state-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 6. Ratings for general wildlife habitat, general fish/aquatic habitat, sediment/nutrient/toxicant removal, and uniqueness increased from 2014 to 2016 because of less disturbance and higher wetland vegetation cover. This site achieved 42.2 percent of the possible score and 1.9 functional units in 2016. Continually developing the vegetation cover will result in increased functional units, although the small size of the AA will limit the total score.

Table 2-14. Montana Wetland Assessment Method Summary for the Middle Site From 2013 Through 2016

Function and Value Parameters From the 2008 Montana Wetland Assessment Method	2013	2014	2015	2016
Listed/Proposed T&E Species Habitat	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)
General Wildlife Habitat	Low (0.2)	Mod (0.4)	Mod (0.4)	Mod (0.4)
General Fish/Aquatic Habitat	N/A	N/A	N/A	N/A
Flood Attenuation	High (1.0)	N/A	N/A	N/A
Short- and Long-Term Surface-Water Storage	Mod (0.6)	Mod (0.6)	Mod (0.6)	Mod (0.6)
Sediment/Nutrient/Toxicant Removal	Mod (0.7)	Mod (0.7)	High (0.8)	High (0.8)
Sediment/Shoreline Stabilization	Low (0.2)	Low (0.2)	Mod (0.6)	Mod (0.6)
Production Export/Food Chain Support	Low (0.2)	Low (0.3)	Low (0.3)	Low (0.3)
Groundwater Discharge/Recharge	N/A	/N/A	N/A	N/A
Uniqueness	Low (0.1)	Low (0.2)	Low (0.2)	Low (0.2)
Recreation/Education Potential (bonus points)	N/A	N/A	N/A	N/A
Actual Points/Possible Points	**3.9/9**	**3.3/9**	**3.8/9**	**3.8/9**
% of Possible Score Achieved	**43.3%**	**36.7%**	**42.2%**	**42.2%**
Overall Category	**III**	**III**	**III**	**III**
Total Acreage of Assessed Wetlands Within Site Boundaries	**0.49**	**0.49**	**0.49**	**0.49**
Functional Units (acreage × actual points)	**1.9**	**1.6**	**1.9**	**1.9**

Infestations of four Priority 2B noxious weeds (field bindweed, Canadian thistle, leafy spurge, and salt-cedar) were identified at this site in 2016 and should be controlled to prevent further spread and colonization. The fence along the mitigation area was in good condition. No man-made water-control structures or bird boxes were installed at this site.

2.4.3 FNW – Treasure County Line (Glendive District, Year 4)

The Treasure County Line site is a 5.89-acre site owned by MDT and 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 subbasin and adjacent to an existing wetland complex along Reservation Creek. This site is intended to provide 1.78 acres of compensatory wetland mitigation. Proposed mitigation actions included the following:

- Excavate 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. Before 2013, this site had not been monitored for regulatory compliance.

The 5.89-acre FNW-Treasure County Line mitigation site includes 1.68 acres of created wetland and 4.21 acres of upland buffer. Applying standard wetland compensatory mitigation ratios [USACE, 2005], the site has attained an estimated 2.52 credit acres, which is 0.14 more credit acre than in 2014, as demonstrated in Table 2-15.

Table 2-15. Credit Summary for the Treasure County Line 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	2016 Delineated Acres	2016 Estimated Credit Acres
Created Wetland	1:1	1.50	1.50	1.50	1.50	1.67	1.67	1.68	1.68
Upland Buffer	5:1	4.39	0.88	4.39	0.88	4.22	0.84	4.21	0.84
Total		**5.89**	**2.38**	**5.89**	**2.38**	**5.89**	**2.51**	**5.89**	**2.52**

Results of the 2013 through 2016 functional assessments are summarized in Table 2-16. 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 AA that encompasses the entire constructed wetland. The AA was rated as a Category III wetland with 59.4 percent of the total possible points and 9.0 functional units. Ratings for general wildlife habitat, production export/food chain support, and uniqueness decreased in 2015 because of the change in disturbance rating from low to moderate. The AA was given a moderate disturbance rating because of the observed moderate grazing that had occurred earlier in the spring of 2016. The site received high ratings for short- and 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 2-16. Montana Wetland Assessment Method Summary for the Treasure County Line Site From 2013 Through 2016

Function and Value Parameters From the 2008 Montana Wetland Assessment Method	2013	2014	2015	2016
Listed/Proposed T&E Species Habitat	Low (0.0)	Low (0.0)	Low (0.0)	Low (0.0)
MTNHP Species Habitat	Mod (0.6)	Mod (0.6)	Mod (0.6)	Mod (0.6)
General Wildlife Habitat	Mod (0.7)	High (0.9)	Mod (0.7)	Mod (0.7)
General Fish/Aquatic Habitat	N/A	N/A	N/A	N/A
Flood Attenuation	N/A	Mod (0.4)	Mod (0.4)	Mod (0.4)
Short- and Long-Term Surface-Water Storage	High (0.8)	High (0.8)	High (0.8)	High (0.8)
Sediment/Nutrient/Toxicant Removal	High (1.0)	High (0.9)	High (0.9)	High (0.9)
Sediment/Shoreline Stabilization	N/A	N/A	N/A	N/A
Production Export/Food Chain Support	Mod (0.4)	Mod (0.7)	Mod (0.5)	Mod (0.5)
Groundwater Discharge/Recharge	High (1.0)	High (1.0)	High (1.0)	High (1.0)
Uniqueness	Low (0.3)	Mod (0.4)	Low (0.3)	Low (0.3)
Recreation/Education Potential (bonus points)	High (0.15)	High (0.15)	High (0.15)	High (0.15)
Actual Points/Possible Points	**4.95/8**	**5.85/8**	**5.35/9**	**5.35/9**
% of Possible Score Achieved	**61.9%**	**73.1%**	**59.4%**	**59.4%**
Overall Category	**III**	**II**	**III**	**III**
Total Acreage of Assessed Wetlands Within Site Boundaries	**1.50**	**1.50**	**1.67**	**1.68**
Functional Units (acreage × actual points)	**7.4**	**8.8**	**8.9**	**9.0**

Three infestations of Canadian thistle (*Cirsium arvense*), which is a Priority 2B noxious weed, were identified within this site in 2016. The size of infestations ranged from less than 0.1-acre to 1 acre with a cover class that ranged from low (1–5 percent) to moderate (6–25 percent). No woody vegetation or man-made water-control structures were installed at this site. The fence that surrounds the mitigation area was in good working order when inspected in 2016. Evidence of cattle grazing that occurred earlier in the year was observed during the 2016 field survey.

2.4.4 FNW – West (Glendive District, Year 4)

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 preexisting wetlands will be preserved at this site. Proposed mitigation actions included the following:

- Excavate 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 preexisting wetland habitat and 4.72 acres of recently created wetlands were delineated in 2016. Approximately 7.7 acres of upland habitat was mapped on the site in 2016. Table 2-17 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 2016 totaled 6.58.

Table 2-17. Credit Summary for the 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	2016 Delineated Acres	2016 Estimated Credit Acres
Preserved Wetland	4:1	1.29	0.32	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	4.72	4.72
Upland Buffer	5:1	8.27	1.65	7.86	1.57	7.70	1.54	7.70	1.54
Total		**13.71**	**6.13**	**13.71**	**6.45**	**13.71**	**6.58**	**13.71**	**6.58**

Results of the 2013 through 2016 functional assessments are summarized in Table 2-18. The FNW-West site was evaluated as one AA (AA-1) that encompassed 6.01 acres in 2016. The AA was rated as a Category II wetland in 2016 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 through 2015 because 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*) that was observed in 2013 and 2014 within the site. 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 in 2016, which is 6.5 more than in 2014 and reflected 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.

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

Table 2-18. Montana Wetland Assessment Method Summary for the West Site From 2013 Through 2016

Function and Value Parameters From the 2008 Montana Wetland Assessment Method	2013	2014	2015	2016
Listed/Proposed T&E Species Habitat	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)
General Wildlife Habitat	Mod (0.5)	Mod (0.7)	Exc (1)	Exc (1)
General Fish/Aquatic Habitat	N/A	N/A	Mod (0.4)	Mod (0.4)
Flood Attenuation	Mod (0.5)	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)	High (1.0)
Sediment/Nutrient/Toxicant Removal	Mod (0.4)	Mod (0.4)	Mod (0.6)	Mod (0.6)
Sediment/Shoreline Stabilization	Low (0.3)	Mod (0.7)	Mod (0.7)	Mod (0.7)
Production Export/Food Chain Support	Mod (0.6)	High (0.9)	High (0.9)	High (0.9)
Groundwater Discharge/Recharge	Mod (0.7)	High (1.0)	High (1.0)	High (1.0)
Uniqueness	Mod (0.4)	Mod (0.5)	Mod (0.6)	Mod (0.6)
Recreation/Education Potential (bonus points)	High (0.15)	High (0.15)	High (0.15)	High (0.15)
Actual Points/Possible Points	**5.45/10**	**6.75/10**	**7.65/11**	**7.65/11**
% of Possible Score Achieved	**54.5%**	**67.5%**	**69.6%**	**69.6%**
Overall Category	**III**	**III**	**II**	**II**
Total Acreage of Assessed Wetlands Within Site Boundaries	**5.44**	**5.85**	**6.01**	**6.01**
Functional Units (acreage × actual points)	**29.6**	**39.5**	**46.0**	**46.0**

The dike failure that occurred at the site during high flows in 2013 was repaired by MDT before 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 failed again during high spring flows, which eroded a channel down to the elevation of the original ephemeral thalweg. The dike was not repaired in 2015. MDT has been working with the USACE to facilitate a permanent engineered repair for the dike since 2015. Because of this coordination, MDT has received a NWP #3 permit from the USACE to conduct repairs in the fall/winter of 2016/2017. Fencing around the perimeter of the monitoring areas was in good condition.

No quantitative performance measures or success criteria were established for this wetland mitigation area. Monitoring requirements that were listed within the approved wetland mitigation plan are being satisfied. In general, the areas that were delineated as wetlands met the criteria for hydrophytic vegetation, hydric soil, and wetland hydrology. Noxious weed cover in 2016 was less than 10 percent site-wide.

2.5 JTX – TUNNICLIFF RANCH (BILLINGS DISTRICT, YEAR 1)

The JTX – Tunnicliff Ranch wetland mitigation project is located in Sections 10 and 15, Township 1 North, Range 33 East, Big Horn County, Montana. This privately owned property is located approximately 4.8 miles north of Hardin, Montana, and is adjacent to the western boundaries of the Montana Fish, Wildlife, and Parks (MFWP) Grant Marsh Wildlife Management Area (WMA) and Fishing Access Site (FAS) along the Bighorn River. The site is intended to provide 29.60 acres of compensatory wetland mitigation credits for wetland impacts associated with the proposed Hardin

North project and to serve as a mitigation bank for future transportation projects in Watershed #13 – Upper Yellowstone. The objectives of this project includes establishing (creating) emergent and scrub/shrub wetlands, riparian floodplain habitat, and a 100-foot wide upland buffer.

The JTX – Tunnicliff Ranch site is a 50-acre parcel of land within the larger JTX – Tunnicliff Ranch property. The landowner contacted MDT with an interest in possibly using a portion of his ranch to serve as a compensatory wetland mitigation site. MDT staff met with the landowner in the fall of 2011. MDT staff then conducted on-site field investigations in the spring of 2012 with the staff from the USACE Billings office to assess the potential for developing a wetland mitigation site on the ranch. This proposed mitigation area is approximately 50 acres in size, and topographically, the property was previously graded for agricultural production, and a series of irrigation and lateral ditches had been constructed across the site. Three irrigation supply ditches and as many as nine lateral distribution ditches formerly ran through the site before construction. The entire parcel is fenced and has access gates in the northeastern and southeastern corners of the site.

The intent of the project is to create and restore the site similar to a riparian floodplain wetland ecosystem that has relic river channel depressional wetlands and woody riparian buffer habitat found within the southern portions of the JTX – Tunnicliff Ranch site and at the Grant Marsh FAS/WMA within the Bighorn River valley. Specifically, the wetland project was designed to restore the riparian wetland habitat that had been converted to farmland; improve wildlife habitat diversity within the property; increase potential flood and stormwater retention within the Bighorn River floodplain; and increase the wetland/riparian floodplain habitats within the Bighorn River Watershed.

The project objectives as described in the *JTX-Tunnicliff Final Wetland Mitigation Plan, Watershed #14 – Middle Yellowstone River Basin, Big Horn County, Montana* [MDT, 2015] include creating the following:

- 26.85 acres of depressional emergent and scrub/shrub wetlands that will be seasonally inundated by groundwater and flood events from the adjacent Bighorn River. Thirteen small excavated depressions, which range in surface area from 0.33 to 1.50 acres, were designed to mimic relic river/flood channels that are found along many natural riverine systems. Average water depths within these excavated depressions is anticipated to be between 0.0 and 1.0 foot, with some small, deeper 1.0–2.0 foot pools. A variety of emergent hydrophytes is expected to establish in these depressions and along the seasonally inundated and saturated margins adjacent to the depressions.
- 2.73 acres of scrub/shrub wetland and riparian habitat is anticipated to develop around the drier perimeter of these excavated depressions that will be subject to seasonal high-water levels in the spring, because of late-summer irrigation, and during flood events along the Bighorn River. As part of the project, eight woody plant enclosures are planned for areas adjacent to the created wetlands cells in an effort to promote woody plant development within the site.

A total of 10.98 acres of upland buffer will be developed along the entire perimeter of the site; this area will also be planted with native herbaceous species commonly found within the riparian areas in the Bighorn River valley.

2016 was the first year of monitoring at the JTX – Tunnicliff site and objectives in year 1 are to establish baseline conditions across the site for comparison in future years. The JTX – Tunnicliff Ranch site did not develop any wetlands during the first growing season after construction, which concluded during the winter of 2016. Continued monitoring will document wetland development at the site, and wetland mitigation credits will be tracked accordingly. Table 2-19 summarizes the current estimated wetland credits based on the USACE-approved credit ratios [USACE, 2005] and the wetland delineation that was completed in July 2016.

Table 2-19. Wetland Mitigation Credits Estimated for the JTX – Tunnicliff Ranch Site in 2016

Compensatory Mitigation Type	Mitigation Area Description	Wetland Type[a]	Anticipated Mitigation Surface Area (acres)	USACE-Approved Mitigation Ratios	Anticipated Mitigation Credit (acres)	2016 Delineated Acres	2016 Mitigation Credit (acres)
Creation (Establishment)	Depressional wetlands	Palustrine emergent and palustrine scrub/shrub	26.85	1:1	26.9	0.0	0.0
Creation (Reestablishment)	Woody plant enclosures	N/A	2.73	5:1	0.6	2.3	0.5
Upland Buffer	100-foot wide upland perimeter	N/A	10.98	5:1	2.2	0.0	0.0
Totals			**40.6**		**29.6**	**2.3**	**0.5**

(a) Cowardin et al. [1979].

Site construction was completed in the winter of 2016. At the time of the July 2016 monitoring, no new wetland habitat or other waters of the US had developed at this site. The 2008 MDT MWAM [Berglund and McEldowney, 2008] will be used in future monitoring events to evaluate the mitigation site and wetland habitat that develops there. During the planning and design phase of this project, MDT completed an MWAM form to show the potential function and value of wetlands that will eventually develop at the site. Over time, project wetlands are expected to rate moderate or high for several functions and values, including general wildlife habitat, short- and long-term surface-water storage, flood attenuation, sediment/nutrient/toxicant removal, groundwater discharge/recharge, and production export/food chain support.

No man-made water-control structures were installed within the JTX – Tunnicliff Ranch site. The perimeter fence that was installed around the site was in good condition at the time of the 2016 investigation. Seven bluebird boxes were installed on the site, and all appeared to be in good condition.

A total of 14 infestations of state-listed Priority 2B noxious weeds were mapped at the JTX – Tunnicliff Ranch site. MDT has an ongoing weed-control program for their mitigation sites that includes an annual assessment of weeds that were identified at each location and treatment to contain and control identified populations. Weed treatment will begin in 2017, as none was conducted in 2016 in an effort to allow seeding and plantings to develop and mature without herbicide influences. This site will be incorporated into MDT's weed-control program for mitigation sites across the state.

2.6 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 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 USACE permit #NWO-2007-00824-MTB. The objectives of this project included creating, restoring, enhancing, and preserving wetland habitat within the historic Kindsfater gravel pit.

The Kindsfater site was previously a gravel mining operation; mining operations ceased in 1987. The excavations from mining exposed groundwater throughout the site. Eventually, the site evolved into a wetland complex that included 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 redelineated 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 involves creating, restoring, enhancing, and preserving wetlands within the western half of the site. The Alternative Option includes excavating and removing gravel materials and constructing new wetlands within the eastern half of the site. Credits to be developed because 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.

Table 2-20 summarizes the current estimated wetland credits based on the USACE-approved credit ratios (MDT 2008) and the wetland delineation completed in June 2016. Mitigation areas delineated at the Kindsfater site in 2016 include 2.0 acres of creation, 7.8 acres of reestablishment, 0.9 acre of rehabilitation, 3.4 acres of enhancement, 20.3 acres of wetland preservation, and 4.6 acres (22.6 acres within 50-foot buffer) of upland buffer. Applying the USACE-approved ratios to these values, a total of 21.1 acres of mitigation credit have been estimated in 2016, a value well below the targeted 32.7 acres anticipated at this site. Although 2016 represents only the fourth 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.

The 2008 MDT MWAM [Berglund and McEldowney, 2008] was used to evaluate two general AAs (Table 2-21). The AAs were generally separated by creation, and preexisting wetland areas are described below.

Table 2-20. Wetland Mitigation Credits Estimated for the Kindsfater Site From 2013 Through 2016

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)	2016 Delineated Acres[a]	2016 Mitigation Credit (acres)
Creation (Establishment)	Wetland Cells 7, 9, 13, and 14	Lacustrine emergent	4.6	1:1	4.6	1.8	1.8	1.8	1.8	1.8	1.8	2.0	2.0
Restoration (Reestablishment)	Wetland Cells 1–6 and parts of Cell 8	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	7.8	7.8
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	0.9	0.6
Enhancement	Wetland Cells 10–12 and parts of Cell 8	Palustrine emergent, scrub/shrub	3.1	3:1	1.0	3.0	1.0	3.0	1.0	3.0	1.0	3.4	1.1
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	20.3	5.1
Upland Buffer	50-foot-wide upland perimeter	N/A	7.3	5:1	1.5	22.9	1.46[b]		4.56[c]		4.6[c]		4.52[c]
Totals					**32.7[d]**	**58.4**	**18.2** 22.8	**57.7**	**21.1** 22.9	**57.8**	**21.2** 22.6	**57.0**	**21.1**

(a) The 2016 credit acres were derived from dgn provided by MDT (5034000ENDETZ01.DGN). A shapefile of the credit areas (MDT_Crediting_polys.shp) was created in and exported from Autodesk Civid 3D, then overlaid with the 2016 delineated wetland boundaries in ArcMap and calculated acreages.

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

(c) Value calculated using GIS.

(d) 11.1 acres of creation wetlands in the Alternative Bid Credits (gravel mining area) were not constructed as planned; the anticipated credits for this gravel mining area have been subtracted to indicate this reduction in credits.

60.1

Table 2-21. Functions and Values of the Kindsfater Site From 2013 Through 2016

Function and Value Parameters From the 2008 MDT Montana Wetland Assessment Method	2013 AA 1 (Existing Wetlands)	2014 AA 1 (Existing Wetlands)	2015 AA 1 (Existing Wetlands)	2016 AA 1 (Existing Wetlands)	2013 AA 2 (Created Wetlands)	2014 AA 2 (Created Wetlands)	2015 AA 2 (Created Wetlands)	2016 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)	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)	High (0.9)	High (0.9)
General Wildlife Habitat	Low (0.3)	Low (0.3)	Low (0.3)	Mod (0.5)	Low (0.3)	Low (0.3)	Low (0.3)	Mod (0.5)
General Fish/Aquatic Habitat	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Flood Attenuation	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Short- and Long-Term Surface-Water Storage	High (0.9)	High (0.9)	High (0.9)	High (0.9)	Mod (0.6)	Low (0.3)	Low (0.3)	Low (0.3)
Sediment/Nutrient/Toxicant Removal	High (0.9)	High (0.9)	High (0.9)	High (0.9)	Mod (0.5)	Mod (0.7)	High (1.0)	High (1.0)
Sediment/Shoreline Stabilization	N/'A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Production Export/Food Chain Support	Mod (0.6)	Mod (0.6)	Mod (0.6)	Mod (0.6)	Low (0.3)	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)	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)	Low (0.2)	Low (0.2)
Recreation/Education Potential	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	**4.7/8**	**4.7/8**	**4.7/8**	**4.9/8**	**3.7/8**	**3.6/8**	**3.9/8**	**4.1/8**
% of Possible Score Achieved	**59%**	**59%**	**59%**	**61%**	**46%**	**45%**	**49%**	**51%**
Overall Category	**III**	**III**	**III**	**III**	**III**	**III**	**III**	**III**
Total Acreage of Assessed Wetlands within Site Boundaries (acres)	**33.7**	**33.1**	**33.1**	**32.4**	**1.8**	**1.8**	**1.8**	**2.0**
Functional Units (acreage × actual points)	**158.44**	**155.57**	**155.57**	**158.76**	**6.55**	**6.37**	**7.02**	**8.2**

The Existing Wetland AA included 33.10 acres of preexisting 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 and scored 61 percent of the possible points and 158.76 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 2.0 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 51 percent of the possible score and 8.20 functional units. The score increased slightly between 2014 and 2016 because of modifications to the sediment/shoreline stabilization and wildlife habitat ratings. 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 2-22 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 2016 met the three criteria outlined in the 1987 Wetland 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 2016 monitoring event. These areas generally showed increased in overall vegetation cover and are anticipated to meet these criteria within 5 years post-construction. Approximately 9 percent of the planted woody vegetation survived through 2016. 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. 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 5 years as determined by the USACE Montana Regulatory Office's review of annual monitoring reports for the site and attainment of wetland success criteria.

No man-made water-control structures were installed within the Kindsfater site. The perimeter fence that was installed around the site was in good working order at the time of the 2016 investigation. Two bluebird boxes were installed on the site. The two trees that the bird boxes were mounted had fallen over before the 2016 survey, which rendered the boxes unusable. This site appears to be used by a high number of people for diverse recreational activities; some refuse is present and should be cleaned up to protect the integrity of the site.

Forty-one infestations of state-listed Priority 2B noxious weeds were mapped at the Kindsfater wetland mitigation site. Fifteen infestations of Canadian thistle (*Cirsium arvense*), ten areas of gypsy-flower (houndstongue, *Cynoglossum officinale*), four areas of spotted knapweed (*Centaurea stoebe*), four infestations of leafy spurge (*Euphorbia esula*), and five 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 before construction. In 2016, a total of 3.5 acres across the site were treated on July 13 for noxious weed infestations, including Canada thistle, leafy spurge, field bindweed, and houndstongue. 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 2-22. Summary of Performance Standards and Success Criteria Compared to Existing Site Conditions (Page 1 of 2)

Performance Standards	Success Criteria	Criteria Achieved Y/N	Discussion
Wetland Characteristics	The three parameter criteria for hydrology, vegetation, and soils are met as outlined in the 1987 Wetland Manual and 2010 Regional Supplement.	Y	Areas that were identified as wetland habitat within the mitigation site meet the three parameter criteria.
Wetland Hydrology	Soil saturation is present for at least 12.5 percent of the growing season.	Y	Areas that were 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 are 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. Preexisting hydric soil characteristics are present in several areas identified as wetland before 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	Wetlands are delineated as hydrophytic by using technical guidelines.	Y	Areas that were 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 many noxious weed infestations have been mapped across this site, the infestations are generally located outside of excavated/created wetlands. Overall, the estimated noxious weed cover across all of the delineated wetlands is greater than 5 percent.
	Hydrophytic vegetation success will include achieving a minimum overall vegetation cover of 80 percent in created wetland areas within 5 years after site construction.	N	The majority of created wetlands exhibited slightly less than 80 percent hydrophytic vegetation cover during the 2016 monitoring event. These areas are close to and approaching 80 percent and generally showed increased vegetation cover, with hydophytic vegetation cover anticipated to increase in subsequent monitoring years.
Woody Plants	Plantings exceed 50 percent survival after 5 years.	N	Approximately 9 percent of the woody plantings observed were alive in 2016, which does not meet the 50 percent survival criteria. However, several wetland cells exhibit at least 40 percent cover by volunteer woody species which are expected to continue expanding across the site. This cover value of volunteer woody species has been included in the success criteria determination for this performance criteria, almost meeting the 50 percent.
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 2016 monitoring event. These areas generally showed increased overall vegetation cover and are anticipated to meet these criteria within 5 years postconstruction.
Open-Water Areas	Open water that is established within the designated wetland cells will be considered successful and creditable.	N/A	Although inundation was observed during the 2016 monitoring event, no areas of open water were mapped within the Kindsfater site.

Table 2-22. Summary of Performance Standards and Success Criteria Compared to Existing Site Conditions (Page 2 of 2)

Performance Standards	Success Criteria	Criteria Achieved Y/N	Discussion
Upland Buffer	Noxious weeds do not exceed 5 percent cover within the buffer areas on site.	N	Many noxious weed infestations, including field bindweed, leafy spurge, houndstongue (gypsy-flower), Canada thistle, and spotted knapweed, have been mapped within the site. MDT will need to continue to implement weed-control measures to meet these criteria.
	Any disturbed area within the creditable buffer zone must have at least 50 percent aerial cover of nonweed species by the end of the monitoring period.	Y	Upland buffers surround wetland areas within the site exhibited greater than 50 percent aerial cover of nonweed species.
Weed Control	Less than 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 generally below 5 percent, state-listed noxious weed species across the entire site have been estimated at greater than 5 percent absolute cover in 2016.
Fencing	Wildlife-friendly fencing is installed along the easement boundaries.	Y	Wildlife-friendly fencing has been installed around the easement boundaries and is in good condition.

2.7 MCGINNIS MEADOWS (MISSOULA DISTRICT, YEAR 7)

The McGinnis Meadows wetland mitigation project is located in Section 33, Township 26 North, Range 28 West, Lincoln County, Montana. McGinnis Meadows is located approximately 7 miles south of the US Highway 2 corridor on two parcels that encompass 33 acres of a historic hay field and pasture. McGinnis Creek is a tributary to the Fisher River and bisects the parcels. This project lies within Watershed #1 – the Kootenai River Basin.

Wetlands that 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 US Department of Agriculture (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, as well as improve the overall wildlife, riparian, and wetland habitats impacted by past agricultural practices within the McGinnis Creek Watershed.

Goals that were established in 2009 for the McGinnis Meadows mitigation project included restoring approximately 0.8 acre of riparian/stream habitat on McGinnis Creek and 17.3 acres of degraded wetlands. Credit was to be awarded for creating 2.9 acres of emergent wetlands and enhancing 1.74 acres of existing emergent wetland and an intermittent drainage. Preserving 0.3 acre of existing riparian communities along the abandoned McGinnis Creek corridor and maintaining 2.2 acres of

upland buffer provided additional wetland credits. Table 2-23 details the project credit ratios approved by the USACE and the calculated credit acreages from 2010 through 2016. Total wetland mitigation credits that were calculated for the McGinnis Meadows site in 2016 were 20.48 credit acres, which is an increase of 0.9 credit acre 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 in 2016 based on a 1:1 creation-to-impact credit ratio.

Approximately 16.6 acres of wetland were delineated within the restoration (rehabilitation) AA in 2016. The restored area included the preexisting, 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 2016.

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 2016 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 2016 wetland delineation identified 0.90 acre within the Enhancement AA. This number is lower than previous years because of 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 overlying the delineated wetland map onto the georeferenced conceptual plan, a portion of the wetland that had been applied to the Enhancement credit scheme 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 2016, which is 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 that bisects the site. MDT seeks to obtain approximately 8,835 stream credits for restoring 2,850 linear feet of McGinnis Creek associated with the area below the ordinary high water mark (OHWM) of the channel. This acreage was excluded from the wetland credit totals. MDT and the USACE will calculate the stream credits separately after monitoring has been concluded.

Functional assessments were completed on four AAs from 2010 through 2016 using the 2008 MWAM (Table 2-24). The four AAs were divided into creation (excavated cells – 8.60 acres), restoration (reestablishment and rehabilitation – 16.60 acres), enhancement (existing emergent wetland – 0.90 acre), and preservation (existing riverine wetlands – 0.30 acre).

Table 2-23. Summary of Wetland Credits at the McGinnis Meadows Site From 2010 Through 2016 (Page 1 of 2)

Proposed Mitigation Activity	Compensatory Mitigation Type	USACE 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)
Creating 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
Restoring/ Reestablishing the McGinnis Creek channel and wetland fringe	Restoration (Reestablishment)	1:1	0.80	0.80	0.75[(a)]	0.75[(a)]	0.75[(a)]	0.75[(a)]	0.75[(a)]	0.75[(a)]	0.75[(a)]	0.75[(a)]
Rehabilitating 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
Enhancing 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
Preserving 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
Maintaining 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
Total				**16.33**	**21.01**	**12.34**	**22.84**	**15.78**	**27.32**	**18.77**	**27.58**	**18.94**

Table 2-23. Summary of Wetland Credits at the McGinnis Meadows Site From 2010 Through 2016 (Page 2 of 2)

Proposed Mitigation Activity	Compensatory Mitigation Type	USACE Mitigation Ratios	Proposed Acres	Final Credit Estimate (acres)	2014 Delineated Acreage	2014 Credit (acres)	2015 Delineated Acreage	2015 Credit (acres)	2016 Delineated Acreage	2016 Credit (acres)
Creating palustrine emergent depression wetlands through shallow excavation	Creation	1:1	2.90	2.90	6.42	6.42	8.60	8.60	8.60	8.60
Restoring/Reestablishing the McGinnis Creek channel and wetland fringe	Restoration (Reestablishment)	1:1	0.80	0.80	0.75[(a)]	0.75[(a)]	0.75[(a)]	0.75[(a)]	0.75[(a)]	0.75[(a)]
Rehabilitating existing impaired wet meadow wetlands	Restoration (Rehabilitation)	1.5:1	17.30	11.53	18.09	12.06	16.60	11.07	16.60	11.07
Enhancing existing emergent wetland upgradient of channel restoration	Enhancement	3:1	1.74	0.58	1.74	0.58	0.90	0.30	0.90	0.30
Preserving 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
Maintaining 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
Total				**16.33**	**28.75**	**19.58**	**28.60**	**20.48**	**28.60**	**20.48**

(a) Stream credit being sought for McGinnis Creek; acreage excluded from total.

Table 2-24. Functions and Values at the McGinnis Meadows Site From 2010 Through 2016 (Page 1 of 4)

Function and Value Parameters From the 2008 MDT Montana Wetland Assessment Method[a]	2010 Creation (excavated cells)	2011 Creation (excavated cells)	2012 Creation (excavated cells)	2013 Creation (excavated cells)	2014 Creation (excavated cells)	2015 Creation (excavated cells)	2016 Creation (excavated cells)
Listed/Proposed T&E Species Habitat	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)
General Wildlife Habitat	Low (0.3)	High (0.9)	Exc. (1.0)	Exc. (1.0)	Exc (1.0)	Exc (1.0)	Exc (1.0)
General Fish/Aquatic Habitat	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Flood Attenuation	Mod (0.6)	Mod (0.6)	Mod (0.6)	Mod (0.6)	Mod (0.6)	Mod (0.6)	Mod (0.6)
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)
Sediment/Nutrient/Toxicant Removal	Mod (0.7)	Mod (0.7)	Mod (0.7)	High (1.0)	High (1.0)	High (1.0)	High (1.0)
Sediment/Shoreline Stabilization	NA	Mod (0.7)	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 (0.8)
Groundwater Discharge/Recharge	Mod (0.7)	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)	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)	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**	**7.90/10**
% of Possible Score Achieved	**38.3**	**66.5**	**69.0**	**79.0**	**79.0**	**79.0**	**79.0**
Overall Category	**III**	**II**	**II**	**II**	**II**	**II**	**II**
Acreage of Assessed Aquatic Habitats Within Easement (acres)	**0.20**	**6.42**	**6.42**	**6.42**	**6.42**	**8.60**	**8.60**
Functional Units (acreage × actual points)	**0.69**	**42.69**	**44.30**	**50.72**	**50.72**	**67.94**	**67.94**

Table 2-24. Functions and Values at the McGinnis Meadows Site From 2010 Through 2016 (Page 2 of 4)

Function and Value Parameters From the 2008 MDT Montana Wetland Assessment Method[a]	2010 Restoration (reestablishment and rehabilitation–existing wet meadow)	2011 Restoration (reestablishment and rehabilitation–existing wet meadow)	2012 Restoration (reestablishment and rehabilitation–existing wet meadow)	2013 Restoration (reestablishment and rehabilitation–existing wet meadow)	2014 Restoration (reestablishment and rehabilitation–existing wet meadow)	2015 Restoration (reestablishment and rehabilitation–existing wet meadow)	2016 Restoration (reestablishment and rehabilitation–existing wet meadow)
Listed/Proposed T&E Species Habitat	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)
MTNHP Species Habitat	Mod (0.6)	Mod (0.6)	Mod (0.6)	Mod (0.7)	High (1.0)	High (1.0)	High (1.0)
General Wildlife Habitat	Mod (0.7)	High (0.9)	Exc. (1.0)	Exc. (1.0)	Exc. (1.0)	Exc. (1.0)	Exc. (1.0)
General Fish/Aquatic Habitat	Mod (0.7)	High (0.8)	High (0.8)	High (0.8)	Mod (0.7)	Mod (0.7)	Mod (0.7)
Flood Attenuation	Mod (0.5)	High (0.8)	Mod (0.5)	Mod (0.5)	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)	High (1.0)	High (1.0)	High (1.0)	High (1.0)
Sediment/Nutrient/ Toxicant Removal	High (0.9)	High (0.9)	High (0.9)	High (0.9)	High (0.9)	High (0.9)	High (0.9)
Sediment/Shoreline Stabilization	Low (0.3)	Mod (0.7)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)
Production Export/Food Chain Support	High (0.9)	Exc. (1.0)	Exc. (1.0)	Exc. (1.0)	Exc. (1.0)	Exc. (1.0)	Exc. (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)
Uniqueness	Low (0.3)	Mod (0.4)	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)	High (0.20)
Actual Points/Possible Points	**7.25/11**	**8.55/11**	**8.70/11**	**8.80/11**	**9.0/11**	**9.0/11**	**9.0/11**
% of Possible Score Achieved	**65.9**	**77.7**	**79.1**	**80.0**	**81.8**	**81.8**	**81.8**
Overall Category	**III**	**II**	**II**	**II**	**I**	**I**	**I**
Acreage of Assessed Aquatic Habitats Within Easement (acres)	**16.57**	**12.60**	**17.08**	**17.34**	**18.09**	**16.60**	**16.60**
Functional Units (acreage × actual points)	**120.13**	**107.73**	**148.60**	**152.59**	**162.81**	**149.40**	**149.40**

Table 2-24. Functions and Values at the McGinnis Meadows Site From 2010 Through 2016 (Page 3 of 4)

Function and Value Parameters From the 2008 MDT Montana Wetland Assessment Method[a]	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)	2016 Enhancement (existing emergent wetland)
Listed/Proposed T&E Species Habitat	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)
General Wildlife Habitat	Mod (0.5)	Mod (0.5)	High (0.9)	High (0.9)	High (0.9)	High (0.9)	High (0.9)
General Fish/Aquatic Habitat	N/A	N/A	N/A	N/A	Mod (0.7)	N/A	N/A
Flood Attenuation	Mod (0.6)	Mod (0.6)	Mod (0.6)	Mod (0.6)	Mod (0.6)	Mod (0.6)	Mod (0.6)
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)	Low (0.1)
Sediment/Nutrient/Toxicant Removal	High (1.0)	High (0.8)	High (0.8)	High (0.8)	High (0.8)	High (0.8)	High (0.8)
Sediment/Shoreline Stabilization	N/A	N/A	N/A	N/A	N/A	N/A	N/A
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)
Groundwater Discharge/Recharge	Mod (0.7)	N/A	N/A	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)	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)	High (0.20)
Actual Points/Possible Points	**4.25/9**	**3.25/8**	**4.0/8**	**4.5/9**	**5.2/9**	**4.5/9**	**4.5/9**
% of Possible Score Achieved	**47.2**	**40.6**	**50.0**	**50.0**	**57.8**	**54.0**	**54.0**
Overall Category	**III**	**III**	**III**	**III**	**II**	**II**	**II**
Acreage of Assessed Aquatic Habitats Within Easement (acres)	**1.74**	**1.32**	**1.32**	**1.32**	**1.74**	**0.90**	**0.90**
Functional Units (acreage × actual points)	**7.40**	**4.29**	**5.28**	**5.94**	**9.05**	**4.05**	**4.05**

Table 2-24. Functions and Values at the McGinnis Meadows Site From 2010 Through 2016 (Page 4 of 4)

Function and Value Parameters From the 2008 MDT Montana Wetland Assessment Method[a]	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)	2016 Preservation (Existing riverine wetlands)
Listed/Proposed T&E Species Habitat	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)
General Wildlife Habitat	Mod (0.7)	High (0.9)	Exc. (1.0)	Exc. (1.0)	Exc. (1.0)	Exc. (1.0)	Exc. (1.0)
General Fish/Aquatic Habitat	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Flood Attenuation	High (0.9)	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	Mod (0.4)	High (0.8)	High (0.8)	High (0.8)	High (0.8)	High (0.8)	High (0.8)
Sediment/Nutrient/Toxicant Removal	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)
Sediment/Shoreline Stabilization	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	Mod (0.5)	Mod (0.7)	Mod (0.7)	Mod (0.7)	Mod (0.7)	Mod (0.7)	Mod (0.7)
Groundwater Discharge/Recharge	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)
Uniqueness	Low (0.3)	Mod (0.4)	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 (0.2)	High (0.2)	High (0.2)	High (0.2)	High (0.2)
Actual Points/Possible Points	**6.25/10**	**7.25/10**	**7.50/10**	**7.9/10**	**7.9/10**	**7.9/10**	**7.9/10**
% of Possible Score Achieved	**62.5**	**72.5**	**75**	**79**	**79**	**79**	**79**
Overall Category	**III**	**II**		**II**		**II**	
Acreage of Assessed Aquatic Habitats Within Easement (acres)	**0.30**	**0.30**	**0.30**	**0.30**	**0.30**	**0.30**	**0.30**
Functional Units (acreage × actual points)	**1.88**	**2.18 II**	**2.25**	**2.37 II**	**2.37**	**2.37 II**	**2.37**

(a) Berglund and McEldowney 2008 MDT MWAM.

The original on-site 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 2016 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 from 2013 through 2016, which is an increase from 69.0 percent in 2012. This AA achieved a total of 67.94 functional units in 2016. 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 2016. The restoration/rehabilitation of the existing wet meadow received 81.8 percent of the total possible points and attained 149.4 functional units, which is 13.4 fewer than in 2014. The decrease in functional units occurred primarily to the correction of the acreage considered restoration in 2016. A portion of the acreage previously reported as restoration has been included in 2016 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 2016, which is an increase of 4.4 percent since 2011. Many of the woody plants that had been installed in this area to enhance structural diversity did not survive. This AA attained 4.05 functional units in 2016. The wetland area that was considered as enhancement credit acres was corrected using GIS in 2016. Additionally, the score for general fish habitat was corrected to Not Applicable because of 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 acre in size. The wetland fringe along the former channel of McGinnis Creek currently encompasses 0.51 acre because of increased water levels once the former channel of McGinnis Creek was plugged in 2010. The additional 0.21 acre 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 acre that abuts 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 2016. 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 2-25 provides a summary of the site's performance against approved success criteria. All wetlands delineated within the site in 2016 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 2016. The success criteria that stipulates 70 percent cover of wetland plants was met site-wide in 2012 and has continued to increase into 2016. 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 5 percent, which satisfies the performance standard. MDT continues to monitor and control noxious weeds within this mitigation site. The woody plants that were installed in 2011 exhibited high mortality immediately after 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 2016. Supplemental plantings of shrubs/trees should be considered at this site to meet this criterion. The McGinnis Creek restoration success criterion that pertains 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 on site in fall 2012 and were used by tree swallows in 2016. The mitigation site design relied on excavating 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 that surrounds the perimeter of the site was intact in 2016. MDT spent 3 days in 2016 repairing damaged fence sections around the perimeter of the site.

2.8 REDSTONE EAST AND WEST (GLENDIVE DISTRICT, YEAR 4)

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 E&W 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.

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 acre of new palustrine emergent/depressional wetland habitat in an existing upland area adjacent to Big Muddy Creek. Aside from creating 0.34 wetland acre, this on-site, 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 that this aquatic resource is properly established and protected.

Table 2-25. Summary of Performance Standards and Success Criteria Compared to Existing Site Conditions for the McGinnis Meadows Site (Page 1 of 2)

Performance Standards	Success Criteria	Criteria Achieved Y/N	Discussion
Wetland Characteristics	All of the 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 Manual and 2010 Regional Supplement.	Y	Areas that were identified as wetland habitat within the mitigation site meet the three parameter criteria.
Wetland Hydrology	Soil saturation is present for at least 12.5 percent of the growing season.	Y	Areas that were 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 are 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 the disturbed soils is near 100 percent.
Hydrophytic Vegetation	Success is achieved where aerial cover of facultative or wetter species is greater than or equal to 70 percent.	Y	Areas that were 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 2–3 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 area will be considered creditable under this plan.	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.

Table 2-25. Summary of Performance Standards and Success Criteria Compared to Existing Site Conditions for the McGinnis Meadows Site (Page 2 of 2)

Performance Standards	Success Criteria	Criteria Achieved Y/N	Discussion
McGinnis Creek Channel	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 (approximately 100 percent) by non-weed species.
Weed Control	Success will be based on annual monitoring of the site to determine weed species and degree of infestation within the site. Control measures, based on 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	Wildlife-friendly fencing will be installed along the easement boundaries.	Y	Wildlife-friendly fencing has been installed around the easement boundaries. A tree has fallen on the western fence near PP6, and repairs are needed.

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 acre of new, created wetland area.

Table 2-26 summarizes the calculated credit acreages based on the results of the 2016 mitigation monitoring efforts. The wetland acreage at the Redstone E&W site totaled 0.96 acre, including approximately 0.69 acre of preexisting wetlands and 0.27 acre 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), 0.37 credit acre has been estimated for the Redstone site in 2016. 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 that exhibited 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 site was evaluated as a single AA. The MWAM results are presented in Table 2-27.

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 2016. The percent possible score increased from 2013 to 2016 because 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, which boosted the MTNHP rating from low (0.1) to high (1.0) and improved 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.

No man-made diversion structures were installed at the site. Two bluebird boxes were installed at the site, but only one was observed and in use during the 2016 visit. One bluebird box should be reinstalled at Photo Point 3. Two infestations of Canadian thistle (*Cirsium arvense*), which is a Priority 2B noxious weed, were observed along the south edge of the site. The largest infestation covered between 0.1 acre and 1 acre with a moderate cover class of 6–25 percent, while the smaller infestation was less than 0.1 acre with less than 0.1 percent cover. Less than 0.1 acre of field bindweed (*Convolvulus arvensis*) with 1–5 percent cover was observed in 2016. The infestation was located at the southeast boundary of the mitigation site. MDT will use the annual monitoring results to determine appropriate weed-control efforts. The fence that was installed around the perimeter of the site was in good working order when inspected during the 2016 field survey.

Table 2-26. Summary of Wetland Credits From 2013 Through 2016 at the Redstone – East and West Site

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	2016 Delineated Acres	2016 Credit Acres
Creation (Establishment)	2:1	0.34	0.27	0.14	0.27	0.14	0.27	0.14	0.27	0.14
Preservation (Protection)	4:1	(a)	0.69	0.17	0.69	0.17	0.69	0.17	0.69	0.17
Upland Buffer	5:1	(a)	0.30	0.06	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**	**1.26**	**0.37**

(a) The approved mitigation plan does not include acreage for these mitigation types.

Table 2-27. Functions and Values of the Redstone – East and West Site From 2013 Through 2016

Function and Value Parameters From the 2008 Montana Wetland Assessment Method	2013 AA Created & Existing	2014 AA Created & Existing	2015 AA Created & Existing	2016 AA Created & Existing
Listed/Proposed T&E Species Habitat	Low (0.0)	Low (0.0)	Low (0.0)	Low (0.0)
MTNHP Species Habitat	Low (0.1)	High (1.0)	High (1.0)	High (1.0)
General Wildlife Habitat	Mod (0.5)	Mod (0.7)	High (0.9)	High (0.9)
General Fish/Aquatic Habitat	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)
Flood Attenuation	Mod (0.6)	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)	High (0.8)
Sediment/Nutrient/Toxicant Removal	Mod (0.7)	Mod (0.7)	Mod (0.7)	Mod (0.7)
Sediment/Shoreline Stabilization	High (1.0)	High (1.0)	High (1.0)	High (1.0)
Production Export/Food Chain Support	Mod (0.6)	Mod (0.4)	Mod (0.4)	Mod (0.4)
Groundwater Discharge/Recharge	High (1.0)	High (1.0)	High (1.0)	High (1.0)
Uniqueness	Low (0.2)	Low (0.3)	Low (0.4)	Low (0.4)
Recreation/Education Potential (bonus points)	N/A	N/A	N/A	N/A
Actual Points/Possible Points	**5.8/11**	**6.8/11**	**7.1/11**	**7.1/11**
% of Possible Score Achieved	**52.7%**	**61.8%**	**64.6%**	**64.6%**
Overall Category	**III**	**II**	**II**	**II**
Total Acreage of Assessed Wetlands Within Site Boundaries	**0.96**	**0.96**	**0.96**	**0.96**
Functional Units (acreage × actual points)	**5.57**	**6.53**	**6.82**	**6.82**

2.9 ROSTAD RANCH (BUTTE DISTRICT, YEAR 2)

The Rostad Ranch wetland mitigation project is located in the southwestern quarter of Section 12, Township 8 North, Range 11 East, Meagher County, Montana. The property is located approximately 0.6 mile 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 historically been used for grazing cattle and hay production. Long-term protection of the wetland mitigation site is provided by a MDT Wetland Conservation Easement with the landowner 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 Rostad Ranch site was selected based on site evaluations and project feasibility assessments initiated by MDT in 2002.
The project objectives include the following:

- 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
  - Palustrine, emergent, wet meadow
  - Palustrine, scrub/shrub

- Lacustrine, littoral – emergent zones around the open-water areas around the perimeter of wetlands

The Lennep 6 WSW (244954) weather station [Western Regional Climate Center, 2016] is located near the site (approximately 11 miles southwest) and has a period of record that extends from August 1959 through August 2016. Based on data recorded from the Lennep Station from January through August, precipitation totals for this region were 12.50 inches (long-term average), 16.32 inches (2011), 9.42 inches (2012), 12.3 inches (2013), 14.27 inches (2014), 11.77 inches (2015), and 10.81 inches (2016). The data that were collected after construction indicate below-average precipitation in 2012, 2015, and 2016; 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 that emerges 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 southern end of the site to direct irrigation water to the mitigation site. 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 2016 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 2.0 feet and averaged 0.5 foot. Vegetation around the perimeter of the open boundary increased since the 2014 monitoring event. Areas that were not inundated exhibited seasonal soil saturation to the ground surface.

Table 2-28 summarizes the estimated wetland credits based on the USACE-approved credit ratios and the wetland delineation completed in June 2016. Proposed mitigation credits from the 2007 Rostad Ranch Mitigation Plan included reestablishing 27.11 wetland acres, rehabilitating 2.63 wetland acres, creating 9.84 wetland acres, preserving 0.25 wetland acre, and maintaining 6.76 acres of upland buffer. The wetland acreages that were delineated in 2016 included 9.96 acres of reestablished wetlands, 1.56 acres of rehabilitated wetland, 3.18 acres of created wetland, and 0.25 acre of preservation wetland (community Type 3). The total mitigation credit estimated in 2016, including the upland buffer credit and the deduction for the 0.41-acre wetland impact that was incurred during mitigation construction, totaled 15.19 credit acres.

The 1999 MDT MWAM [Berglund, 1999] was used to evaluate the three existing wetlands that were identified within the site in 2004. The 2008 MWAM [Berglund and McEldowney, 2008] has been used to evaluate the site from 2013 through 2016. All of the wetlands identified from 2013 through 2016 were evaluated as one AA. The results of the 2004 and 2013 through 2016 assessments are summarized in Table 2-29.

Table 2-28. Summary of Wetland Credits at the Rostad Ranch Site From 2013 Through 2016

Compensatory Mitigation Type	Wetland Type[a]	Approved Mitigation Ratio[b]	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 Areas (acres)	2015 Delineated Mitigation Areas (acres)	2015 Estimated Mitigation Credit (acres)	2016 Delineated Mitigation Areas (acres)	2016 Estimated Mitigation Credit (acres)
Restoration (Reestablishment)	Palustrine emergent	1:1	27.11	27.11	10.89	10.89	9.91	9.91	9.91	9.91	9.96	9.96
Creation (Establishment)	Palustrine emergent	1:1	9.84	9.84	1.07	1.07	2.68	2.68	3.18	3.18	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	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	0.25	0.06
Upland Buffer	N/A	5:1	6.76[c]	1.35	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	N/A	–0.41
Totals			**46.59**	**39.70**	**20.50**	**13.98**	**21.16**	**14.63**	**21.66**	**15.13**	**21.72**	**15.19**

(a) Cowardin et al. [1979].
(b) The mitigation credit ratios that were used are from the Montana Corps Regulatory Programs 2005 Wetland Credit Ratios [USACE, 2005].
(c) The anticipated upland buffer credit was used until wetland areas expand to full extent.

Table 2-29. Functions and Values of the Rostad Ranch Site From 2004 and 2013 Through 2016

Function and Value Parameters From the Montana Wetland Assessment Method	2004[a] W-1-04	2004[a] W-2-04	2004[a] W-3-04	2013[b]	2014[b]	2015[b]	2016[b]
Listed/Proposed T&E Species Habitat	Low (0.0)	Low (0.0)	Low (0.0)	Low (0.0)	Low (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)	High (0.9)
General Wildlife Habitat	Low (0.3)	Low (0.3)	Low (0.3)	Mod (0.5)	Low (0.3)	Mod (0.5)	Mod (0.5)
General Fish/Aquatic Habitat	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Flood Attenuation	N/A	N/A	N/A	N/A	N/A	N/A	N/A
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)	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)	High (1.0)
Sediment/Shoreline Stabilization	Mod (0.6)	Mod (0.6)	N/A	N/A	Mod (0.6)	High (0.9)	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)	High (0.8)
Groundwater Discharge/Recharge	High (1.0)	High (1.0)	N/A	High (1.0)	Mod (0.7)	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)	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)	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**	**5.75/9**
% of Possible Score Achieved	**39.0%**	**39.0%**	**24.0%**	**65.6%**	**51.7%**	**63.9%**	**63.9%**
Overall Category	**III**	**III**	**III**	**II**	**III**	**III**	**III**
Total Acreage of Assessed Wetlands Within Site Boundaries	**1.2**	**1.8**	**0.4**	**13.74**	**14.40**	**14.90**	**14.96**
Functional Units (acreage × actual points)	**4.68**	**7.02**	**0.76**	**72.1**	**67.0**	**85.7**	**86.02**

(a) 1999 MWAM form [Berglund, 1999].
(b) 2008 MWAM form [Berglund and McEldowney, 2008].

The 2004 assessment identified a total of 3.4 acres of Category III wetlands. The majority of the existing wetlands within the site before 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 preexisting wetlands averaged 34 percent of the possible score and attained 12.46 functional units.

Because of the complex boundaries of the proposed mitigation credits within the site, the Rostad Ranch site was assessed as one AA. The functional ratings displayed a decrease between 2013 and 2014, primarily because of the reevaluation of the water regime within the site from perennial to seasonal. The AA was rated as moderately disturbed in 2016 because of increased vegetation growth and time following disturbance from construction and/or grazing/cultivation. In 2016, wetland vegetation had successfully established on approximately 94 percent of the wetland areas, which resulted in high ratings for sediment/shoreline stabilization and sediment/nutrient/toxicant removal. The AA also received a high rating for MTNHP species habitat because of the documented primary habitat for the Great Basin calico-flower (*Downingia laeta*), which was observed on site from 2013

through 2015. The extent of wetland slightly increased (0.06 acre) within the site in 2016, which influenced the acreage used to calculate the functional units score. The AA was rated as a Category III wetland in 2016, scored 63.9 percent of the possible points, and attained 86.02 functional units. 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 2-30 provides a summary of the approved performance standards and success criteria based on site conditions documented in 2016. All of the wetlands delineated at the Rostad Ranch site in 2016 satisfied the three criteria of wetland hydrology, hydrophytic vegetation, and hydric soils. Willow stakes that were planted within the site exhibited a 75 percent survival rate during the third year of planting, which is the same survival rate observed in 2015. 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 was 5 percent in 2016. The cover of noxious weeds within the delineated wetlands was less than 5 percent. The extent of the open water surveyed in 2016 composed 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.

Priority 2B noxious weeds that were identified within the Rostad Ranch site included hoary alyssum, spotted knapweed, Canadian thistle, gypsy-flower, field bindweed, and common tansy. A total of 33 infestation areas were mapped in 2016; these areas range in size from less than 0.1 acre to greater than 1 acre in size. The majority of the infestations, with cover classes that range from trace (< 1 percent) to moderate (6–25 percent), were located at the edge of the constructed wetlands in upland community Type 1. A weed contractor with MDT treated 2 acres (4.4 percent of the upland buffer) of the site in July 2016, with treatment concentrated in areas of infestation by the six noxious weed species observed on site. MDT has an ongoing weed-control program for their mitigation sites that includes an annual assessment of weeds identified at each location during the yearly monitoring and treatment of mapped weeds to contain and control identified populations.

The wildlife-friendly fence that was installed around the easement area was intact during the 2016 site visit. Seven bluebird boxes were installed around the site perimeter in 2012 and were in good condition in 2016. Swallows occupied two bird boxes during the 2016 site visit. The irrigation headgate structure was in good condition during the 2016 site visit. A small amount of fine sediment was beginning to accumulate in the stilling pool but did not appear to inhibit hydrology or the function of the structure. During future monitoring efforts, inspecting this structure and stilling pool is recommended to ensure proper functionality. Also, no indicators of hydrology were observed in the northwestern portion of the site during the 2016 monitoring event.

Table 2-30. Summary of Performance Standards and Success Criteria (Page 1 of 2)

Performance Standards	Success Criteria	Criteria Achieved Y/N	Discussion
Wetland Characteristics	The three parameter criteria for hydrology, vegetation, and soils are met as outlined in the 1987 Wetland Manual and 2010 Regional Supplement.	Y	Wetland habitat areas within the mitigation site meet the three parameter criteria.
Wetland Hydrology	Soil saturation is present for at least 12.5 percent of the growing season.	Y	Wetland habitat areas within the site exhibit soil saturation for a minimum 12.5 percent of growing season.
Hydric Soil	Hydric soil conditions are present or appear to be forming.	Y	The recently constructed wetland complex exhibits weak hydric soil development in areas that had been originally identified as upland before construction. Preexisting hydric soil characteristics are present in several areas that had been identified as wetland before 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	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	Many 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 exceed 50 percent survival after 5 years.	Y	Approximately 75 percent of the woody plantings observed were alive in 2015, which exceeds 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 2016 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 open water does not exceed 10 percent of the total wetland acreage.	Y	Open water was mapped within 4 percent of the total wetland acreage in 2016. These areas are exhibiting emergent vegetation development and are anticipated to continue to develop aquatic macrophyte communities within the 5-year monitoring period.

Table 2-30. Summary of Performance Standards and Success Criteria (Page 2 of 2)

Performance Standards	Success Criteria	Criteria Achieved Y/N	Discussion
Upland Buffer	Success will be achieved when noxious weeds do no exceed 5 percent cover within the buffer areas on site.	Y	Many noxious weed infestations, including field bindweed, gypsy-flower, Canadian thistle, spotted knapweed, common tansy, and hoary alyssum were mapped within the site in 2016. Noxious weeds are currently estimated to cover right at 5 percent of the upland buffer within the conservation easement area. MDT will need to continue to implement weed-control measures to continue to meet these criteria.
	Any area that was disturbed within creditable buffer zone must have at least 50 percent aerial cover of desirable upland plant species by the end of the monitoring period.	Y	Upland buffers that surround wetland areas within the site exhibited greater than 50 percent aerial cover of non-weed species in 2016.
Weed Control	Weed-control measures are implemented to minimize and/or eliminate infestations of state-listed noxious weed species within the site.	Y	State-listed noxious weed species across the site have been estimated at 5 percent absolute cover in 2016.
Fencing	Wildlife-friendly fencing is installed along the easement boundaries.	Y	Wildlife-friendly fencing has been installed around the easement boundaries and is in good condition.

2.10 SCHRIEBER LAKE (MISSOULA DISTRICT, YEAR 2)

The Schrieber Lake Wetland Mitigation 2016 Monitoring Report presents the results of the second year of post-construction monitoring at the Schrieber Lake mitigation area. The site was acquired by 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.

Before 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 preserving, restoring, and creating wetland and riparian habitats. Specifically, MDT plans to restore the hydrology to approximately 19 acres of drained wetlands by excavating and creating depressional wetland cells; protecting the existing 10.2 acres of fen-carr shrub land wetland vegetation community; restoring previously developed agricultural areas into native wetland and upland plant communities by seeding and plantings; relocating and reconstructing approximately 3,500 linear feet of Schrieber Creek from the adjacent Schrieber Meadows site to its historic channel and outfall into Schrieber Lake; and relocating and restoring approximately 1,500 linear feet of channelized Coyote Creek to its historic channel and outfall into Schrieber Lake.

MDT anticipates developing 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 creating additional depression wetland cells and buffer areas within upland and degraded wetlands, enhancing scrub/shrub palustrine wetlands, and reconstructing the Coyote and Schrieber Creek channels. The crediting objectives of the full Schrieber Lake stream and wetland restoration project include the following:

Wetland Mitigation Objectives

- **Creation**: Create 3.06 wetland credit acres by excavating 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 volunteer seeds within the soil bank are anticipated to colonize within these sites.
- **Restoration (Reestablishment)**: 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 nonnative pasture grass sod within the site. These depressions will be flat and 1–2 feet deep to promote revegetation 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 because of 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 because of 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 reseeded 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 Objectives

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 32 SSE, Montana (245020) weather station recorded an average total annual precipitation rate of 24.44 inches from 1949 to 2016 [Western Regional Climate Center, 2016]. Annual precipitation in 2015 (the first year of monitoring) was 21.26 inches, which is more than 3 inches below the long-term average. Precipitation from January through August was 11.14 inches in 2015 and 10.56 inches in 2016, which is 4 inches below the long-term average for that time of year (14.94 inches). In general, the region that surrounds the project area received below-average precipitation in the first 2 years of monitoring. Based on field observations of hydrology within the site over the first 2 years of monitoring, water levels within the excavated basins appear to be largely influenced by groundwater and stream discharge with moderate influence from direct precipitation.

During the July 2016 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 AA 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 that drives wetland hydrology within this site. Other site-wide indicators of wetland hydrology included saturation and inundation that is visible on aerial photographs and a seasonal high groundwater table.

Wetland Mitigation Credit

A total of approximately 13.4 wetland credit acres is expected to be generated from the full build-out of the Schrieber Lake project. Proposed mitigation credits from the 2014 Schrieber Lake Mitigation Plan included creating 3.06 wetland acres, reestablishing 2.53 wetland acres, enhancing 4.53 acres of the fen-carr shrubland expansion, preserving 25.6 acres of existing fen-carr Carex areas, and creating a 50-foot upland buffer (3.81 acres).

Table 2-31 summarizes the estimated wetland credits based on the pending USACE-approved credit ratios and the wetland delineation completed in July 2016. The 2016 wetland delineation indicates that when Schreiber Lake, riparian buffer, and other uncreditable areas are considered, 37.65 acres of wetland habitat exist within the site. The wetland acreages delineated in 2016 included 4.8 acres of created wetland, 2.42 acres of reestablished wetlands, 4.77 acres of enhanced wetlands, 25.66 acres of preserved wetlands, and 8.42 acres of upland buffer. The 2016 estimated credit acres for this site have exceeded the proposed credit acres. A total of 16.09 credit acres have developed at this site after mitigation construction.

Table 2-31. Summary of Wetland Credits at the Schrieber Lake Site in 2016

Mitigation Type	Total Proposed Acreage	Ratio[a]	Proposed Credit Acres	2015 Delineated Acreage	2015 Credit Acres	2016 Delineated Acreage	2016 Credit Acres
Creation	3.06	1:1	3.06	4.80	4.80	4.80	4.80
Restoration (Reestablishment)	2.53	1.5:1	1.69	2.42	1.62	2.42	1.62
Enhancement areas – carr shrubland expansion	4.53	3:1	1.51	4.77	1.59	4.77	1.59
Preservation – existing fen-carr *Carex* areas	25.60	4:1	6.40	25.66	6.42	25.66	6.42
Upland buffer (50 ft)[b]	3.81	5:1	0.76	8.42	1.68	8.42	1.68
Permanent project impacts	0.02	None	–0.02	–0.02	–0.02	–0.02	–0.02
Total Mitigation Acreage	**39.55**		**13.40**	**46.05**	**16.09**	**46.05**	**16.09**

(a) The ratios used are from Column A of the Montana Regulatory Program Wetland Compensatory Mitigation Ratios, April 2005.
Riparian buffer areas were used to calculate stream and riparian credits.
Wetland acreages within riparian buffer were subtracted from wetland credit total; the riparian buffer does not include upland buffer acreage.

(b) A standard 50-foot upland buffer was assumed for the perimeter of the delineated wetland.
No credits are being requested for the existing Schrieber Lake.

Stream Mitigation Credit

The goal of the stream mitigation component of the Schrieber Lake project includes restoring 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, which results in an overall increase of 3,108 linear feet of stream length. When combined with establishing and protecting 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 2-32). The stream mitigation project has been separated into seven distinct reaches, including the following:

1. **Coyote Creek, Reach 1A,** which involves reconstructing 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 because of this project (423.0 feet)
3. **Schrieber Creek, Reach 1,** which consists of a newly constructed channel configuration that extends from the existing channel downstream to Reach 2A (531.6 feet)
4. **Schrieber Creek, Reach 2A,** which consists of a newly constructed channel configuration that extends form 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 form 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).

The 2008 MDT MWAM was used to evaluate the site in 2015 (Table 2-33). The functional assessment completed in 2016 incorporated the created, restored and preserved wetlands into one AA. The MWAM AA included all of the delineated wetlands, including the creditable wetlands (37.12 acres), the wetlands within the riparian buffers of Schreiber and Coyote creeks (3.9 acres), the open water within Schrieber Lake (8.26 acres), those portions of Schreiber and Coyote creeks that flow through the wetland areas (0.65 acre), and the wetlands on US Forest Service (USFS) lands (1.25 acres). The wetlands in the AA received a Category I rating with 87 percent of the total possible points in 2016. The 51.7-acre AA rated as a Category I wetland, scored excellent for general wildlife habitat and production export/food chain support, and scored 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 2-32. Anticipated Riparian and Stream Credits Generated From the Schrieber Lake 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**

Table 2-33. Functions and Values of the Schrieber Lake Site in 2016

Function and Value Parameters From the 2008 MDT Montana Wetland Assessment Method[(a)]	2015	2016
Listed/Proposed T&E Species Habitat	High (0.8)	High (0.8)
MTNHP Species Habitat	Mod (0.6)	Mod (0.6)
General Wildlife Habitat	High (1.0)	High (1.0)
General Fish/Aquatic Habitat	Mod (0.7)	Mod (0.5)
Flood Attenuation	Mod (0.6)	Mod (0.6)
Short- and Long-Term Surface-Water Storage	High (1.0)	High (1.0)
Sediment/Nutrient/Toxicant Removal	High (1.0)	High (1.0)
Sediment/Shoreline Stabilization	High (1.0)	High (1.0)
Production Export/ Food Chain Support	High (1.0)	High (1.0)
Groundwater Discharge/Recharge	High (1.0)	High (1.0)
Uniqueness	High (0.9)	High (0.9)
Recreation/Education Potential	Mod (0.1)	High (0.2)
Actual Points/Possible Points	**9.7/11**	**9.6/11**
% of Possible Score Achieved	**88.2**	**87**
Overall Category	**I**	**I**
Acreage of Assessed Aquatic Habitats within Easement (acres)	**51.7**	**51.7**
Functional Units (acreage × actual points)	**501.49**	**496.32**

(a) Berglund and McEldowney 2008.

The current site conditions documented in 2015 are compared to the approved performance standards and success criteria in Table 2-34. The wetlands that were delineated in 2016 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 at 70 percent or more. The open-water area of Schrieber Lake was 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 is estimated at less than 5 percent, which meets the success criteria. Isolated weed infestations were mapped throughout the site and are controlled by MDT as mandated by the performance standards. The upland buffer success criteria have been achieved; these areas have at least 50 percent aerial cover of nonweed species.

The 2015 monitoring report for the Schrieber Lake site provided a first-year, baseline assessment of the site's condition after the project's completion. Data collected during the 2016 monitoring revealed continued development of vegetation cover along the reaches. The increase in vegetation cover included an increase in noxious weed cover. Reaches 1, 2A, and 2B of Schrieber Creek have yet to meet performance criteria established for (1) establishing 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 currently meet all of the success criteria and are expected to generate the predicted credits outlined in the monitoring plan. Future site monitoring will determine whether vegetation establishment within Reaches 1, 2A, and 2B of Schrieber Creek results in achieving the success criteria and generating all of the anticipated credits.

Table 2-34. Summary of Performance Standards and Success Criteria at the Schrieber Lake Site in 2016 (Page 1 of 4)

Performance Standards	Success Criteria	Criteria Achieved Y/N	Discussion
Wetland Characteristics	The three parameter criteria are met for hydrology, vegetation, and soils as outlined in the 1987 Wetland Manual and 2010 Regional Supplement.	Y	Areas that were identified as wetland habitat within the mitigation site meet the three parameter criteria.
Wetland Hydrology	Soil saturation is present for at least 12.5 percent of the growing season.	Y	Areas that were 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 are 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	Combined absolute cover of facultative or wetter species is 70 percent or greater.	Y	Areas that were identified as wetland habitat within the mitigation site support a prevalence of hydrophytic vegetation (OBL, FACW, and FAC).
	State-listed noxious weeds do not exceed 5 percent absolute cover.	Y	State-listed noxious weeds are estimated well below 5 percent absolute cover within wetland areas.
	Woody plants exceed 50 percent survival after 5 years.	N	Only 1 year has passed since construction.
Open Water	The project is intended 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 depressions within the upper reach of the site experience seasonal drawdown, and rooted hydrophytic vegetation development has been observed. The lower depressions appear to support perennial inundation with an established aquatic macrophyte community.

Table 2-34. Summary of Performance Standards and Success Criteria at the Schrieber Lake Site in 2016 (Page 2 of 4)

Performance Standards	Success Criteria	Criteria Achieved Y/N	Discussion
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 than 1.5 ft/year = Functioning at Risk iv.) Rate of less than 2.5 ft/year = 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 transect data derived from bank pin locations during the 2016 monitoring have documented no lateral channel migration since 2015.

Table 2-34. Summary of Performance Standards and Success Criteria at the Schrieber Lake Site in 2016 (Page 3 of 4)

Performance Standards	Success Criteria	Criteria Achieved Y/N	Discussion
Bank Restoration Success	Ratings for the stream bank will be based on the proper functioning condition rating that determines if the area supports a healthy, stable bank area adjacent to the stream: i.) Functioning – The stream bank supports a healthy and stable bank area adjacent to the river. ii.) Functioning at Risk – one or more functions of the stream bank are adjusting to changes in the design within the reach area, and more monitoring is needed. ii.) Not Functioning – Measurements of the functions indicate that the site is not achieving functional goals and is not supporting a healthy, stable bank reach.	N/A	This data 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 nonnoxious weed species by the end of the monitoring period.	Y	All riparian vegetation transects exhibited 50 percent or greater areal cover of nonnoxious weed species along both Schrieber and Coyote Creek.
	Combined aerial cover of riparian and stream bank vegetation communities is 70 percent or greater.	Y[(a)]	Combined areal cover of riparian and stream bank vegetation along Schrieber Creek is 56 percent; however, two cross-sections indicated a total weighted percent cover below 70 percent. Combined areal cover of riparian and stream bank vegetation along Coyote Creek is 100 percent.
	Noxious weeds do not exceed 5 percent cover within the riparian buffer areas.	Y[(a)]	Noxious weed cover along Schrieber Creek is estimated at 8 percent. Noxious weed cover along Coyote Creek is 2 percent.
	Planted trees and shrubs will be considered successful where they exhibit 50 percent survival after 5 years.	Y[(a)]	Planted trees and shrubs along Schrieber Creek exhibit 79 percent survival to date. Planted trees and shrubs along Coyote Creek exhibit a 43 percent survival rate to date.

Table 2-34. Summary of Performance Standards and Success Criteria at the Schrieber Lake Site in 2016 (Page 4 of 4)

Performance Standards	Success Criteria	Criteria Achieved Y/N	Discussion
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 that was disturbed within creditable buffer zone must have at least 50 percent aerial cover of nonweed species by end of monitoring period.	Y	Disturbed areas have established greater than 50 percent cover by nonweed species.
Weed Control	Weed control will be based on annual site monitoring to determine weed species and degree of infestation within the site. Control measures based on 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 ongoing weed-control program.

(a) The majority of monitoring transects met performance criteria for this category.

Two nest boxes were installed at the site, in good repair, and occupied. Noxious weed management will be an ongoing issue at this site. MDT completed noxious weed spraying at the Schrieber Lake site on July 5, 2016. 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*), ox-eye daisy (*Leucanthemum vulgare*), dalmatian toadflax (*Linaria dalmatica*), whitetop (*Lepidium draba*), and yellow toadflax (*Linaria vulgaris*).

2.11 SCHRIEBER MEADOWS (MISSOULA DISTRICT, YEAR 6)

The MDT 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 constructing 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, which limited 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 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.

Two components to this mitigation site are 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 by permanently restoring hydrology, land-surface manipulation (excavating shallow depressions), and revegetation with wetland plant seed
- Provide approximately 4.41 wetland credit acres by enhancing 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 by developing upland buffers that total 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 acre of wetlands by installing 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 by restoring sinuosity, floodplains, and natural stream migration within the project site
- Develop approximately 35,551 stream mitigation credits by restoring 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 acre of restoration (rehabilitation) of existing wetlands (1.12 acres restored), and 0.59 credit acre 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 2-35 provides the credits generated at the Schrieber Meadows 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.

Approximately 17.24 wetland credit acres was anticipated to 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 2-35 are described below. Approximately 8.91 acres of wetlands was expected to be created by excavating Cells 1 to 11. The 2013 through 2016 delineated acreages indicated that 22.43 acres of wetland habitat have been created within this mitigation site. Water levels have substantially increased because of the newly constructed channel of Coyote Creek and abundant surface and groundwater that flows through the valley. The high groundwater elevations found on the site are caused by a combination of restoration efforts to plug existing drain ditches and channels as

Table 2-35. Summary of Wetland Mitigation Credits at the Schrieber Meadows Mitigation Site in 2010 and 2012 Through 2016

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	2016 Delineated Acreage	2016 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	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	3.46	2.31
Enhancement of Wetlands Inside Geotechnical Limits Adjacent to US Highway 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	13.22	4.41
Riparian Buffer[(a)]		–		8.30	(b)	8.30	(b)	8.30	(b)	8.30	(b)	8.30	(b)
Upland Buffer	8.50	5:1	1.70	8.50	1.70	12.39[(c)]	2.48	12.39[(c)]	2.48	12.39[(c)]	2.48	12.39[(c)]	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	–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	59.72	31.54

(a) Riparian buffer areas were used to calculate stream and riparian credits.
(b) Wetland acreages within riparian buffer were subtracted from wetland credit total; riparian buffer does not include upland buffer acreage.
(c) Acreage includes 50-foot buffer around wetlands within MDT and USFS property and outside of the riparian buffer.

well as the subsidence of the histosol soil elevations over time. All wetlands within the 25-foot riparian buffer (8.30 acres) that were 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 restoring 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 by hydrologically enhancing 13.22 acres of existing wetlands that are 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. Developing this mitigation site resulted in impacts to 0.08 acre of wetland by installing the ditch plugs. The 0.08 acre was debited from the estimated credit acreages. Overall, the proposed credit acres of 17.24 have been surpassed by developing 31.54 acres, which created a surplus of 14.30 credit acres.

The 2016 estimated credit acres for this site have exceeded the proposed credit acres because of the rise in the water table after the former Coyote Creek channel was abandoned and also because of the subsequent increase in site-wide wetland hydrology. A total of 31.54 credit acres have developed at this site after mitigation construction.

Stream Mitigation Credit

The goal of the stream mitigation component of the Schrieber Meadows project was to restore approximately 7,756 linear feet of new stream channel in both Coyote and Schrieber Creeks, which would result 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:

- **Upper Coyote Creek** is the segment from the edge of the forested areas on and through the USFS parcel onto the MDT-owned parcel. This segment is considered a seasonally intermittent stream and does not become perennial again until it reaches the spring area on the MDT property.
- **Coyote Creek Spring Area** is the area between the USFS restored segment of stream and the access road into the MDT site. A large spring emanates from this location; MDT did not manipulate this area except to plant the adjacent riparian zones with woody shrubs and trees.
- **Middle Coyote Creek** begins at the culverts under the access road and extends to its connection with Schrieber Creek. The stream is perennial because of groundwater flows that emanate from the spring area.
- **Perennial Spring Channel Ditch** was originally a drainage ditch constructed to relocate flows from a natural spring that emanates 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.

- **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, which is 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 [USACE, 2005], calculating stream mitigation credits includes summing both riparian (Table 2-36) and stream credits (Table 2-37).

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 used 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 used 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 before 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. To determine 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 more than 0.5 mile away, the off-site factor of 0.10 was used.

Table 2-36. Determination of Riparian Mitigation Credits for Schrieber Meadows

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 × L × RM)	**2,409**	**332**	**4,371**	**550**	**3,334**
Total Riparian Credits = 10,996					

To determine stream credits for the Coyote and Schrieber Creek corridors, many of the same factors that were 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 because this area was not constructively changed.

Table 2-37. Determination of Stream Mitigation Credits for Schrieber Meadows

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 × 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					

Stream credits reported here are based on 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 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 5 years has not been achieved. An approximate 5 percent survival rate for the planted woody species was estimated in 2016. 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 2016. The 2010 functional assessment 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 2016 (Table 2-38). The score for listed/proposed T&E species habitat function was increased to high because of the presence of grizzly bears in the area as reported by MFWP and US Fish and Wildlife Service (USFWS) biologists in 2015.

The 2012 through 2016 Restoration AA included 3.46 acres of preexisting wetlands within the footprint of the excavated cells. The AA includes both aquatic bed and emergent wetland habitats. The assessment score increased by 8 percentage points to 82 percent and the functional units totaled 28.37. The AA was rated as a Category I wetland, scored excellent for general wildlife habitat and production export/food chain support, and scored high for listed/proposed T&E species habitat, MTNHP species habitat, short- and long-term surface-water storage, sediment/shoreline stabilization,

Table 2-38. Functions and Values at the Schrieber Meadows Site From 2010 and From 2012 Through 2016 (Page 1 of 3)

Function and Value Parameters From the 2008 MDT Montana Wetland Assessment Method[(a)]	2010 Creation/ Enhancement AA	Enhancement AA				
		2012	2013	2014	2015	2016
Listed/Proposed T&E Species Habitat	Low (0.1)	Low (0.3)	Low (0.3)	Low (0.3)	High (0.8)	High (0.8)
MTNHP Species Habitat	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)
General Fish/Aquatic Habitat	N/A	N/A	N/A	N/A	N/A	N/A
Flood Attenuation	N/A	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)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)
Sediment/Nutrient/Toxicant Removal	Mod (0.7)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)
Sediment/Shoreline Stabilization	Mod (0.6)	N/A	N/A	High (1.0)	High (1.0)	High (1.0)
Production Export/ Food Chain Support	Mod (0.5)	High (0.8)	High (0.8)	High (0.8)	Exc. (1.0)	Exc. (1.0)
Groundwater Discharge/Recharge	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)
Recreation/Education Potential	Low (0.5)	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**	**8.7/10**
% of Possible Score Achieved	**68%**	**79%**	**80%**	**80%**	**87%**	**87%**
Overall Category	**II**	**II**	**II**	**I**	**I**	**I**
Acreage of Assessed Aquatic Habitats Within Easement (acres)	**4.84**	**13.22**	**13.22**	**13.22**	**13.22**	**13.22**
Functional Units (acreage × actual points)	**26.38**	**93.86**	**95.18**	**105.76**	**115.01**	**115.01**

Table 2-38. Functions and Values at the Schrieber Meadows Site From 2010 and From 2012 Through 2016 (Page 2 of 3)

Function and ValueParameters From the 2008 MDT Montana Wetland Assessment Method[a]	2010 Creation/ Enhancement AA	Creation AA				
		2012	2013	2014	2015	2016
Listed/Proposed T&E Species Habitat	Low (0.1)	Low (0.3)	Low (0.3)	Low (0.3)	High (0.8)	High (0.8)
MTNHP Species Habitat	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)	High (0.9)	High (0.9)	High (0.9)	High (0.9)
General Fish/Aquatic Habitat	N/A	Mod (0.6)	High (0.8)	High (0.8)	Mod (0.6)	Mod (0.6)
Flood Attenuation	N/A	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)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)
Sediment/Nutrient/Toxicant Removal	Mod (0.7)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)
Sediment/Shoreline Stabilization	Mod (0.6)	Mod (0.7)	Mod (0.7)	High (1.0)	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)	Excel (1.0)
Groundwater Discharge/Recharge	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)
Uniqueness	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)
Recreation/Education Potential	Low (0.5)	High (0.2)	High (0.2)	High (0.2)	High (0.2)	High (0.2)
Actual Points/Possible Points	**5.4 /8**	**8.3/11**	**8.5/11**	**8.8/11**	**9.3/11**	**9.3/11**
% of Possible Score Achieved	**68%**	**75%**	**77%**	**80%**	**85%**	**85%**
Overall Category	**II**	**II**	**II**	**II**	**I**	**I**
Acreage of Assessed Aquatic Habitats Within Easement (acres)	**4.84**	**22.40**	**22.43**	**22.43**	**22.43**	**22.43**
Functional Units (acreage × actual points)	**26.38**	**185.92**	**190.66**	**197.38**	**208.60**	**208.60**

Table 2-38. Functions and Values at the Schrieber Meadows Site From 2010 and From 2012 Through 2016 (Page 3 of 3)

Function and Value Parameters From the 2008 MDT Montana Wetland Assessment Method[(a)]	2010 Creation/ Enhancement AA	Restoration AA				
		2012	2013	2014	2015	2016
Listed/Proposed T&E Species Habitat	Low (0.1)	Low (0.3)	Low (0.3)	Low (0.3)	High (0.8)	High (0.8)
MTNHP Species Habitat	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)	High (0.9)	High (0.9)	Exc. (1.0)	Exc. (1.0)
General Fish/Aquatic Habitat	N/A	N/A	N/A	N/A	N/A	N/A
Flood Attenuation	N/A	Mod (0.6)	Mod (0.6)	Mod (0.6)	Mod (0.5)	Mod (0.5)
Short- and Long-Term Surface-Water Storage	Mod (0.6)	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)	Mod (0.7)	Mod (0.7)	Mod (0.6)	Mod (0.6)
Sediment/Shoreline Stabilization	Mod (0.6)	Low (0.3)	Low (0.3)	High (1.0)	High (1.0)	High (1.0)
Production Export/ Food Chain Support	Mod (0.5)	Mod (0.7)	Mod (0.7)	Mod (0.7)	Exc. (1.0)	Exc. (1.0)
Groundwater Discharge/Recharge	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)
Uniqueness	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Mod (0.4)	Mod (0.4)
Recreation/Education Potential	Low (0.5)	High (0.2)	High (0.2)	High (0.2)	High (0.2)	High (0.2)
Actual Points/Possible Points	**5.4 /8**	**6.7/10**	**6.7/10**	**7.4/10**	**8.2/10**	**8.2/10**
% of Possible Score Achieved	**68%**	**67%**	**67%**	**74%**	**82%**	**82%**
Overall Category	**II**	**II**	**II**	**II**	**I**	**I**
Acreage of Assessed Aquatic Habitats Within Easement (acres)	**4.84**	**3.46**	**3.46**	**3.46**	**3.46**	**3.46**
Functional Units (acreage × actual points)	**26.38**	**23.18**	**23.18**	**25.60**	**28.37**	**28.37**

(a) Berglund and McEldowney, 2008.

groundwater/discharge/recharge, and recreation/education potential. Production export/food chain support shifted from a moderate to excellent rating in 2015 because 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 because 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 Highway 2 corridor. The AA achieved 87 percent of the possible score in 2016. Because of 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 because of the observation of a restricted water-surface outlet.

The 2012 through 2016 Creation AA included all of the 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 on site because of the substantially increased water table elevation observed site-wide. This 22.43-acre AA was rated as a Category I wetland in 2016 with 85 percent of the possible points, which is 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 because of no fish species observed during the 2015 survey. Production export/food chain support shifted from a high to excellent rating in 2015 because of the observation of restricted surface and subsurface water outlets.

The current site conditions documented in 2016 are compared to the approved performance standards and success criteria in Table 2-39. The wetlands that were delineated in 2016 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 of 70 percent or greater. 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 nonweed species and noxious weeds do not exceed 5 percent cover.

Table 2-39 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 that indicates 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 2016. Robust reed canary grass made seeing small shrubs throughout much of the site difficult.

Table 2-39. Summary of Performance Standards and Success Criteria at Schrieber Meadows in 2016 (Page 1 of 2)

Performance Standards	Success Criteria	Criteria Achieved Y/N	Discussion
Wetland Characteristics	The three parameter criteria for hydrology, vegetation, and soils are met as outlined in the 1987 Wetland Manual and the 2010 Regional Supplement.	Y	Areas that were identified as wetland habitat within the mitigation site meet the three parameter criteria.
Wetland Hydrology	Soil saturation is present for at least 12.5 percent of the growing season.	Y	Areas that were 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 are 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	Combined absolute cover of facultative or wetter species is 70 percent or greater.	Y	Areas that were identified as wetland habitat within the mitigation site support a prevalence of hydrophytic vegetation (OBL, FACW, and FAC).
	State-listed noxious weeds do not exceed 5 percent absolute cover.	Y	State-listed noxious weeds are estimated well below 5 percent absolute cover within wetland areas.
Riparian Buffer Success	Woody and riparian vegetation is established.	N	No woody-dominated communities have formed along the established riparian buffer; riparian vegetation (primarily reed canary grass) has established.
	Noxious weeds do not exceed 10 percent cover within the riparian buffer areas.	Y	State-listed noxious weeds are estimated at 1–3 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.
	Combined aerial cover of riparian and stream bank vegetation communities is 70 percent or greater.	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	After plantings, the majority of the site supported standing water and likely drowned out 90 percent of the plantings by the end of the second growing season. Approximately 3 percent survival was noted in 2016. MDT is currently working with the USFS Kootenai National Forest to coordinate a replanting plan in appropriate riparian buffer areas within the site that are not inundated by high water levels.

Table 2-39. Summary of Performance Standards and Success Criteria at Schrieber Meadows in 2016 (Page 2 of 2)

Performance Standards	Success Criteria	Criteria Achieved Y/N	Discussion
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 canary grass, which has a stability rating of 9.
	The intent of the stream restoration is to allow 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 to be stable with no lateral adjustment observed following construction.
Stream Bank Vegetation	Banks are vegetated with a majority of deep-rooting riparian plant species that have root-stability indices of 6 or greater.	Y	Reed canary grass and foxtail (*Alopecurus* sp.) dominate the stream banks. Reed canary grass has a root-stability index of 9. Alopecurus species found at the site have root stability index values of 3 for short-awned foxtail and 4 for Garrison creeping foxtail.
Open Water	The project will provide open water during the spring and early summer within excavated depressions. As the growing season progresses and the groundwater levels recede, vegetation is anticipated to germinate within the majority of the depressions. Open water with submerged and/or floating vegetation will, therefore, be considered successful and creditable.	Y	Excavated depressions 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 the creditable buffer zone must have at least 50 percent aerial cover of nonweed species by the end of the monitoring period.	Y	Disturbed areas have established greater than 50 percent cover by nonweed species.
Weed Control	Weed control will be based on annual site monitoring to determine weed species and degree of infestation within the site. Control measures based on 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 postconstruction monitoring event. MDT administers an ongoing weed-control program.

Fifteen infestations of state-listed Priority 2A and 2B noxious weeds were treated in 2016. Weed-control activities were conducted on July 5, 2016. Weed spraying has been conducted annually within the site to eliminate the predominant Canadian thistle infestations. 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.

2.12 SILICON MOUNTAIN (BUTTE DISTRICT, YEAR 2)

The Silicon Mountain Aquatic Resource Mitigation 2016 Monitoring Report presents the results the second year of post-construction monitoring at the Silicon Mountain mitigation area. Butte Silver Bow County (BSBC) and 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 5 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. BSBC 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 acre of property previously owned by BSBC, in the immediate vicinity of the new roadway alignment.

The goals of the mitigation project include preserving, restoring, and establishing wetland, riparian, and upland habitats. Specifically, the mitigation goals include the following:

- Establish 6.77 acres of emergent and scrub/shrub wetland by excavating and creating six wetland cells
- Protect the existing 10.06 acres of emergent and scrub/shrub wetland
- Restore upland, wetland, and riparian areas that were impacted by the new roadway alignment by seeding and planting 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.

2.12.1 Wetland Mitigation Credits

Table 2-40 summarizes the current estimated wetland credits based on the USACE-approved credit ratios [USACE, 2005] and the wetland delineation completed in June 2016. A total of 27.4 creditable acres were delineated at the Silicon Mountain site in 2016, including 6.3 acres of wetland creation, 10.3 acres of wetland preservation, and 10.8 acres of upland buffer. Applying the USACE-approved ratios to these values, a total of 11.03 acres of mitigation credit have been estimated in 2016, a value

Table 2-40. Wetland Mitigation Credits Estimated for the Silicon Mountain Mitigation Site in 2015 and 2016

Compensatory Mitigation Type	Mitigation Area Description	Wetland Type[(a)]	Anticipated Mitigation Surface Area (acres)	USACE-Approved Mitigation Ratios	Anticipated Mitigation Credit (acres)	2015 Delineated Acres	2015 Mitigation Credit (acres)	2016 Delineated Acres	2016 Mitigation Credit (acres)
Creation (Establishment)	Wetland Cells 1, 2, 3, 4, and 5	Palustrine emergent, aquatic bed	6.77	1:1	6.77	6.19	6.19	6.30	6.30
Preservation	Existing wetland areas	Palustrine emergent, scrub/shrub	10.06	4:1	2.52	10.24	2.56	10.30	2.57
Upland Buffer	50-foot wide upland perimeter	N/A	10.80	5:1	2.16	10.80	2.16	10.80	2.16
Totals			**27.63**		**11.45**	**27.23**	**10.91**	**27.40**	**11.03**

(a) Cowardin et al. [1979].
Actual delineated acres exceeded the creditable acres; therefore, only the requested acreage is reported.

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 6.7 credit acres are available for MDT to use as mitigation reserve within Watershed # 2 – Upper Clark Fork River Basin.

2.12.2 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 2-41. 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 12,369.5 stream and riparian mitigation credits if all of the success criteria are met.

Table 2-41. Summary of Anticipated Stream Mitigation Credits From the Silicon Mountain Mitigation Project

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

(a) From Table 7 of *Silicon Mountain Aquatic Resource Mitigation Plan* [Confluence Consulting, Inc., 2013].

To date, the project meets 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 and 2016. Two AAs were assessed in 2015 and 2016 that included created wetland Cells 2, 3, and 4, and created wetland Cells 1 and 5. In 2016, a third assessment was completed for the preservation wetlands (Table 2-42). The created wetland cells were classified into separate AAs based on perennial hydrology and open water observed during the 2015 and 2016 site visits 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 increased slightly from 3.1 acres in 2015 to 3.3 acres in 2016; was characterized by wetland community Types 6 – *Puccinellia nuttalliana/Deschampsia caespitosa* and 11 – *Typha latifolia*; and was rated as a Category III wetland with 48 percent of the total possible points in 2016. This 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.

Table 2-42. Functions and Values of the Silicon Mountain Site in 2015 and 2016

Function and Value Parameters From the 2008 MDT Montana Wetland Assessment Method[a]	2015 AA 1 (Created Wetland Cells 2, 3, and 4)	2015 AA 2 (Created Wetland Cells 1 and 5)	2016 AA 1 (Created Wetland Cells 2, 3, and 4)	2016 AA 2 (Created Wetland Cells 1 and 5)	2016 AA 3 (Preservation Wetlands)[b]
Listed/Proposed T&E Species Habitat	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)
General Wildlife Habitat	Low (0.3)	Mod (0.5)	Low (0.3)	Mod (0.5)	Mod (0.5)
General Fish/Aquatic Habitat	N/A	N/A	N/A	N/A	N/A
Flood Attenuation	N/A	Mod (0.6)	Mod (0.6)	Mod (0.6)	Mod (0.6)
Short- and Long-Term Surface-Water Storage	Mod (0.6)	High (0.8)	Mod (0.6)	High (0.8)	High (0.8)
Sediment/Nutrient/Toxicant Removal	High (0.8)	Mod (0.7)	High (0.8)	Mod (0.7)	Mod (0.7)
Sediment/Shoreline Stabilization	N/A	Low (0.3)	NA	Low (0.3)	Mod (0.7)
Production Export/Food Chain Support	Mod (0.7)	Mod (0.7)	Mod (0.7)	Mod (0.7)	Mod (0.7)
Groundwater Discharge/Recharge	Mod (0.7)	High (1.0)	Mod (0.7)	High (1.0)	High (1.0)
Uniqueness	Low (0.1)	Low (0.3)	Low (0.1)	Low (0.3)	Low (0.3)
Recreation/Education Potential	Low (0.05)	Low (0.05)	Low (0.05)	Low (0.05)	Low (0.05)
Actual Points/Possible Points	**3.75/8**	**5.45/10**	**4.35/9**	**5.45/10**	**5.75/10**
% of Possible Score Achieved	**47%**	**55%**	**48%**	**55%**	**58%**
Overall Category	**III**	**III**	**III**	**III**	**III**
Total Acreage of Assessed Wetlands Within Site Boundaries (ac)	**3.1**	**3.1**	**3.3**	**3.0**	**10.3**
Functional Units (acreage × actual points)	**11.63**	**16.90**	**14.35**	**16.35**	**59.22**

(a) Berglund and McEldowney [2008].

(b) Preservation wetlands were assessed in 2016 for the first time.

The AA for created wetland Cells 1 and 5 encompassed 3 acres of excavated wetland cells; was characterized by wetland community Type 7 – Open Water/Aquatic Macrophytes; and was rated as a Category III wetland with 55 percent of the total possible points in 2016. This 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, 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 desirable vegetation cover increases.

The AA for the preservation wetlands encompassed 10.3 acres, including 0.5 acre of open water. This AA was rated as a Category III wetland with 58 percent of the total possible points for 2016. This 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, production export/food chain support, sediment/shoreline stabilization, general wildlife habitat, and MTNHP species habitat.

Table 2-43 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 hydrophytic vegetation cover, soil stability, and its ability to support vegetation cover and noxious weed cover. All of the wetlands delineated within the Silicon Mountain site in 2016 met the three criteria outlined in the 1987 Wetland Manual and 2010 Regional Supplement but exhibited less than 70 percent desirable hydrophytic vegetation cover and more than 10 percent cover of noxious weeds. Created wetland areas alone exhibited less than 10 percent cover from noxious weeds and less than 70 percent hydrophytic vegetation cover. Upland buffer areas also exhibited more than 10 percent cover of noxious weed infestations. 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. Comprehensive site monitoring has occurred for 2 years and will be conducted for a minimum period of 5 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.

A total of 51 infestations of state-listed Priority 2B noxious weeds were mapped at the Silicon Mountain site (Figure A-3, Appendix A). These mapped infestations include clusters or groups of noxious weed plants within an area and not individual plants. A total of 13 infestations of spotted knapweed, 15 infestations of Canada thistle, 20 infestations of leafy spurge, 1 infestation of black henbane (*Hyoscyamus niger*), and 2 infestations of butter-and-eggs (*Linaria vulgaris*) were identified in areas less than 1.0 acre in size with cover classes that range from trace (< 1 percent) to high (> 26 percent). MDT has an ongoing weed-control program for their mitigation sites that includes an annual assessment of weeds that are identified at each location and treatment to contain and control identified populations. On July 8, 2016, MDT's weed contractor sprayed infestations of spotted knapweed, Canada thistle, leafy spurge, and black henbane that cover 4.5 acres across the mitigation site. Because of long-term grazing and disturbance at this site, weed control will likely be required for several more years to contain and control noxious weed populations.

No diversions or nesting structures are currently installed at the site. Fences that were installed around the site were in good condition at the time of the 2016 investigation. Wetland Cell 6 does not appear to be developing wetland characteristics. No wetland vegetation communities or supporting hydrology were noted in this area, which is like because of a lack of groundwater intercept from too shallow an excavation. MDT may wish to investigate further.

Table 2-43. Summary of Performance Standards and Success Criteria at the Silicon Mountain Site in 2016 (Page 1 of 2)

Performance Standards	Success Criteria	Criteria Achieved Y/N	Discussion
Wetland Characteristics	The three parameter criteria for hydrology, vegetation, and soils are met as outlined in the 1987 Wetland Manual and 2010 Regional Supplement.	Y	Areas that are identified as wetland habitat within the mitigation site meet the three parameter criteria.
Wetland Hydrology	Soil saturation is present for at least 12.5 percent of the growing season.	Y	Areas that are 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 are 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 slowly establishing across recently disturbed soils.
Hydrophytic Vegetation	Success is achieved where combined absolute cover of facultative or wetter species is 70 percent.	Y	Created wetland cells support 70 percent or greater cover of hydrophytic vegetation (OBL, FACW, and FAC).
	State-listed noxious weeds do not exceed 10 percent absolute cover.	Y	Montana state-listed noxious weeds are 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 to be stable with no lateral adjustment observed after construction.
Stream Bank Vegetation	Banks are vegetated with a majority of deep-rooting riparian plant species that have 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 > 6.

Table 2-43. Summary of Performance Standards and Success Criteria at the Silicon Mountain Site in 2016 (Page 2 of 2)

Performance Standards	Success Criteria	Criteria Achieved Y/N	Discussion
Open Water	The project is intended to provide seasonal open water during the spring and early summer within excavated depressions. As the growing season progresses and the groundwater levels recede, vegetation is expected to 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; rooted hydrophytic vegetation development has been observed; and 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 that was disturbed within the creditable buffer zone must have at least 50 percent aerial cover of nonweed species by the end of the monitoring period.	Y	Disturbed areas have established greater than 50 percent cover by nonweed species.
Weed Control	Control measures will be based on annual monitoring of the site to determine weed species and the degree of infestation within the site; control measures based on 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 postconstruction monitoring event. MDT administers an ongoing weed-control program. Noxious weeds were sprayed in July 2016 by MDT's contractor and will continue in the following years until MDT meets this performance objective and standard.

Several thousand willow sprigs were installed with approximately 18–24 inches of the stems exposed. Exposing this sprig length may cause higher mortality because they tend to generate a large number of new stems and leaves during the first two growing seasons that cannot be supported by the root growth of the plant. To date, willow sprig survival is excellent; approximately 85 percent of stems show new stem shoots and leaf growth.

2.13 US 93 NORTH – PETERSON (MISSOULA DISTRICT, YEAR 8)

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. Five mitigation sites were developed along this corridor. The 2016 monitoring effort documented the eighth year at Peterson. Bouchard, Mission Creek, Mud Creek, and Jocko Spring Creek were not monitored in 2016. 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 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 that is 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:

- Construct impoundments using 12 log crib structures and earthen berms
- Excavate an oxbow basin along the outer fringe of existing wetland boundaries
- Plant 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 2016 totaled 3.2 acres, an increase of 0.11 acre since 2014. Table 2-44 summarizes the 2016 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 Confederated Salish and Kootenai Tribes (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 2-45. The formula was developed to measure the post-construction functional lift expected to occur after rehabilitation of the mitigation site.

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

$$\text{Enhancement factor} = \left(8.6 - 5.3\right) / 5.3; \text{ Enhancement factor} = 0.62$$

$$\text{Enhancement ratio} = 1 / 0.62 = 1.61$$

The site has earned 2.73 USACE credit acres and 1.25 CSKT credit acres to date. These 2016 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 2-44. Credit Summary for the Peterson Site (Part 1 of 2)

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**

Table 2-44. Credit Summary for the Peterson Site (Part 2 of 2)

Targeted Mitigation Type	Credit Ratio		2013 Wetland (acre)	2013 Credit (acre)		2014 Wetland (acre)	2014 Credit (acre)		2015 Wetland (acre)	2015 Credit (acre)		2016 Wetland (acre)	2016 Credit (acre)	
	USACE	CSKT		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	1.95	1.95	0.58
Rehabilitation/ secondary restoration	2.12:1[(a)] (2013) 1.61:1[(a)] (2014) 1.61:1 (2015) 1.61:1 (2016)	1.86:1	1.25	0.59	0.67	1.25	0.78	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**	**3.20**	**2.73**	**1.25**

(a) Corrected enhancement ratio.

Table 2-45. Summary of 2004 (Baseline), 2008 Through 2011, and 2013 Through 2016 Wetland Function/Value Ratings and Functional Points at the Peterson Site

Function and Value Parameters From the 1999 MDT Montana Wetland Assessment Method	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)	2016 (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)	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)	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)	High (0.9)
General Fish/Aquatic Habitat	Low (0.1)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
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)	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)	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)	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)	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)	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)	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)	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)	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**	**8.6/11**
% of Possible Score Achieved	**44%**	**61%**	**61%**	**67%**	**69%**	**71%**	**78%**	**78%**	**78%**
Overall Category	**III**	**III**	**III**	**II**	**II**	**II**	**II**	**II**	**II**
Total Acreage of Assessed Wetlands and Open Water within Easement (acres)	**1.26**	**3.71**	**3.71**	**4.18**	**4.25**	**3.09**	**3.09**	**3.20**	**3.20**
Total Functional Units (acreage × actual points)	**6.68**	**25.23**	**25.23**	**30.93**	**32.30**	**24.10**	**26.57**	**27.52**	**27.52**
Net Acreage Gain (acres)	**N/A**	**2.45**	**2.45**	**2.92**	**2.99**	**1.83**	**1.83**	**1.94**	**1.94**
Net Functional Unit Gain	**N/A**	**18.55**	**18.55**	**24.25**	**25.62**	**17.42**	**19.89**	**20.84**	**20.84**

No quantitative performance measures or success criteria were established for this site. Created wetlands within the project corridor were expected to meet the three parameter criteria for hydrology, vegetation, and soils established for wetland determination as outlined in the 1987 Wetland Manual. All of the wetlands that were delineated within the site in 2016 met the three parameter criteria for hydrology, vegetation, and soils, which satisfied the indicated measure of success for this site.

Results of the 2004 (baseline), 2008 through 2011, and 2013 through 2015 functional assessment are summarized in Table 2-45. The 1999 MDT MWAM [Berglund, 1999] was used to complete functional assessments at the site since monitoring began. The total aquatic habitat developed to date within the 25-acre project area is 3.2 acres.

The Peterson property was evaluated as one AA (AA-1) that increased to 3.2 acres in 2015 from 3.09 acres in 2013 and 2014. This AA was rated as a Category II wetland in 2016 with 78 percent of the total possible points and 27.52 total functional units. The AA rating in 2016 was similar to ratings determined in 2015. In 2014, a gain of 7 percentage points was realized and was the result of the documented sighting of a grizzly bear on site and improved 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 in 2014. The functional unit gain from 2014 to 2016 was 0.95. The decrease in total functional units from 2011 to 2016 corresponds with the overall decrease of wetland acreage at the Peterson site, which is presumably the result of multiple log crib structure failures. The majority of the 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; instead, the site consists 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 the previous year's scores based on the density of the cat-tail community, which effectively functioned as woody vegetation in the way it slowed floodwaters. Despite these slight modifications, the overall functional points (8.6) were the same in 2016 as in 2015.

The location of a Priority 2A noxious weed, pale-yellow iris (*Iris pseudacorus*), and Priority 2B noxious weeds, Canadian thistle (*Cirsium arvense*), ox-eye daisy (*Leucanthemum vulgare*), and gypsy-flower (houndstongue – *Cynoglossum officinale*), that were observed during 2016 field monitoring were mapped on aerial photographs. The Canada thistle infestations were generally less than 0.1 acre in size in 2016. The percent cover ranged from trace (< 1 percent) to moderate (6–25 percent). Gypsy-flower, ox-eye daisy, and pale-yellow iris were found at trace (< 1 percent) to low (1–5 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 in July at this site each year since 2013 and occurred on July 6, 2016.

MDT was notified by the CSKT in early July 2015 that cows were in the site; based on this information, MDT visited the site and found that some fences had failed along the western boundary. A major cattle intrusion (250 cow/calf pairs) into the site required MDT staff to chase the cattle out and to make temporary repairs to the western boundary fence. In late 2015, MDT issued a contract to a local fence contractor to install new fences and gates along the southern, western, and northern boundaries of the site. This fence installation was completed in January 2016. No evidence of livestock grazing was observed within the site during the 2016 monitoring efforts.

In 2015, an increase in inundation was observed near T-1, which suggests that flow through the log crib structures in this area was being more restricted than in the previous 2 years. However, the flow through Crib Structures 1, 2, and 3 at the western end of the site was not impeded. At least four of the original log crib structures that had been 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 had limited success as the identified failed structures indicate. MDT had originally proposed to the USACE to repair the failed log crib structures by using woven beaver analog structures. However, after field investigations into the failed structures, the Aquatic Resource Engineer determined that more permanent fixes were required to maximize and protect the wetland credit acreage developed within the site. As a result, Robert Peccia & Associates was hired in September 2016 to evaluate and develop a permanent design to replace these failed structures and add an additional structure to impound water within the site.

3.0 REFERENCES

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APPENDIX A
SUMMARY INFORMATION FOR MDT WETLAND MITIGATION SITES

MDT Wetland Mitigation Monitoring
2016 Executive Summary

Site	Year Built	Major Montana Watershed Basin	Pre Project Wetland Acreage & MDT Category	Target Wetland Credit	2016 Wetland / Open Water Acreage and MDT Category	Upland Acrege, Ratio	Total Acreage Credit and Functional Unit as of 2016	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 Uplland Buffer - 0.44 ac 223.76 FU	2016 was the seventh 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 2016.
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	12.39 ac 5:1	Creation - 22.4 ac Enhancement - 4.41 ac Restoration - 2.31 ac Upland Buffer - 2.48 ac 351.99 FU	2016 was the sixth 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 2016.
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	2016 was the second 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 2016. 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	2016 was the eigth 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 2016.
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	2016 was the seventh 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 2016.
Silicon Mountain Silver Bow	2014	2 – Upper Clark Fork of the Columbia River	10.06 ac Category III	11.45 ac	16.60 ac Category III	10.8 ac 5:1	Create - 6.3 ac Preserve - 10.3 ac 89.92 FU	2016 was the second 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 2016 the site yielded 11.03 wetland credit acres and 12,369.5 stream mitigation credits
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 - 9.96 ac Restoration - 1.04 ac Preservation - 0.06 ac Upland Buffer - 1.35 ac 86.02 FU	2016 was the fourth 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 15.19 credit acres in 2016.

Site	Year Built	Major Montana Watershed Basin	Pre Project Wetland Acreage & MDT Category	Target Wetland Credit	2016 Wetland / Open Water Acreage and MDT Category	Upland Acreage, Ratio	Total Acreage Credit and Functional Unit as of 2016	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 15.75 FU	The 2016 monitoring was the sixth annual monitoring event following repair of a dike breach (2010) that temporarily drained the 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 2016.
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> 2.5 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	2016 was the fifth monitoring year at the south parcel and sixth year at the north parcel. 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 2016 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	2016 was the fourth 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 2016.
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	2016 was the fourth 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 2016.
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	2016 was the fourth 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 2016.
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	2016 was the fourth 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 2.52 credit acres in 2016.
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	2016 was the fourth 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 2016.
BILLINGS DISTRICT:								
Kindsfater Wetland Laurel	2012	13- Upper Yellowstone	25.9 ac	32.7 ac As ultimately constructed	34.4 ac Category III	22.6 ac 5:1	Creation - 2.0 ac Re-establishment - 7.8 ac Rehabilitation - 0.6 ac Enhancement - 1.1 ac Preservation - 5.1ac Upland Buffer - 4.52 ac 166.96 FU	2016 was the fourth monitoring year. The project is intended to provide before-the-fact mitigation credits for proposed projects in Watershed 13. The site yielded 21.1 credit acres in 2016.
JTX Tunnicliff Hardin	2015/16	13- Upper Yellowstone	0 ac	29.6 ac	0 ac NA	10.98 ac 5:1	0 ac	2016 was the first monitoring year following construction in late 2015 and early 2016. The project was in the first year of development at the time of the monitoring and no wetlands had developed at that point. The site was designed and constructed with the intent to provide 29.6 wetland credit acres.