MONTANA DEPARTMENT OF TRANSPORTATION STATEWIDE WETLAND MITIGATION SITE MONITORING PROJECT

EXECUTIVE SUMMARY – 2018 MONITORING RESULTS



Prepared for:

VISION ZERO
zero deaths · zero serious injuries
MONTANA DEPARTMENT OF TRANSPORTATION

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December 2018

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Cover: View looking southwest from highway across the Forsyth Northwest West Site.

1.0 INTRODUCTION

This document summarizes the results of the 2018 monitoring efforts at nine 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 2018. The Forsyth Northwest project consisted of three sites in 2018. The following mitigation sites were monitored in 2018, and their locations are shown on Figure 1-1:

- Easton Ranch
- Forsyth Northwest
- JTX – Tunnicliff
- Kindsfater Wetland
- Fort Peck Northeast
- Rostad Ranch
- Schrieber Lake
- Schrieber Meadows
- Silicon Mountain.

Monitoring activities were conducted by RESPEC wetlands personnel under contract to MDT during the months of June, July, and August 2018 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 surveys, 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 Wetlands Delineation 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) [USACE, 2010a] and Western Mountain Valleys and Coast (WMVC) [USACE, 2010b] 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. Sites that were evaluated using the WMVC supplement included Easton Ranch, Schrieber Lake, Schrieber Meadows, and Silicon Mountain. Sites that were evaluated with the GP version included Forsyth Northwest (FNW), JTX – Tunnicliff, Kindsfater, Fort Peck Northeast, and Rostad Ranch.

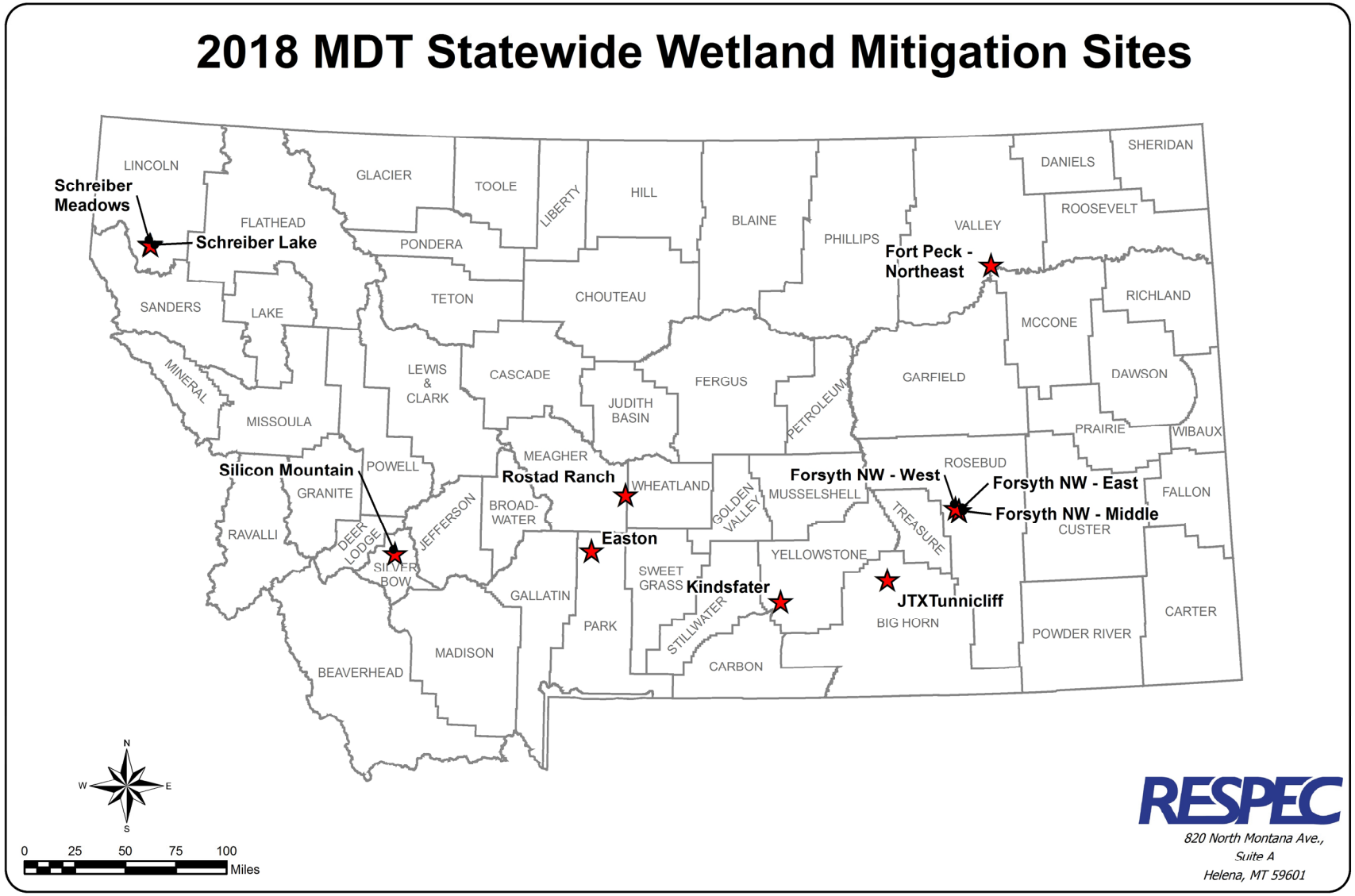


Figure 1-1. Location Map for All Nine Montana Department of Transportation Mitigation Sites Monitored in 2018.

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) [Berglund, 1999]. In 2008, use of the 1999 method was discontinued for most projects because the 2008 MWAM [Berglund and McEldowney, 2008] became available and was applied. 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			
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			
Fort Peck - Northeast	4.5	GP	2008
Forsyth NW – East	2.7	GP	2008
Forsyth NW – Middle	1.8	GP	2008
Forsyth NW – West	13.7	GP	2008
Billings District			
JTX – Tunnicliff	50	GP	2008
Kindsfater Wetland	138	GP	2008

Monitoring summaries for all of the mitigation sites investigated in 2018 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, 2018 wetland acreage and functional assessment category, upland buffer acreage, total credit acreage and functional units as of 2018, and general site comments.

2.0 INDIVIDUAL MITIGATION SITE DISCUSSIONS

2.1 EASTON RANCH (BUTTE DISTRICT, YEAR 9)

The MDT wetland mitigation project at the Easton Ranch is located in the northwestern 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 northeastern 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 2-1 summarizes the current estimated wetland credits based on the USACE-approved credit ratios [MDT, 2008] and the wetland delineation completed in June 2018. 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.

Table 2-1. Credit Summary From 2011 Through 2018 for the Easton Ranch Site

Proposed Mitigation Features	Compensatory Mitigation Type	USACE Mitigation Ratios	Anticipated Final Credit Acreages	Proposed Final Wetland Credits (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)	2017 Wetland Acreages	2017 Credit Estimated (Acres)	2018 Wetland Acreages	2018 Credit Estimated (Acres)
Creation of palustrine emergent wetland via shallow excavation	Creation	1:1	24.95	24.95	9.09	9.09	9.09	9.09	9.74	9.74	9.98	9.98	9.34	9.34	9.34	9.34	9.79	9.79	8.93	8.93
Reestablishment of relic flood channel	Restoration (Reestablishment)	1:1	1.56	1.56	1.45	1.45	1.45	1.45	1.56	1.56	1.56	1.56	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	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	2.60[b]	0.52	11.5[b]	2.30	11.5	2.30	11.5	2.30	11.5	2.30
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	-0.67	-0.67
Total				**27.41**		**11.44**		**11.44**		**12.19**		**11.67**		**12.81**		**12.81**		**13.26**		**12.40**

(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.

The 2018 delineation identified a total of 11.59 acres of wetlands within the project boundary. Approximately 8.93 acres of emergent and scrub/shrub wetland has developed to date within the constructed cells. The restored channel encompassed 1.56 acres of riverine emergent wetland. The preexisting wetlands, which included portions of community Types 3 – *Carex* spp., 4 – *Salix drummondiana*, and 5 – *Populus balsamifera*, encompassed 1.1 acres. Uplands accounted for 21.06 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, which resulted in a slight increase of credits between 2014 and 2017. However, the overall extent of wetland habitat has decreased slightly because of wetland/upland boundary shifts that are occurring primarily in the northeastern portion of the project site. Applying the approved USACE mitigation ratios to each mitigation feature, a total of 12.40 acres of credit were estimated in 2018, which is approximately 15.01 acres short of the proposed final credit acreage.

This mitigation site has not developed wetland habitat acreage as expected. In 2018, most of the excavated depression soils were either saturated or inundated, which was likely caused by irrigation water release, flooding from the Shields River, and/or groundwater levels during the spring and summer. The river flows were above average during the July 1, 2018, monitoring. Surface water was present in portions of the overflow channel and other low areas across the site. Signs of overland flow were noted along the western portion of the site, and debris from high flows was deposited along the base of young trees and shrubs. Sediment deposits were observed in the uplands along the southwestern portion of the project. New scour, deposition, and debris were also noted in the southern portion of the channel. This additional water supported wetland hydrology, hydrophytic vegetation, and hydric soil development; and improved vegetation cover; and supported the expansion of facultative species across the northern portion of the project site. The decrease in wetland acreage delineated in 2018 was primarily associated with shifts in wetland /upland boundaries in the northeastern portion where the increase in hydrology was evident further to the north.

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 2-2 summarizes the function and value ratings of the AAs from 2010 through 2018.

The Creation AA encompassed 8.93 acres of constructed palustrine, emergent wetland cells and has generated 54.98 functional units, which represents a decrease of 2.29 functional units from 2017, because of wetland boundary shifts and the associated changes in 2018 that occurred primarily in the northeastern and northwestern portions of the project boundary.. The overall rating for the Creation AA remained at a Category III wetland characterized by low disturbance in 2018. The ratings were high for general wildlife habitat, flood attenuation, short- and long-term surface-water storage, sediment/nutrient/toxicant removal, and production export/food chain support. The number of units and acreage are expected to increase as some areas of upland in the excavated areas (community Type 18 – *Lotus corniculatus/Phleum pratense*) transition to wetland habitat, provided sufficient wetland hydrology continues to supply the site.

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. Sediment/ shoreline stabilization increased from moderate to high 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 2018.

The 1.1-acres 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 that was recognized on previous evaluations and resulted in a decrease of actual points and functional units. The Preservation AA scored 6.44 functional units in 2018.

Table 2-2. Montana Wetland Assessment Method Summary for the Easton Ranch Site From 2011 Through 2018 (Page 1 of 3)

Function and Value Parameters From the 2008 MDT Montana Wetland Assessment Method	2011 Creation	2012 Creation	2013 Creation	2014 Creation	2015 Creation	2016 Creation	2017 Creation	2018 Creation
Listed/Proposed T&E Species Habitat	Low (0.1)	Low (0.1)	Low (0.1)	Low (0.0)	Low (0.0)	Low (0.0)	Low (0.0)	Low (0.0)
Montana Natural Heritage Program (MTNHP) Species Habitat	Mod (0.6)	Low (0.2)	Low (0.2)	Low (0.2)	Low (0.2)	Low (0.2)	Low (0.2)	Low (0.2)
General Wildlife Habitat	Mod (0.7)	Mod (0.7)	Mod (0.7)	Mod (0.7)	Mod (0.7)	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	N/A
Flood Attenuation	Mod (0.5)	Mod (0.5)	Mod (0.5)	Mod (0.5)	Mod (0.5)	Mod (0.5)	Mod (0.5)	High (0.8)
Short- and Long-Term Surface-Water Storage	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	Mod (0.7)	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 (0.2)	Mod (0.6)	Mod (0.6)	Mod (0.6)	Mod (0.6)	Mod (0.6)	Mod (0.6)	Mod (0.6)
Production Export/Food Chain Support	High (0.8)	High (0.8)	High (0.8)	High (0.8)	High (0.8)	High (0.8)	High (0.8)	High (0.8)
Groundwater Discharge/Recharge	High (1.0)	Mod (0.7)	Mod (0.7)	Mod (0.7)	Mod (0.7)	Mod (0.7)	Mod (0.7)	Mod (0.7)
Uniqueness	Low (0.3)	Mod (0.4)	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)	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	**5.75/10**	**5.75/10**	**5.75/10**	**5.65/10**	**5.65/10**	**5.85/10**	**5.85/10**	**6.15/10**
% of Possible Score Achieved	**57.5**	**57.5**	**57.5**	**56.5**	**56.5**	**58.5**	**58.5**	**61.5**
Overall Category	**III**	**III**	**III**	**III**	**III**	**III**	**III**	**III**
Acreage of Assessed Aquatic Habitats Within Easement	**9.09**	**9.09**	**9.74**	**9.98**	**9.34**	**9.34**	**9.79**	**8.93**
Functional Units (acreage × actual points)	**52.27**	**52.27**	**56.01**	**56.39**	**52.77**	**54.64**	**57.27**	**54.98**

Table 2-2. Montana Wetland Assessment Method Summary for the Easton Ranch Site From 2011 Through 2018 (Page 2 of 3)

Function and Value Parameters From the 2008 MDT Montana Wetland Assessment Method	2011 Restoration	2012 Restoration	2013 Restoration	2014 Restoration	2015 Restoration	2016 Restoration	2017 Restoration	2018 Restoration
Listed/Proposed T&E Species Habitat	Low (0.1)	Low (0.1)	Low (0.1)	Low (0.0)	Low (0.0)	Low (0.0)	Low (0.0)	Low (0.0)
MTNHP Species Habitat	Mod (0.6)	Low (0.2)	Low (0.2)	Low (0.2)	Low (0.2)	Low (0.2)	Low (0.2)	Low (0.2)
General Wildlife Habitat	Mod (0.7)	Mod (0.7)	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	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)	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)	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)	High (1.0)
Sediment/Shoreline Stabilization	Mod (0.6)	Mod (0.6)	High (0.9)	High (0.9)	High (0.9)	High (0.9)	High (0.9)	High (0.9)
Production Export/Food Chain Support	Mod (0.7)	Mod (0.7)	Mod (0.7)	Mod (0.7)	Mod (0.7)	Mod (0.7)	Mod (0.7)	Mod (0.7)
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 (0.3)	Mod (0.4)	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)	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	**5.95/10**	**5.65/10**	**5.95/10**	**5.85/10**	**5.85/10**	**5.85/10**	**5.85/10**	**5.85/10**
% of Possible Score Achieved	**59.5**	**56.5**	**59.5**	**58.5**	**58.5**	**58.5**	**58.5**	**58.5**
Overall Category	**III**	**III**	**III**	**III**	**III**	**III**	**III**	**III**
Acreage of Assessed Aquatic Habitats Within Easement	**1.45**	**1.45**	**1.56**	**1.56**	**1.56**	**1.56**	**1.56**	**1.56**
Functional Units (acreage × actual points)	**8.63**	**8.19**	**9.28**	**9.13**	**9.13**	**9.13**	**9.13**	**9.13**

Table 2-2. Montana Wetland Assessment Method Summary for the Easton Ranch Site From 2011 Through 2018 (Page 3 of 3)

Function and Value Parameters From the 2008 MDT Montana Wetland Assessment Method	2011 Preservation	2012 Preservation	2013 Preservation	2014 Preservation	2015 Preservation	2016 Preservation	2017 Preservation	2018 Preservation
Listed/Proposed T&E Species Habitat	Low (0.1)	Low (0.1)	Low (0.1)	Low (0.0)	Low (0.0)	Low (0.0)	Low (0.0)	Low (0.0)
MTNHP Species Habitat	Mod (0.6)	Low (0.2)	Low (0.2)	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)	High (0.9)
General Fish/Aquatic Habitat	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Flood Attenuation	High (0.9)	Mod (0.6)	High (0.9)	High (0.9)	High (0.9)	High (0.9)	High (0.9)	High (0.9)
Short- and Long-Term Surface-Water Storage	High (0.8)	High (0.8)	High (0.8)	Mod (0.6)	Mod (0.6)	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)	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	Exc (1.0)	Exc (1.0)	Exc (1.0)	High (0.9)	High (0.9)	High (0.9)	High (0.9)	High (0.9)
Groundwater Discharge/Recharge	High (1.0)	High (1.0)	High (1.0)	Mod (0.7)	Mod (0.7)	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)	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)	Low (0.05)
Actual Points/Possible Points	**6.95/9**	**6.25/9**	**6.55/9**	**5.85/9**	**5.85/9**	**5.85/9**	**5.85/9**	**5.85/9**
% of Possible Score Achieved	**77.2**	**69.4**	**72.8**	**65.0**	**65.0**	**65.0**	**65.0**	**65.0**
Overall Category	**II**	**II**	**II**	**III**	**II**	**II**	**II**	**II**
Acreage of Assessed Aquatic Habitats Within Easement	**1.1**	**1.1**	**1.1**	**1.1**	**1.1**	**1.1**	**1.1**	**1.1**
Functional Units (acreage × actual points)	**7.65**	**6.88**	**7.21**	**6.44**	**6.44**	**6.44**	**6.44**	**6.44**

Table 2-3 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 2018, the wetland acreage is anticipated to continue to increase with consistent annual precipitation and managed delivery of supplemental irrigation flows to improve hydrology within the site. The site has achieved five of the six goals for this site. Although the site has developed nearly 9 acres of created wetland habitat (11 acres) including wetland creation and restoration, this value exceeds 50 percent short of the 25 acres originally identified as a target for wetland creation. The current wetland acreage is likely to expand with the continued release of irrigation water during the spring and summer to supplement hydrology and restore/maintain hydrology across the northern and northeastern portions of the site.

Five of the six 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.

Table 2-3. 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 8.93 acres of wetland habitat have been created at this site to date. Site observations include the beginnings of a dominance of hydrophytic trees and shrubs within created wetlands can be seen and the presence of young willow and cottonwood seedlings in uplands east of the channel in the northern portion of the project.
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. Wetland vegetation (e.g., young cottonwood seedlings/saplings, planted alder, and willow) 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	The wildlife habitat has been improved by diversifying the site to include various community types, establishing wetland vegetation, and increasing woody vegetation that will continue to support wildlife usage.

The summary of performance standards listed in Table 2-4 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 2018 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 that were 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. Although precipitation was above average this year, the lower-than-average precipitation levels over the past several years have undoubtedly decreased the groundwater levels in the mitigation site and entire Shields Valley. 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 174 live, planted woody stems were observed in 2018, which is approximately 9 more than noted in 2017. Although the number of speckled alder and sandbar willows increased in 2018, the number of live willow cuttings was reduced. The woody plants are increasing in height and coverage and positively trend toward achieving scrub/shrub communities. During the 2017 and 2018 monitoring, speckled alder plants were especially robust and thriving as, and the improvement in woody plant growth is likely attributed to releasing irrigation water and improved hydrology observed across portions of the site.

MDT is working with the landowner to establish a water management plan to divert irrigation flows into the site on a more consistent basis to meet the water right requirements for monitoring usage. Irrigation water was diverted onto the site several times during the spring and summer growing season

A total of 17 bird boxes are present around the perimeter of the site; nine bird boxes were installed at the site between 2010 and 2016, and eight new bird boxes were installed before the 2017 monitoring. Five of the bird boxes were occupied. All of the remaining fences were intact. No maintenance was required for the man-made structures.

The site supports two state-listed noxious weeds (Canada thistle and gypsy-flower) primarily within the uplands and along the site perimeter. The cover classes ranged from trace (< 1 percent) to low (1–5 percent) and moderate (6–25 percent) cover. Canada thistle was observed in community Types 1 – *Phleum pratense/Poa pratensis*, Type 5 – *Populus balsamifera*, and Type 18 – *Lotus corniculatus/Phleum pretense*. The gypsy-flower infestations represent a trace (< 1.0 percent) cover. MDT has an ongoing weed-control program, and contractors sprayed the site on July 5, 2018.

Table 2-4. 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. During 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 most 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 29 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	Preferred 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 12.40 acres of wetland credit has been generated for the site. This total includes 8.93 acres of created wetland, 1.56 acres of restored wetland, 1.10 acres of preserved wetland, establishment of a 11.5-acre upland buffer, and 0.67-acre debit from project impacts.
	Emergent wetland habitat will be 70–75 percent of mitigation wetland.	N	Emergent wetland habitat comprises approximately 71 percent of total wetland areas delineated in 2018.

Table 2-4. 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.	Y	Scrub/shrub wetland habitat comprises approximately 27 percent of total wetland areas delineated in 2018.
	Open water will be less than 5 percent of wetland area.	Y	Aquatic macrophytes habitat composes approximately 2 percent of total wetland areas delineated in 2018 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 northwestern 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 non-weed species by the end of the monitoring period.	Y	Disturbed areas have established greater than 50 percent cover by non-weed species.
Weed Control	Less than 5 percent absolute cover of state-listed noxious weed species 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 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 9 years, since construction activities were completed in 2009.

The east bank of the Shields River along the northwestern 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 2018. Large wood debris accumulation that was noted previously in the floodplain was burned or hauled away. 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 2018 runoff period was supported by above-average precipitation in June.

2.2 FORSYTH NORTHWEST (3 SITES)

The 2018 Forsyth – Northwest (FNW) wetland monitoring report documents the sixth year of monitoring at three of the four FNW sites: (1) West, (2) Middle, and (3) East. Monitoring at the Treasure County Line site (4) was ended after the 2017 monitoring event because the site had reached its maximum wetland development potential, and monitoring was no longer warranted. The FNW sites were developed to mitigate for a cumulative total of 8.98 acres of wetland impacts that are associated with two MDT highway construction projects: (1) the Volborg – North and South project that was constructed in 2004 and (2) the FNW project constructed in 2012. The three 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.

2.2.1 Forsyth Northwest – East (Glendive District, Year 6)

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. This 2.74-acre site is owned by MDT and intended to provide 1.07 acres of compensatory wetland mitigation. Proposed mitigation actions included the following:

- Excavate 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 that was delineated in 2018 totaled 0.56 acre, which is an increase of 0.13 acre since 2017. This increase was likely driven by the above average precipitation received at the site in 2018. Upland buffer accounted for 2.18 acres within the FNW East monitoring boundary. Applying standard wetland compensatory mitigation ratios [USACE, 2005], the site attained an estimated 1.00 credit acre in 2018 (Table 2-5). No performance standards were established for this site.

Table 2-5. Estimated Credit Summary for the Forsyth Northwest – East Wetland Mitigation Site

Habitat Type	Mitigation Ratio	2014 Delineated Acres	2014 Estimated Credit Acres	2015 Delineated Acres	2015 Estimated Credit Acres	2016 Delineated Acres	2016 Estimated Credit Acres	2017 Delineated Acres	2017 Estimated Credit Acres	2018 Delineated Acres	2018 Estimated Credit Acres
Created Wetland	1:1	1.19	1.19	0.46	0.46	0.43	0.43	0.43	0.43	0.56	0.56
Upland Buffer	5:1	1.55	0.31	2.28	0.46	2.31	0.46	2.31	0.46	2.18	0.44
Total		**2.74**	**1.50**	**2.74**	**0.92**	**2.74**	**0.89**	**2.74**	**0.89**	**2.74**	**1.00**

The results of the 2013 through 2018 functional assessments are summarized in Table 2-6. The total aquatic habitat developed to date within the 2.74-acre project area is 0.56 acre. The site was evaluated as one AA, which was rated as a Category III wetland with 48.9 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 2018. Sediment/shoreline stabilization improved from a low to moderate rating from 2015 to 2016 because of an increase in percent cover of wetland species with stability ratings greater than or equal to 6. The site achieved 2.5 functional units in 2018.

Low infestations of noxious weeds continue to persist at the site. Yearly control measures will continue to eliminate noxious weed infestations. The fence along the eastern side of the site was in good condition. No man-made water-control structures have been installed at the East site. A survey may be required to determine if the central area of the excavated area is higher than the northwestern and southeastern ends.

Table 2-6. Montana Wetland Assessment Method Summary for the Forsyth Northwest – East Site From 2013 Through 2018

Function and Value Parameters From the 2008 Montana Wetland Assessment Method	2013	2014	2015	2016	2017	2018
Listed/Proposed T&E Species Habitat	Low (0.0)	Low (0.0)	Low (0.0)	Low (0.0)	Low (0.0)	Low (0.0)
MTNHP Species Habitat	High (0.9)	High (0.9)	High (0.9)	High (0.9)	High (0.9)	High (0.9)
General Wildlife Habitat	Low (0.2)	Mod (0.4)	Mod (0.4)	Mod (0.4)	Mod (0.4)	Mod (0.4)
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	Mod (0.6)	Mod (0.6)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)
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	Low (0.2)	Low (0.2)	Mod (0.6)	Mod (0.6)	Mod (0.6)	Mod (0.6)
Production Export/Food Chain Support	Low (0.2)	Low (0.3)	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)
Uniqueness	Low (0.1)	Low (0.2)	Low (0.2)	Low (0.2)	Low (0.2)	Low (0.2)
Recreation/Education Potential (bonus points)	N/A	N/A	N/A	N/A	N/A	N/A
Actual Points/Possible Points	**3.6/9**	**4.3/9**	**4.4/9**	**4.4/9**	**4.4/9**	**4.4/9**
% of Possible Score Achieved	**40.0%**	**47.8%**	**48.9%**	**48.9%**	**48.9%**	**48.9%**
Overall Category	**III**	**III**	**III**	**III**	**III**	**III**
Total Acreage of Assessed Wetlands Within Site Boundaries	**1.19**	**1.19**	**0.46**	**0.43**	**0.43**	**0.56**
Functional Units (acreage × actual points)	**4.3**	**5.1**	**2.0**	**1.9**	**1.9**	**2.5**

2.2.2 Forsyth Northwest – Middle (Glendive District, Year 6)

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 acre 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 2-7 shows the total delineated acres and credit acres estimated for the FNW Middle site from 2013 through 2018. The 2018 wetland delineation identified 0.58 acre, an increase of 0.09 acre since 2016. The site accrued 0.82 estimated credit acre in 2018. No performance standards were identified for this site. Two noxious weeds were identified within the mitigation site boundaries but exhibited very low percent areal cover (1–5 percent). The percent cover of native hydrophytes was low. The cover of wetland vegetation will increase if favorable hydrologic conditions persist.

Table 2-7. Credit Summary for the Forsyth Northwest – Middle Site

Habitat Type	Mitigation Ratio	2014 Delineated Acres	2014 Estimated Credit Acres	2015 Delineated Acres	2015 Estimated Credit Acres	2016 Delineated Acres	2016 Estimated Credit Acres	2017 Delineated Acres	2017 Estimated Credit Acres	2018 Delineated Acres	2018 Estimated Credit Acres
Created Wetland	1:1	0.49	0.49	0.49	0.49	0.49	0.49	0.58	0.58	0.58	0.58
Upland Buffer	5:1	1.31	0.26	1.31	0.26	1.31	0.26	1.22	0.24	1.22	0.24
Total		**1.80**	**0.75**	**1.80**	**0.75**	**1.80**	**0.75**	**1.8**	**0.82**	**1.80**	**0.82**

The results of the functional assessments from 2013 through 2018 are summarized in Table 2-8. The Middle site was evaluated as one AA and encompassed 0.58 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: a high percentage of bare ground, low vegetation cover, and low quality of wildlife habitat. The disturbance rating went from high in 2013 to moderate in 2014 based on the increased vegetation cover in disturbed areas. The Montana-listed S2 species of concern, grand redstem (*Ammannia robusta*), was documented growing within the constructed wetland in 2013 and provided a high MTNHP rating. The flood attenuation rating was modified based on the 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, sediment/nutrient/toxicant removal, and uniqueness increased from 2013 to 2018 because of less disturbance and higher wetland vegetation cover; no change was observed from 2017 to 2018. This site achieved 42.2 percent of the possible score and a total of 2.2 functional units in 2018, which is an increase of 0.1 unit since 2016 because of the increase in wetland acreage. Continual development of the vegetation cover will result in increased functional units, although the small size of the AA will limit the total score.

Five minor infestations of Canada thistle, which is a Priority 2B noxious weed, were identified at this site in 2018 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.

Table 2-8. Montana Wetland Assessment Method Summary for the Forsyth Northwest – Middle Site From 2013 Through 2018

Function and Value Parameters From the 2008 Montana Wetland Assessment Method	2013	2014	2015	2016	2017	2018
Listed/Proposed T&E Species Habitat	Low (0.0)	Low (0.0)	Low (0.0)	Low (0.0)	Low (0.0)	Low (0.0)
MTNHP Species Habitat	High (0.9)	High (0.9)	High (0.9)	High (0.9)	High (0.9)	High (0.9)
General Wildlife Habitat	Low (0.2)	Mod (0.4)	Mod (0.4)	Mod (0.4)	Mod (0.4)	Mod (0.4)
General Fish/Aquatic Habitat	N/A	N/A	N/A	N/A	N/A	N/A
Flood Attenuation	High (1.0)	N/A	N/A	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)	Mod (0.6)	Mod (0.6)
Sediment/Nutrient/Toxicant Removal	Mod (0.7)	Mod (0.7)	High (0.8)	High (0.8)	High (0.8)	High (0.8)
Sediment/Shoreline Stabilization	Low (0.2)	Low (0.2)	Mod (0.6)	Mod (0.6)	Mod (0.6)	Mod (0.6)
Production Export/Food Chain Support	Low (0.2)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)
Groundwater Discharge/Recharge	N/A	N/A	N/A	N/A	N/A	N/A
Uniqueness	Low (0.1)	Low (0.2)	Low (0.2)	Low (0.2)	Low (0.2)	Low (0.2)
Recreation/Education Potential (bonus points)	N/A	N/A	N/A	N/A	N/A	N/A
Actual Points/Possible Points	**3.9/9**	**3.3/9**	**3.8/9**	**3.8/9**	**3.8/9**	**3.8/9**
% of Possible Score Achieved	**43.3%**	**36.7%**	**42.2%**	**42.2%**	**42.2%**	**42.2%**
Overall Category	**III**	**III**	**III**	**III**	**III**	**III**
Total Acreage of Assessed Wetlands Within Site Boundaries	**0.49**	**0.49**	**0.49**	**0.49**	**0.58**	**0.58**
Functional Units (acreage × actual points)	**1.9**	**1.6**	**1.9**	**1.9**	**2.2**	**2.2**

2.2.3 Forsyth Northwest – West (Glendive District, Year 6)

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 10.55 aquatic habitat acres consisting of approximately 1.29 acres of preexisting wetland habitat and 9.26 acres of created wetlands and open water habitat were delineated in 2018.

Approximately 3.16 acres of upland habitat was mapped on the site in 2018. Table 2-9 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 2018 totaled 10.21, which is a substantial increase from 2017 (6.48 acres).

Table 2-9. Credit Summary for the Forsyth Northwest – West Site

Wetland	Ratio	2014 Delineated Acres	2014 Estimated Credit Acres	2015 Delineated Acres	2015 Estimated Credit Acres	2016 Delineated Acres	2016 Estimated Credit Acres	2017 Delineated Acres	2017 Estimated Credit Acres	2018 Delineated Acres	2018 Estimated Credit Acres
Preserved Wetland	4:1	1.29	0.32	1.29	0.32	1.29	0.32	1.29	0.32	1.29	0.32
Created Wetland	1:1	4.56	4.56	4.72	4.72	4.72	4.72	4.60	4.60	9.26	9.26
Upland Buffer	5:1	7.86	1.57	7.70	1.54	7.70	1.54	7.82	1.56	3.16	0.63
Total		**13.71**	**6.45**	**13.71**	**6.58**	**13.71**	**6.58**	**13.71**	**6.48**	**13.71**	**10.21**

Results of the 2013 through 2018 functional assessments are summarized in Table 2-10. The FNW West site was evaluated as one AA (AA-1) that encompassed 10.55 acres in 2018. The AA was rated as a Category III wetland in 2018 with 59 percent of the total possible points. The site received a high rating for MTNHP species habitat based on the presence of grand redstem (*Ammannia robusta*) within the site, which was observed in 2013 and 2014. The site also received high ratings for short- and long-term surface water storage and recreation/education potential. The site achieved 68.09 functional units in 2018, which is a substantial increase of 27.6 units since 2017. The dike was reconstructed in the late spring of 2017 and was in good functioning condition in 2018.

Table 2-10. Montana Wetland Assessment Method Summary for the Forsyth Northwest – West Site From 2013 Through 2018

Function and Value Parameters From the 2008 Montana Wetland Assessment Method	2013	2014	2015	2016	2017	2018
Listed/Proposed T&E Species Habitat	Low (0.0)	Low (0.0)	Low (0.0)	Low (0.0)	Low (0.0)	Low (0.0)
MTNHP Species Habitat	High (0.9)	High (0.9)	High (0.9)	High (0.9)	High (0.9)	High (0.9)
General Wildlife Habitat	Mod (0.5)	Mod (0.7)	E (1)	E (1)	Mod (0.7)	Mod (0.5)
General Fish/Aquatic Habitat	N/A	N/A	Mod (0.4)	Mod (0.4)	Low (0.3)	Low (0.3)
Flood Attenuation	Mod (0.5)	Mod (0.5)	Mod (0.5)	Mod (0.5)	Mod (0.6)	Mod (0.5)
Short- and Long-Term Surface-Water Storage	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (0.9)	High (0.9)
Sediment/Nutrient/Toxicant Removal	Mod (0.4)	Mod (0.4)	Mod (0.6)	Mod (0.6)	High (1.0)	Mod (0.7)
Sediment/Shoreline Stabilization	Low (0.3)	Mod (0.7)	Mod (0.7)	Mod (0.7)	Mod (0.6)	Mod (0.6)
Production Export/Food Chain Support	Mod (0.6)	High (0.9)	High (0.9)	High (0.9)	High (0.8)	Mod (0.7)
Groundwater Discharge/Recharge	Mod (0.7)	High (1.0)	High (1.0)	High (1.0)	Mod (0.7)	Mod (0.7)
Uniqueness	Mod (0.4)	Mod (0.5)	Mod (0.6)	Mod (0.6)	Mod (0.4)	Mod (0.5)
Recreation/Education Potential (bonus points)	High (0.15)	High (0.15)	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**	**7.05/11**	**6.45/11**
% of Possible Score Achieved	**54.5%**	**67.5%**	**69.6%**	**69.6%**	**64.0%**	**59.0%**
Overall Category	**III**	**III**	**II**	**II**	**III**	**III**
Total Acreage of Assessed Wetlands Within Site Boundaries	**5.44**	**5.85**	**6.01**	**6.01**	**5.89**	**10.55**
Functional Units (acreage × actual points)	**29.6**	**39.5**	**46.0**	**46.0**	**41.5**	**68.09**

Infestations of two Priority 2B noxious weeds, Canadian thistle and leafy spurge were mapped within the project site. Overall, weed infestations are down (< 1 percent cover) across the site from what was observed in 2017 because several previously mapped infestations were flooded in 2018, and weed-spraying activities likely have had a positive impact. MDT has an ongoing weed-control program that assesses and employs weed-control measures within their wetland mitigation sites on an annual basis.

Weeds were sprayed at this site on July 2, 2018. In general, noxious weed cover has decreased because of the MDT's yearly weed control.

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 worked with the USACE to facilitate a permanent engineered repair for the dike. Because of this coordination, MDT received a Nationwide Permit (NWP) #3 permit from the USACE to conduct repairs in the fall/winter of 2016/2017. The dike was reconstructed in the late spring of 2017 and was in good functioning condition in 2018. Fencing around the perimeter of the monitoring areas was in good condition in 2018.

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 2018 was less than 1 percent site-wide.

2.3 FORT PECK – NORTHEAST (GLENDIVE DISTRICT, YEAR 2)

The Fort Peck – Northeast wetland mitigation project is located in Section 22, Township 27 North, Range 41 East, Valley County, Montana. This MDT-owned property is located approximately 5 miles north of Fort Peck, Montana, and is adjacent to the Intersection of MT117 and G-C Road. The site is intended to provide 3.41 acres of compensatory wetland mitigation credits for wetland impacts associated with the Fort Peck – Northeast highway reconstruction project and to serve as a mitigation bank for future transportation projects in Watershed #12 – Lower Missouri River. The objectives of this project include establishing (creating) emergent marsh wetlands and providing a protective 50-foot-wide upland buffer around created wetlands.

This 4.52-acre site was selected based on its geomorphic location below a natural terrace and near several small drainage features that flow toward the site. These drainages supply surface runoff from precipitation events at a frequency and duration during the growing season that will encourage wetland development at the site. Hydrology from these natural drainages has historically been used to irrigate the pasture at this location with excess water drained off to the south and east of the site in adjacent roadside ditch wetlands. The clay soils at this site would allow for water collection at peak times of the year and would reduce natural infiltration below the surface. Wetlands existed in the borrow ditches adjacent to the roadway in this area before construction.

Upon completion of the feasibility evaluation of the site, the probability of creating a self-sustaining aquatic resource at this location was determined to likely be very high. Developing an aquatic resource on this site would require a minimum amount of construction and, over the long term, would require minimal maintenance. The favorable soils and the high probability of sufficient hydrology for the site were two of the primary factors in this decision to move forward with mitigation at this location. MDT

selected this site for on-site wetland development because no approved wetland mitigation banks are currently within the Watershed #12 – Lower Missouri River Basin.

The project objectives include the following:

- 3.13 acres of emergent marsh wetland will be created by excavating down to the preferred ground elevation in the proposed wetland cell.
- 1.39 acres of upland buffer will be developed along the entire perimeter of the wetland.

2018 was the second year of monitoring at the Fort Peck – Northeast site following construction in the fall of 2015. Table 2-11 summarizes the current estimated wetland credits based on the USACE-approved credit ratios [USACE, 2005] and the wetland delineation that was completed in July 2018. The mitigation area currently supports 2.9 acres of palustrine emergent wetland in the excavated cell and 1.6 acres of upland habitat within a 50-foot buffer of the wetlands. Applying the USACE-approved ratios to these values, a total of 3.22 acres of mitigation credit have already developed, which is just short of the anticipated 3.41 credit acres.

Table 2-11. Wetland Mitigation Credits Estimated for the Fort Peck – Northeast Site From 2017 Through 2018

Compensatory Mitigation Type	Mitigation Area Description	Wetland Type[(a)]	Anticipated Mitigation Surface Area (acres)	USACE-Approved Mitigation Ratios	Anticipated Mitigation Credit (acres)	2017 Delineated Acres	2017 Mitigation Credit (acres)	2018 Delineated Acres	2018 Mitigation Credit (acres)
Creation (Establishment)	Depressional wetlands	Palustrine emergent	3.13	1:1	3.13	2.90	2.90	2.90	2.90
Upland Buffer	50-foot-wide upland perimeter	N/A	1.39	5:1	0.28	1.60	0.32	1.60	0.32
Totals			**4.52**		**3.41**	**4.5**	**3.22**	**4.5**	**3.22**

(a) Cowardin et al. [1979].

The 2008 MDT MWAM [Berglund and McEldowney, 2008] was used to evaluate the functions and values of the 2.9 acres of developed wetland at the site. Project wetlands received high ratings for short- and long-term surface-water storage, sediment/nutrient/toxicant removal, and recreation/education potential, while receiving low to moderate ratings for all other assessed functions and values. These values are provided in Table 2-12.

No diversion structures or nesting structures are currently installed at the site. The fence and access gate that were installed around the site following construction were in good condition at the time of the field survey, and no maintenance is necessary. One small infestation of Canada thistle, which is a Priority 2B noxious weed, was observed along the southern boundary of the site in 2017 but not in 2018. 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.

Table 2-12. Functions and Values of the Fort Peck – Northeast Site From 2017 Through 2018

Function and Value Parameters 2008 MDT Montana Wetland Assessment Method	2017 Wetland Creation	2018 Wetland Creation
Listed/Proposed T&E Species Habitat	Low (0.0)	Low (0.0)
MTNHP Species Habitat	Low (0.1)	Low (0.1)
General Wildlife Habitat	Mod (0.4)	Mod (0.4)
General Fish/Aquatic Habitat	N/A	N/A
Flood Attenuation	N/A	N/A
Short- and Long-Term Surface-Water Storage	High (0.9)	High (0.9)
Sediment/Nutrient/Toxicant Removal	High (0.9)	High (0.9)
Sediment/Shoreline Stabilization	N/A	N/A
Production Export/Food Chain Support	Mod (0.6)	Mod (0.6)
Groundwater Discharge/Recharge	N/A	N/A
Uniqueness	Low (0.3)	Low (0.3)
Recreation/Education Potential	Mod (0.1)	High (0.15)
Actual Points/Possible Points	**3.3/7.0**	**3.35/7.0**
% of Possible Score Achieved	**47%**	**48%**
Overall Category	**III**	**III**
Total Acreage of Assessed Wetlands within Site Boundaries (ac)	**2.9**	**2.9**
Functional Units (acreage × actual points)	**9.57**	**9.75**

Table 2-13 provides a summary of the site conditions in relation to the established performance standards and success criteria. Success criteria related to all identified performance standards were being met in the first year of monitoring. All of the performance standards and success criteria will continue to be monitored annually.

Table 2-13. Summary of Performance Standards and Success Criteria for the Fort Peck Northeast Site

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 GP Regional Supplement.	Y	With the introduction of salvaged wetland soil to the excavated depression and the immediate saturation of soil, this mitigation site very quickly developed all three wetland parameters.
Wetland Hydrology	Soil saturation is present for at least 12.5 percent of the growing season.	Y	Soil is sufficiently saturated in the excavated depression to support a prevalence of wetland vegetation.
Hydric Soil	Hydric soil conditions are present or appear to be forming.	Y	Hydric soil was brought in to line the bottom of the excavation, so this criterion has been met.
	Soil is sufficiently stable to prevent erosion.	Y	Soil is very stable; no erosion noted.
	Soil is able to support plant cover.	Y	Plant cover in the wetland exceeded 80 percent in Year 2.
Hydrophytic Vegetation	Wetlands are delineated as hydrophytic by using technical guidelines.	Y	FAC, FACW and OBL plant species dominate the wetland depression.
	Noxious weeds do not exceed 5 percent cover.	Y	No noxious weeds were identified at the site in 2018.
	Hydrophytic vegetation success will include achieving a minimum overall vegetation cover of 80 percent in created wetland areas within 5 years after site construction.	Y	Plant cover in the wetland exceeded 80 percent after Year 2.
Open Water	This project is meant to provide seasonal open water during the spring and early summer months within this site. Open water will, therefore, be considered successful and creditable as wetland vegetation establishes in the form of either emergent, floating, and/or submerged species of plants.	Y	The site had no standing water at the time of the July 10, 2018, field survey, but evidence of standing water at the site in the form of drift lines indicates that seasonal standing water was present in 2018.
Upland Buffer	Noxious weeds do not exceed 5 percent cover within the buffer areas on site.	Y	Noxious weed cover was < 1 percent at the site in 2018.
	Any disturbed area within the creditable buffer zone must have at least 50 percent aerial cover of non-weed species by the end of the monitoring period.	Y	Upland buffer meets this criteria.
Functional Assessments	The site will be considered fully functional and creditable when it achieves a Category III or better rating at the end of the compensatory monitoring period.	Y	This site rates out as a Category III wetland.
Noxious Weeds	The site will be considered successful when noxious weed aerial coverage is less than 5 percent at the end of the 5-year monitoring period.	Y	Noxious weed cover was < 1 percent at the site in 2018.

2.4 JTX – TUNNICLIFF RANCH (BILLINGS DISTRICT, YEAR 3)

The JTX – Tunnicliff Ranch wetland mitigation project is located in Sections 10 and 15, Township 1 North, Range 33 East, Big Horn County, Montana. The site is approximately 4.8 miles north of Hardin, Montana, and was purchased by Montana Fish, Wildlife, and Parks (MFWP) in 2017 as an addition to the Grant Marsh Wildlife Management Area (WMA) and Fishing Access Site (FAS) along the Bighorn River. The site is intended to provide 29.63 acres of compensatory wetland mitigation credits (Table 2-14) 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 include establishing (creating) emergent and scrub/shrub wetlands, riparian floodplain habitat, and a 100-foot-wide upland buffer.

Table 2-14. Wetland Credit Determination for the JTX – Tunnicliff Ranch Site

Compensatory Mitigation Type	Mitigation Area Description	Proposed Wetland Type[(a)]	Mitigation Surface Area (acres)	USACE-Approved Mitigation Ratios	Anticipated Mitigation Credit (acres)
Base Bid Credits					
Creation (Establishment)	Depressional wetland	Palustrine emergent and palustrine scrub/shrub	26.85	1:1	26.85
Creation (Reestablishment)	Woody plant enclosures	Palustrine scrub/shrub	2.73	5:1	0.55
Upland buffer	100-foot wide perimeter	N/A	10.98	5:1	2.20
Preservation	Pre-project wetlands	Palustrine emergent	0.03	1:1	0.03
Temporary impacts	N/A	N/A	0.00	None	0.00
Total Mitigation Credit					**29.63**

(a) Cowardin et al. [1979].

The JTX – Tunnicliff Ranch site is a 50-acre parcel of land within the larger JTX – Tunnicliff Ranch property that was purchased by MFWP in 2017. In 2011, 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.

This project is meant 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 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 the 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- to 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 0.03 acre of existing wetland will be preserved on 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.

2018 was the third year of monitoring at the JTX – Tunnicliff site. The JTX – Tunnicliff Ranch site did not develop any wetlands during the first growing season after construction, which concluded during the winter of 2016. At the time of the 2018 monitoring event, 8.31 acres of wetland habitat had been created within excavated wetland cells. Table 2-15 summarizes the current estimated wetland credits based on the USACE-approved credit ratios [USACE, 2005] and the wetland delineation that was completed in July 2018.

Table 2-15. Wetland Mitigation Credits Estimated for the JTX – Tunnicliff Ranch Site From 2016 Through 2018

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)	2017 Delineated Acres	2017 Mitigation Credit (acres)	2018 Delineated Acres	2018 Mitigation Credit (acres)
Creation (Establishment)	Depressional wetlands	Palustrine emergent and palustrine scrub/shrub	26.85	1:1	26.85	0.0	0.0	3.86	3.86	8.31	8.31
Creation (Reestablishment)	Woody plant enclosures	Palustrine scrub/shrub	2.73	5:1	0.55	2.3	0.5	2.33	0.47	0	0
Preservation	Pre-project Wetlands	Palustrine Emergent	0.03	1:1	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Upland Buffer	100-foot-wide upland perimeter	N/A	10.98	5:1	2.2	0.0	0.0	13.32	2.66	13.32	2.66
Total			**40.6**		**29.63**	**2.3**	**0.5**	**19.51**	**7.02**	**21.66**	**11.00**

(b) Cowardin et al. [1979].

The 2018 results of the functional assessments are summarized in Table 2-16. The site was evaluated as one AA and encompassed 8.31 acres. This site achieved 59 percent of the possible score in 2018, which is 15 percent higher than 2017, and 49.1 functional units in 2018, which is an increase of 33.8 functional units from 2017. As deep-rooted wetland vegetation continues to develop, ratings are expected to increase from moderate to high for several of the function and value variables.

Table 2-16. Montana Wetland Assessment Method Summary for the JTX – Tunnicliff Ranch Site From 2017 Through 2018

Function and Value Parameters From the 2008 Montana Wetland Assessment Method	2017	2018
Listed/Proposed T&E Species Habitat	Low (0.0)	Low (0.0)
MTNHP Species Habitat	Low (0.1)	Mod (0.6)
General Wildlife Habitat	Mod (0.4)	Mod (0.7)
General Fish/Aquatic Habitat	N/A	N/A
Flood Attenuation	Mod (0.5)	Mod (0.6)
Short- and Long-Term Surface-Water Storage	Mod (0.6)	High (0.9)
Sediment/Nutrient/Toxicant Removal	Mod (0.7)	Mod (0.7)
Sediment/Shoreline Stabilization	N/A	Mod (0.6)
Production Export/Food Chain Support	Mod (0.4)	Mod (0.5)
Groundwater Discharge/Recharge	Mod (0.7)	Mod (0.7)
Uniqueness	Mod (0.4)	Mod (0.4)
Recreation/Education Potential (bonus points)	High (0.2)	High (0.2)
Actual Points/Possible Points	**4.0/9**	**5.9/10**
% of Possible Score Achieved	**44%**	**59%**
Overall Category	**III**	**III**
Total Acreage of Assessed Wetlands Within Site Boundaries	**3.86**	**8.31**
Functional Units (acreage × actual points)	**15.3**	**49.1**

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 2018 investigation. Seven bluebird boxes were installed on the site, and all appeared to be full of nesting materials and in good condition.

Four infestations of state-listed Priority 2B noxious weeds were mapped at the JTX – Tunnicliff Ranch site. Noxious species observed in 2018 include Canada thistle (*Cirsium arvense*) and Russian knapweed (*Acroptilon repens*) and did not exceed 5 percent cover across the 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. The number of noxious weed species and cover has decreased since 2016 because of weed-control measures conducted by the MDT.

2.5 KINDSFATER WETLAND (BILLINGS DISTRICT, YEAR 6)

The Kindsfater 2018 Wetland Mitigation Monitoring Report presents the results of the sixth year of post-construction monitoring at the Kindsfater mitigation area. 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 2-17 summarizes the current estimated wetland credits based on the USACE-approved credit ratios and the wetland delineation completed in June 2018. Mitigation areas delineated at the Kindsfater site in 2018 include 4.7 acres of creation, 6.1 acres of reestablishment, 1.0 acre of rehabilitation, 3.0 acres of enhancement, 17.6 acres of wetland preservation, and 22.6 acres of upland buffer. Applying the USACE-approved ratios to these values, a total of 21.4 acres of mitigation credit have been estimated in 2018, a value well below the targeted 32.7 acres anticipated at this site. Although 2018 represents only the sixth year of monitoring, the attainment of the full target value of 32.7 credit acres may prove difficult without an increase of groundwater or supplemental water into the mitigation area.

Table 2-17. Wetland Mitigation Credits Estimated for the Kindsfater Site From 2013 Through 2018

Compensatory Mitigation Type	Mitigation Area Description	Wetland Type[a]	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[b]	2016 Mitigation Credit (acres)	2017 Delineated Acres[b]	2017 Mitigation Credit (acres)	2018 Delineated Acres[b]	2018 Mitigation Credit (acres)
Creation (Establishment)	Wetland Cells 7, 9, 13, & 14	Lacustrine emergent	4.6	1:1	4.6	1.8	1.8	1.8	1.8	1.8	1.8	2.0	2.0	2.2	2.2	4.7	4.7
Restoration (Reestablishment)	Wetland Cells 1–6 and partial Cell 18	Lacustrine emergent and Palustrine emergent, scrub-shrub	14.0	1:1	14.0	7.9	7.9	7.9	7.9	7.9	7.9	7.8	7.8	6.8	6.8	6.1	6.1
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	1.0	0.7	1.0	0.7
Enhancement	Wetland Cells 10–12 & Partial Cell 8	Palustrine emergent, scrub-shrub	3.1	3:1	1.0	3.0	1.0	3.0	1.0	3.0	1.0	3.4	1.1	3.0	1.0	3.0	1.0
Preservation	Existing Wetland Areas	Palustrine emergent, scrub-shrub	21.9	4:1	5.5	21.9	5.5	21.3	5.3	21.3	5.3	20.3	5.1	20.5	5.1	17.6	4.4
Upland Buffer	50-foot-wide upland perimeter	N/A	7.3	5:1	1.5	22.9	1.46[c]	22.8	4.56[d]	22.9	4.6[d]	22.6	4.5	22.6	4.5	22.6	4.5
Total			**60.1**		**32.7**	**58.4**	**21.3**	**57.7**	**39.2**	**57.8**	**39.2**	**57.0**	**21.1**	**56.1**	**20.3**	**55.0**	**21.4**

(a) Cowardin et al., 1979.
(b) The 2016–2018 credit areas are derived were from a .dgn file (5034000ENDETZ01.DGN) provided by MDT. A shapefile of the credit areas (MDT_Crediting_polys.shp) was created in Autodesk Civil 3D, exported, laid over the 2018 delineated wetland boundaries in ArcMap, and used to calculate acreages.
(c) Estimated credit acres for upland buffer included the 1.46 acres anticipated in USACE-approved mitigation plan.
(d) Value calculated using GIS.

The 2008 MDT MWAM [Berglund and McEldowney, 2008] was used to evaluate two general AAs (Table 2-18). The AAs were generally separated by creation, and preexisting wetland areas are described below. In 2018, the Existing Wetland AA included 17.6 acres of preservation wetland habitat, 7.1 acres of restoration habitat, and 3.0 acres of enhancement habitat for a total of 27.7 acres. The Existing Wetland AA was rated as a Category III wetland and scored 65 percent of the possible points and 144.04 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 4.7 acres of constructed palustrine, emergent wetlands and included Cells 9, 13, 14, and a portion of Cell 7 and new wetlands along the lower slope. This AA was rated as a Category III wetland with 61 percent of the possible points and a total of 23.02 functional units. Recreational use was reflected in a moderate disturbance rating for the site in 2018. The AA received a high rating for MTNHP species habitat because of the documented primary habitat of the plains spadefoot (an S3 sensitive species) observed in 2013. The AA was also given a high rating for recreation/education potential because access to the site is permitted to the public without permission. In 2018, the hydrophytic vegetation cover continues to increase in the AA, which resulted in a high rating for sediment/nutrient/toxicant removal. The rating for this AA has increased as preferred vegetation cover improves and portions of the site retains wetland hydrology.

Table 2-19 provides a summary of the site conditions in relation to the established performance standards and success criteria. This site meets the established performance standards, except for the success criteria that measures desirable hydrophytic herbaceous plant cover across all the wetlands and the woody plantings survival. All wetlands that were delineated within the Kindsfater site in 2018 met the three criteria outlined in the 1987 Wetland Manual and 2010 GP Regional Supplement. The percent cover by desirable hydrophytic vegetation varied across the wetland sites. Overall, most of the restored, enhanced, created, and preserved wetlands exhibited 80 percent cover by preferred hydrophytic vegetation; however, a few areas that are close to and approaching 80 percent hydrophytic vegetation cover remain. Created wetland areas exhibited less than 5 percent cover from noxious weeds, whereas the upland buffer areas exhibited close to 5 percent cover by 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. Woody planting survival was estimated at 11 percent during the 2018 survey, which is well below the 50 percent threshold for success. However, the percentage of volunteer woody species in several areas was estimated at 45 percent with trends toward increasing volunteer woody species. Young aspen seedlings and eastern cottonwood seedlings and saplings were noted in and around the perimeter of wetland Cell 6 as well as narrow-leaf seedlings and saplings within wetland Cell 9. Comprehensive site monitoring has occurred for 6 years, which is the minimum number of monitoring years as determined by the USACE Montana Regulatory Office's review of annual monitoring reports for the site and attaining 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 2018 investigation. Two bluebird boxes were installed on the site. The two trees that the bird boxes were mounted had fallen over before the 2018 survey, which rendered the boxes unusable. This site appears to be used by a high number of people for a variety of recreational activities.

Table 2-18. Functions and Values of the Kindsfater Site From 2013 Through 2018

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)	2017 AA 1 (Existing Wetlands)	2018 AA 1 (Existing Wetlands)	2013 AA 2 (Created Wetlands)	2014 AA 2 (Created Wetlands)	2015 AA 2 (Created Wetlands)	2016 AA 2 (Created Wetlands)	2017 AA 2 (Created Wetlands	2018 AA 2 (Created Wetlands)
Listed/Proposed Threatened and Endangered 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)	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)	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)	Mod (0.5)	Mod (0.5)	Low (0.3)	Low (0.3)	Low (0.3)	Mod (0.5)	Mod (0.5)	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	N/A	N/A
Flood Attenuation	N/A	N/A	N/A	N/A	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)	High (0.9)	High (0.9)	Mod (0.6)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Mod (0.6)
Sediment/Nutrient/Toxicant Removal	High (0.9)	High (0.9)	High (0.9)	High (0.9)	High (0.9)	High (0.9)	Mod (0.5)	Mod (0.7)	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	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)	Mod (0.8)	Mod (0.8)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Mod (0.4)	Low (0.5)
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)	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 (0.3)	Low (0.3)	Low (0.2)	Low (0.2)	Low (0.2)	Low (0.2)	Low (0.3)	Low (0.3)
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)	High (0.2)	High (0.2)	High (0.2)	High (0.20)
Actual Points/Possible Points	**4.7/8**	**4.7/8**	**4.7/8**	**4.9/8**	**5.2/8**	**5.2/8**	**3.7/8**	**3.6/8**	**3.9/8**	**4.1/8**	**4.3/8**	**4.9/8**
% of Possible Score Achieved	**59%**	**59%**	**59%**	**61%**	**65%**	**65%**	**46%**	**45%**	**49%**	**51%**	**54%**	**61%**
Overall Category	**III**	**III**	**III**	**III**	**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**	**31.2**	**27.7**	**1.8**	**1.8**	**1.8**	**2.0**	**2.2**	**4.7**
Functional Units (acreage × actual points)	**158.44**	**155.57**	**155.57**	**152.28**	**162.29**	**144.04**	**6.55**	**6.37**	**7.02**	**8.2**	**9.46**	**23.03**

Table 2-19. 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	Meet the three parameter criteria for hydrology, vegetation, and soils as outline din the 1987 Wetland Delineation Manual and 2010 Great Plains Region.	Y	Areas identified as wetland habitat within the mitigation site meet the three parameter criteria.
Wetland Hydrology	Soil saturation present for at least 12.5 percent of the growing season.	Y	Areas identified as wetland habitat within the mitigation site exhibit soil saturation for a minimum 12.5 percent of the growing season.
Hydric Soil	Hydric soil conditions present or appear to be forming.	Y	The recently constructed wetland complex exhibits weak hydric soil development, including faint redoximorphic concentrations observed within several of the excavated depressions. Preexisting hydric soil characteristics are present in several areas identified as wetland prior to project construction.
	Soil is sufficiently stable to prevent erosion.	Y	Disturbed soil is stable and does not exhibit signs of erosion.
	Soil is able to support plant cover.	Y	Plant cover has continued to develop across disturbed soils.
Hydrophytic Vegetation	Achieved when wetlands delineated as hydrophytic utilizing technical guidelines.	Y	Areas identified as wetland habitat within the mitigation site support a prevalence of hydrophytic vegetation (OBL< FACW, and FAC).
	Noxious weeds do not exceed 5 percent cover.	Y	Although several noxious weed infestations have been mapped across this site, these infestations are generally located outside of excavated wetlands. Overall, the estimated noxious weed cover within delineated wetlands is less than 5 percent.
	Hydrophytic vegetation success will include achieving a minimum overall vegetation cover of 80 percent in created wetland areas within 5 years following site construction.	N	The majority of created wetlands exhibited 80 percent hydrophytic vegetation cover during the 2018 monitoring event. However, there are a few cells with improved or increased vegetation cover by hydrophytic vegetation but still do not meet 80 percent cover, this is anticipated to improve in subsequent monitoring years.
Woody Plants	Plantings will be considered successful where they exceed 50 percent survival after 5 years.	N	Approximately 11 percent of the woody plantings observed were alive in 2018, which does not meet the 50 percent survival criteria. However, several wetland cells exhibit at least 45 percent cover by volunteer woody species which are expected to continue expanding across the site. This cover values 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	There are still areas around two wetland cells where cover by desirable hydrophytic vegetation is less than 80 percent due to rocky soils or drier south facing slopes. Some of these bank slopes were intentionally left as gravel or rock to allow for shorebird (e.g., killdeer and sandpipers) nesting habitat. These areas have showed increased overall vegetation cover but may not meet this criteria in subsequent monitoring years.
Open Water Areas	Open water that is established within the designated wetland cells will be considered successful and creditable.	Y	Seasonal open water was present within 2 of the 3 wetland enhancement cells (Cell 8 and Cell 12). Wetland Cell 10 lacked open water in 2018. Overall water depths ranged from 2 to 5 inches deep. These areas were generally vegetated with various herbaceous and woody hydrophytic species.

Table 2-19. 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	Success will be achieved when noxious weeds do not exceed 5 percent cover within the buffer areas on site.	Y	Noxious weed infestations, including field bindweed, leafy spurge, gypsy-flower, spotted knapweed and Canada thistle have been mapped within the site but do not exceed 5 percent. MDT will continue to implement weed control measures to maintain this criteria.
	Any area disturbed within creditable buffer zones must have at least 50 percent aerial cover of 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 non-weed species.
Weed Control	Success will be achieved where < 5 percent absolute cover of noxious weed species occurs across the site.	Y	The estimated coverage of noxious weeds within the constructed wetlands is below 5 percent, state-listed noxious weed species across the entire site has been estimated at less than 5 percent absolute cover in 2018.
Fencing	Install wildlife-friendly fencing along the easement boundaries.	Y	Wildlife-friendly fencing has been installed around the easement boundaries and is in good condition.
Monitoring	Monitor the site for a minimum period of five years or longer as determined by the US Army Corps.	Y	Comprehensive site monitoring has been ongoing for 6 years.

Twenty-four infestations of state-listed Priority 2B noxious weeds were mapped at the Kindsfater site. Eight infestations of Canada thistle, six infestations of leafy spurge, six infestations of field bindweed, three infestations of gypsy-flower, and one infestation of spotted knapweed were identified with cover classes that ranged from low (1–5 percent), to high (26 to 36 percent cover). Most of the higher cover noxious weed infestations that were identified occur along the south-facing slope above the lower terrace and field bindweed grows under waist tall grass. A large dense patch of Canada thistle, gypsy-flower, and field bindweed were mapped near the southern property boundary with waist tall grass. The central portion of the project site (near Cells, 4, 9, 10, and 11) was also mapped with low to moderate infestations of noxious weeds. Great mullein and poison hemlock plants (Yellowstone County noxious weeds) were also observed in a few areas across portions of community Type 6 – *Elymus trachycaulus/Bromus* spp., and Type 14 – *Elymus* spp./*Bromus* spp. Scotch thistle plants (also a Yellowstone County noxious weed) were observed along the southeastern side of wetland Cell 8 within community Type 3.

The overall extent of weed infestations observed in 2018 does not exceed the success criterion for weed populations at 5 percent site-wide. A weed contractor with MDT treated this site in 2012 before construction. MDT's weed contractor treated the site on July 4, 2018, and concentrated on areas of infestations by Canada thistle, leafy spurge, field bindweed, great mullein, and gypsy-flower. MDT has an ongoing weed-control program for their mitigation sites that includes an annual assessment of weeds identified at each location and treatment to contain and control identified populations.

2.6 ROSTAD RANCH (BUTTE DISTRICT, YEAR 6)

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 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 the following:
    - Palustrine, emergent, wet meadow
    - Palustrine, scrub/shrub
    - Lacustrine, littoral – emergent zones around the open-water areas around the perimeter of wetlands

Post-construction monitoring at this site between 2013 and 2016 revealed that less than half of the anticipated mitigation credits had developed at the site with no encouraging signs that more wetland would develop without modifying the site. During the spring of 2017, adaptive management efforts were initiated through a series of small berms and supply ditches that were constructed at the site to help spread irrigation water across a broader area than had been previously flooded. 2018 represents the second year of monitoring since site improvements were completed.

The Lennep 6 WSW (244954) weather station [Western Regional Climate Center, 2018a] is located near the site (approximately 11 miles southwest) and has a period of record that extends from August 1959 through August 2017. 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), 10.81 inches (2016), 8.16 inches (2017), and 18.55 (2018). The data that were collected after construction indicate below-average precipitation in 2012, 2015, 2016, and 2017; near-average precipitation in 2013; and above-average precipitation in 2014 and 2018.

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 2018 field survey, approximately 85 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 southern half of the site. MDT turned the irrigation water into the Rostad site on June 8; this water was shut off on September 6. In total, approximately 106 acre-feet of water was used at the site in 2018. Water depths ranged from 0.25 to 3.0 feet and averaged 1.0 foot. Areas that were not inundated exhibited seasonal soil saturation to the ground surface.

Table 2-20 summarizes the estimated wetland credits based on the USACE-approved credit ratios and the wetland delineation completed in July 2018. 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 2018 included 14.62 acres of reestablished wetlands, 0.81 acres of rehabilitated wetland, 13.83 acres of created wetland, and 0.25 acre of preservation wetland (community Type 3). The total mitigation credit estimated in 2018, including the upland buffer credit and the deduction for the 0.41-acre wetland impact that was incurred during mitigation construction, totaled 29.34 credit acres, which is an increase of 14.15 acres since 2016.

Table 2-20. Summary of Wetland Credits at the Rostad Ranch Site From 2015 Through 2018

Compensatory Mitigation Type	Wetland Type[a]	Approved Mitigation Ratio[b]	Anticipated Mitigation Area (acres)	Anticipated Mitigation Credit (acres)	2015 Delineated Mitigation Areas (acres)	2015 Estimated Mitigation Credit (acres)	2016 Delineated Mitigation Areas (acres)	2016 Estimated Mitigation Credit (acres)	2017 Delineated Mitigation Areas (acres)	2017 Estimated Mitigation Credit (acres)	2018 Delineated Mitigation Areas (acres)	2018 Estimated Mitigation Credit (acres)
Restoration (Reestablishment)	Palustrine emergent	1:1	27.11	27.11	9.91	9.91	9.96	9.96	14.62	14.62	14.62	14.62
Creation (Establishment)	Palustrine emergent	1:1	9.84	9.84	3.18	3.18	3.18	3.18	10.74	10.74	13.18	13.18
Restoration (Rehabilitation)	Palustrine emergent	1.5:1	2.63	1.75	1.56	1.04	1.56	1.04	0.81	0.54	0.81	0.54
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**	**21.66**	**15.13**	**21.72**	**15.19**	**33.18**	**26.90**	**35.62**	**29.34**

(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.

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 2018. All of the wetlands identified from 2013 through 2018 were evaluated as one AA. The results of the 2004 and 2014 through 2018 assessments are summarized in Table 2-21.

Table 2-21. Functions and Values of the Rostad Ranch Site From 2004 and 2014 Through 2018

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	2014[(b)]	2015[(b)]	2016[(b)]	2017[(b)]	2018[(b)]
Listed/Proposed T&E Species Habitat	Low (0.0)	Low (0.0)	Low (0.0)	Low (0)	Low (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)	High (0.9)
General Wildlife Habitat	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Mod (0.5)	Mod (0.5)	Mod (0.5)	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	Low (0.2)	Low (0.2)	Low (0.2)	Mod (0.6)	Mod (0.6)	Mod (0.6)	High (0.9)	High (0.9)
Sediment/Nutrient/Toxicant Removal	Mod (0.6)	Mod (0.6)	Mod (0.6)	Mod (0.7)	High (1.0)	High (1.0)	High (1.0)	High (1.0)
Sediment/Shoreline Stabilization	Mod (0.6)	Mod (0.6)	N/A	Mod (0.6)	High (0.9)	High (0.9)	High (0.9)	High (0.9)
Production Export/Food Chain Support	Mod (0.7)	Mod (0.7)	Low (0.3)	Mod (0.6)	High (0.8)	High (0.8)	High (0.8)	High (0.8)
Groundwater Discharge/Recharge	High (1.0)	High (1.0)	N/A	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 (0.3)	Low (0.3)	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)	Low (0.05)
Actual Points/Possible Points	**3.9/10**	**3.9/10**	**1.9/8**	**4.65/9**	**5.75/9**	**5.75/9**	**6.05/9**	**6.05/9**
% of Possible Score Achieved	**39.0%**	**39.0%**	**24.0%**	**51.7%**	**63.9%**	**63.9%**	**67%**	**67%**
Overall Category	**III**	**III**	**III**	**III**	**III**	**III**	**II**	**II**
Total Acreage of Assessed Wetlands Within Site Boundaries	**1.2**	**1.8**	**0.4**	**14.40**	**14.90**	**14.96**	**26.42**	**28.86**
Functional Units (acreage × actual points)	**4.68**	**7.02**	**0.76**	**67.0**	**85.7**	**86.02**	**159.85**	**175.59**

(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 AA was rated as moderately disturbed in 2016 because of increased vegetation growth and time following disturbance from construction and/or grazing/cultivation. In 2017, 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. Wetlands across the site in 2018 rate as Category II with high ratings for MTNHP species habitat, sediment/nutrient/toxicant removal, sediment/shoreline stabilization, and production export/food chain support. The 13.90-acre increase in wetland acreage from 2016 to 2018 increased the total functional units from 85.7 to 175.59.

Table 2-22 provides a summary of the approved performance standards and success criteria based on site conditions documented in 2018. All of the wetlands delineated at the Rostad Ranch site in 2018 satisfied the three criteria of wetland hydrology, hydrophytic vegetation, and hydric soils. Willow stakes that were planted within the site exhibited a 50 percent survival rate; however, not all of the live cuttings may have been located because of tall grass. Although the site was recently disturbed from construction efforts in 2017, 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 approximately 2 percent in 2018. The cover of noxious weeds within the delineated wetlands was less than 1 percent. The extent of the open water surveyed in 2018 composed approximately 5 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 the site. The entire 60-acre easement area has been fenced to exclude grazing during the development and monitoring phase but may be used as a vegetative management tool in the future.

Priority 2B noxious weeds that were identified within the Rostad Ranch site included hoary alyssum, spotted knapweed, and Canadian thistle. A total of 15 infestation areas were mapped in 2018. The majority of the infestations, with cover classes that range from trace (< 1 percent) to moderate (6–25 percent). Most of the infestation are associated with constructed wetlands in upland community Type 8 and Type 11. Weeds were sprayed at this site on June 30, 2018.

The wildlife-friendly fence that was installed around the easement area was intact during the 2018 site visit. Seven bluebird boxes were installed around the site perimeter in 2012 and were in good condition in 2018. The irrigation headgate structure was in good condition during the 2018 site visit.

Table 2-22. 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 GP 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	Irrigation water was turned into the site on June 8 and turned off on September 6, 2018. All wetlands within the project area were likely saturated for greater than the 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) with absolute cover exceeding 70 percent.
	Noxious weeds do not exceed 5 percent cover.	Y	Noxious weed infestations have been mapped across this site, primarily outside of site wetlands. Noxious weed infestations continue to receive annual treatment and are decreasing site-wide. Estimated noxious weed cover within delineated wetlands is below 5 percent.
Woody Plants	Plantings exceed 50 percent survival after 5 years.	Y	Approximately 50 percent of the woody plantings observed were alive in 2018, which meets 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 2018 monitoring event.
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 10 percent of the total wetland acreage in 2018. These areas are exhibiting emergent vegetation development and are anticipated to continue to develop aquatic macrophyte communities within the 5-year monitoring period.

Table 2-22. 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	Noxious weed infestations, including Canada thistle, spotted knapweed, and hoary alyssum were mapped within the site in 2018. Although a variety of noxious weeds are present throughout the site, aerial coverage does not exceed 5 percent.
	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 2018.
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 2 percent absolute cover in 2018.
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 SCHRIEBER LAKE (MISSOULA DISTRICT, YEAR 4)

The Schrieber Lake Wetland Mitigation 2018 Monitoring Report presents the results of the fourth 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:

2.7.1 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.

2.7.2 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.

2.7.3 Hydrology

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 2017 [Western Regional Climate Center, 2018b]. Annual precipitation in 2015 (21.26 inches), 2016 (21.73 inches), and 2017 (13.64 inches) was approximately 3 inches below the long-term average in 2015 and 2016, and nearly 11 inches below the long-term average in 2017, which was a widespread drought year across Montana. Precipitation from January through July in 2015 (10.38 inches), 2016 (11.42 inches), 2017 (8.46 inches), and 2018 (12.02 inches) were roughly 1–5 inches below the long-term average for that time of year (13.77 inches). In general, the region that surrounds the project area received below-average precipitation over the past 4 years of monitoring. Based on field observations of hydrology within the site over the first 4 years of monitoring, water levels within the excavated basins appeared to be largely influenced by groundwater and stream discharge with moderate influence from direct precipitation. Conversely, precipitation plays a large role in stream discharge from Schrieber Creek because of the ephemeral nature of this stream.

During the July 2018 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 project area wetlands were 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. Thirteen groundwater monitoring wells are located across the Schrieber Lake and Schrieber Meadows wetland complex and are monitored by the US Geological Survey (USGS) monthly from April through October. Groundwater levels fluctuate seasonally; April readings show groundwater levels that are typically at their highest for the year (typically within 1 foot of the surface) and October readings are the lowest

(6–9 feet below the land surface in many cases). The 2018 groundwater level readings during the growing season were comparable to past years. Other site-wide indicators of wetland hydrology included saturation and inundation that is visible on aerial photographs and a seasonal high groundwater table.

2.7.4 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 2-23 summarizes the estimated wetland credits based on the pending USACE-approved credit ratios and the wetland delineation completed in July 2018. The 2018 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 2018 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 3.81 acres of upland buffer. Please note that the 2015 and 2016 credit calculations in Table 2-23 included an upland buffer around all wetlands on the property rather than just the newly established wetlands toward the center of the site. Because MDT only proposes to obtain upland buffer credits on 3.81 acres of upland, these numbers have been adjusted. The 2018 estimated credit acres for this site have exceeded the proposed credit acres. A total of 15.17 credit acres have developed at this site after mitigation construction.

2.7.5 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 2-24). 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)

Table 2-23. Summary of Wetland Credits at the Schrieber Lake Site From 2015 to 2018

Mitigation Type	Total Proposed Acreage	Ratio[a]	Proposed Credit Acres	2015 Delineated Acreage	2015 Credit Acres	2016 Delineated Acreage	2016 Credit Acres	2017 Delineated Acreage	2017 Credit Acres	2018 Delineated Acreage	2018 Credit Acres
Creation	3.06	1:1	3.06	4.80	4.80	4.80	4.80	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	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	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	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	3.81	0.76	3.81	0.76
Permanent Project Impacts	0.02	None	–0.02	–0.02	–0.02	–0.02	–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**	**41.44**	**15.17**	**41.44**	**15.17**

(a) The ratios used are from Column A of the Montana Regulatory Program Wetland Compensatory Mitigation Ratios, April 2005.

(b) A standard 50-foot upland buffer was assumed for the perimeter of the delineated wetland.
Wetland acreages within riparian buffer were subtracted from wetland credit total; the riparian buffer does not include upland buffer acreage.
Riparian buffer areas were used to calculate stream and riparian credits.
No credits are being replaced for the existing Schrieber Lake.

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).

Table 2-24. 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**

2.7.6 Functional Assessment

The 2008 MDT MWAM was used to evaluate the site in 2018; Table 2-25 displays the results of this evaluation. The 2015 functional assessment incorporated the created, restored, and preserved wetlands into one AA. The 2018 functional assessment followed this format. The MWAM AA included all of the delineated wetlands, including the creditable wetlands (37.65 acres); the wetlands within the riparian buffers of Schrieber and Coyote Creeks (3.9 acres); the open water within Schrieber Lake (8.26 acres); portions of Schreiber and Coyote creeks that flow through the wetland areas (1.00 acres); 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 2018. The 52.1-acre AA was rated as a Category I wetland and scored excellent for general wildlife habitat and production export/food chain support and high for listed/proposed threatened and endangered (T&E) species habitat, short- and long-term surface-water storage, sediment/nutrient/toxicant removal, sediment/shoreline stabilization, groundwater/discharge/recharge, and uniqueness. The fish habitat score decreased slightly in 2016 and 2017 from 2015 because brook trout are listed as a Tier IV species rather than Tier III, which was used in the 2015 rating.

Table 2-25. Functions and Values of the Schrieber Lake Site From 2015 to 2018

Function and Value Parameters From the 2008 MDT MWAM[(a)]	2015	2016	2017	2018
Listed/Proposed T&E Species Habitat	High (0.8)	High (0.8)	High (0.8)	High (0.8)
MTNHP Species Habitat	Mod (0.6)	Mod (0.6)	Mod (0.6)	High (0.9)
General Wildlife Habitat	High (1.0)	High (1.0)	High (1.0)	High (1.0)
General Fish/Aquatic Habitat	Mod (0.7)	Mod (0.5)	Mod (0.5)	Mod (0.5)
Flood Attenuation	Mod (0.6)	Mod (0.6)	Mod (0.6)	Mod (0.6)
Short- and Long-Term Surface-Water Storage	High (1.0)	High (1.0)	High (1.0)	High (1.0)
Sediment/Nutrient/Toxicant Removal	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)
Production Export/ Food Chain Support	High (1.0)	High (1.0)	High (1.0)	High (1.0)
Groundwater Discharge/Recharge	High (1.0)	High (1.0)	High (1.0)	High (1.0)
Uniqueness	High (0.9)	High (0.9)	High (0.9)	High (0.9)
Recreation/Education Potential	Mod (0.1)	High (0.2)	High (0.2)	High (0.2)
Actual Points/Possible Points	**9.7/11**	**9.6/11**	**9.6/11**	**9.9/11**
% of Possible Score Achieved	**88.2**	**87**	**87**	**90**
Overall Category	**I**	**I**	**I**	**I**
Acreage of Assessed Aquatic Habitats within Easement (acres)	**51.7**	**51.7**	**51.7**	**52.1**
Functional Units (acreage × actual points)	**501.49**	**496.32**	**496.32**	**515.9**

2.7.7 Performance Standards and Success Criteria

The current site conditions documented in 2018 were evaluated using the approved performance standards and success criteria in Table 2-26. The wetlands delineated in 2018 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 across the site 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 non-weed species.

Table 2-26. Summary of Performance Standards and Success Criteria at the Schrieber Lake Site in 2018 (Page 1 of 4)

Performance Standards	Success Criteria	Criteria Achieved Y/N		Discussion
		SC[(a)]	CC[(b)]	
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	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	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	Y	Hydric soil characteristics have developed throughout a majority of the constructed wetlands.
	Soil is sufficiently stable to prevent erosion.	Y	Y	Disturbed soil is stable and does not exhibit signs of erosion.
	Soil is able to support plant cover.	Y	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	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	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	N	Woody plant survival is very low.
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	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 2-26. Summary of Performance Standards and Success Criteria at the Schrieber Lake Site in 2018 (Page 2 of 4)

Performance Standards	Success Criteria	Criteria Achieved Y/N		Discussion
		SC[(a)]	CC[(b)]	
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.	Y	Y	The ephemeral reaches of Schrieber Creek are establishing at different rates. Reach 1 is at a higher elevation, with a steeper longitudinal slope, and steeper bank slopes, which are all contributing to slower vegetation establishment. Reach 2 is lower elevation with less steep bank slopes and vegetation appears to be establishing at a higher rate, likely also because of the higher moisture availability. As a result, SC1 is not currently meeting the performance criteria; however, SC2 appears to have met the criteria. The downstream reaches of Schrieber Creek (Reaches SC3 and SC7) and both reaches of Coyote Creek (CC1A and CC1B) meet the success criteria because they 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	Y	No lateral migration has been documented along either Schrieber or Coyote Creek to date. However, no physical constraints were constructed to prevent lateral migration.
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.	Y	Y	Transect data derived from bank pin locations during the 2018 monitoring have documented no lateral channel migration since 2015.

Table 2-26. Summary of Performance Standards and Success Criteria at the Schrieber Lake Site in 2018 (Page 3 of 4)

Performance Standards	Success Criteria	Criteria Achieved Y/N		Discussion
		SC[(a)]	CC[(b)]	
Bank Restoration Success	Ratings for the streambank will be based on the Proper Functioning Condition (PFC) rating that determines if the area supports a healthy, stable bank area adjacent to the stream: i.) Functioning – The streambank supports a healthy and stable bank area adjacent to the river. ii.) Functioning at Risk – one or more functions of the streambank 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/Y	Y	An assessment of PFC was performed during the 2018 monitoring year and will also be performed in the 2020 monitoring year. The 2018 monitoring year performed a PFC for three areas of the site (Appendix B). Coyote Creek and Schrieber Creek Reach 3 were grouped into one PFC assessment, and Schrieber Creek Reach 1 and Reach 2 consisted of the remaining two PFC assessment groups. The groups were based on similar stream characteristics. All of the reaches are functioning based on the criteria. Coyote Creek and Schrieber Creek Reaches 2 and 3 were rated as Proper Functional Condition. Reach 1 was rated as Functional – At Risk because of less vegetation establishment and some areas of bare soil along the bank. There is an upward trend in this reach because vegetation continues to establish, just at a slower rate likely because of less moisture availability and steeper bank slopes. The At Risk qualifier was designated because the reach is most susceptible to damage after a large flow event.
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	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 streambank vegetation communities is 70 percent or greater.	Y	Y	Combined areal cover of riparian and streambank vegetation along Schrieber Creek is 86 percent; however, two cross sections indicated a total weighted percent cover below 70 percent. Combined areal cover of riparian and streambank vegetation along Coyote Creek is 100 percent.
	Noxious weeds do not exceed 5 percent cover within the riparian buffer areas.	Y	Y	Noxious weed cover along Schrieber Creek is estimated at 5 percent. Noxious weed cover along Coyote Creek is 1 percent.
	Planted trees and shrubs will be considered successful where they exhibit 50 percent survival after 5 years.	N	N	Planted trees and shrubs along Schrieber Creek exhibit less than 50 percent survival to date. Planted trees and shrubs along Coyote Creek exhibit a 43 percent survival rate to date.

Table 2-26. Summary of Performance Standards and Success Criteria at the Schrieber Lake Site in 2018 (Page 4 of 4)

Performance Standards	Success Criteria	Criteria Achieved Y/N		Discussion
		SC[(a)]	CC[(b)]	
Upland Buffer	Noxious weeds do not exceed 5 percent cover within upland buffer area.	Y	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 non-weed species by end of monitoring period.	Y	Y	Disturbed areas have established greater than 50 percent cover by non-weed 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	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) SC = Schrieber Creek
(b) CC = Coyote Creek.

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 2018 monitoring revealed continued development of vegetation cover along the reaches. Reach 1of Schrieber Creek has yet to fully meet performance criteria established for (1) establishing bank-stabilizing vegetation communities and (2) percent cover of noxious weeds within the riparian corridor. Ongoing drought conditions and the ephemeral nature of this reach results in slower vegetative growth. Reaches 2A, 2B, 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 Reach 1 of Schrieber Creek results in achieving the success criteria and generating all of the anticipated credits.

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 May 20, 2018. 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*).

2.8 SCHRIEBER MEADOWS (MISSOULA DISTRICT, YEAR 8)

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 in Sections 2.81 and 2.82, respectively.

2.8.1 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.

2.8.2 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

2.8.3 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 2-27 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.

Table 2-27. Summary of Wetland Mitigation Credits at the Schrieber Meadows Site From 2013 Through 2018

Mitigation Type	Total Proposed Acreage	Ratio	Proposed 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	2017 Delineated Acreage	2017 Credit Acres	2018 Delineated Acreage	2018 Credit Acres
Creation – USFS/MDT Property	8.91	1:1	8.91	22.43	22.43	22.43	22.43	22.43	22.43	22.43	22.43	22.43	22.43	21.90	21.90
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	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	13.22	4.41
Riparian Buffer[a]		–		8.30	(b)	8.30	(b)	8.30	(b)	8.30	(b)	8.30	(b)	8.30	(b)
Upland Buffer	8.50	5:1	1.70	12.39[c]	2.48	12.39[c]	2.48	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	–0.08	–0.08
Total Mitigation Acreage	**34.01**		**17.25**	**59.72**	**31.54**	**59.72**	**31.54**	**59.72**	**31.54**	**59.72**	**31.54**	**59.72**	**31.54**	**59.72**	**31.01**

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

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 2-27 are described below. Approximately 8.91 acres of wetlands was expected to be created by excavating Cells 1 to 11. The 2013 through 2018 delineated acreages indicated that 21.90 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 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 31.01 acres, which created a surplus of 13.77 credit acres.

The 2018 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 31.01 credit acres have developed at this site after mitigation construction.

2.8.4 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 2-28) and stream credits (Table 2-29).

Table 2-28. 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					

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 2-29. 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					

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.

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 2017. 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 2018. 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 2018 (Table 2-30). 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.

Table 2-30. Functions and Values at the Schrieber Meadows Site From 2010 and From 2012 Through 2018 (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	2017	2018
Listed/Proposed T&E Species Habitat	Low (0.1)	Low (0.3)	Low (0.3)	Low (0.3)	High (0.8)	High (0.8)	High (0.8)	High (0.8)
Montana Natural 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	Mod (0.7)	High (0.9)	Exc (1.0)	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	N/A
Flood Attenuation	N/A	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	Mod (0.6)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)
Sediment/Nutrient/Toxicant Removal	Mod (0.7)	High (1.0)	High (1.0)	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)	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)	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)	High (1.0)
Uniqueness	Low (0.3)	Mod (0.4)	Mod (0.4)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)
Recreation/Education Potential	Low (0.5)	High (0.2)	High (0.2)	High (0.2)	High (0.2)	High (0.2)	High (0.2)	High (0.2)
Actual Points/Possible Points	**5.45/8**	**7.1/9**	**7.2/9**	**8.0/10**	**8.7/10**	**8.7/10**	**8.7/10**	**8.7/10**
% of Possible Score Achieved	**68%**	**79%**	**80%**	**80%**	**87%**	**87%**	**87%**	**87%**
Overall Category	**II**	**II**	**II**	**I**	**I**	**I**	**I**	**I**
Acreage of Assessed Aquatic Habitats Within Easement (acres)	**4.84**	**13.22**	**13.22**	**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**	**115.01**	**115.01**

Table 2-30. Functions and Values at the Schrieber Meadows Site From 2010 and From 2012 Through 2018 (Page 2 of 3)

Function and Value Parameters From the 2008 MDT Montana Wetland Assessment Method[(a)]	2010 Creation/ Enhancement AA	Creation AA						
		2012	2013	2014	2015	2016	2017	2018
Listed/Proposed T&E Species Habitat	Low (0.1)	Low (0.3)	Low (0.3)	Low (0.3)	High (0.8)	High (0.8)	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)	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)	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)	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)	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)	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)	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)	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)	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)	High (1.0)
Uniqueness	Low (0.3)	Low (0.3)	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)	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**	**9.3/11**	**9.3/11**
% of Possible Score Achieved	**68%**	**75%**	**77%**	**80%**	**85%**	**85%**	**85%**	**85%**
Overall Category	**II**	**II**	**II**	**II**	**I**	**I**	**I**	**I**
Acreage of Assessed Aquatic Habitats Within Easement (acres)	**4.84**	**22.40**	**22.43**	**22.43**	**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**	**208.60**	**208.60**

Table 2-30. Functions and Values at the Schrieber Meadows Site From 2010 and From 2012 Through 2018 (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	2017	2018
Listed/Proposed T&E Species Habitat	Low (0.1)	Low (0.3)	Low (0.3)	Low (0.3)	High (0.8)	High (0.8)	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)	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)	Exc. (1.0)	Exc. (1.0)
General Fish/Aquatic Habitat	N/A	N/A	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)	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)	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)	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)	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)	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)	High (1.0)
Uniqueness	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Mod (0.4)	Mod (0.4)	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)	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**	**8.2/10**	**8.2/10**
% of Possible Score Achieved	**68%**	**67%**	**67%**	**74%**	**82%**	**82%**	**82%**	**82%**
Overall Category	**II**	**II**	**II**	**II**	**I**	**I**	**I**	**I**
Acreage of Assessed Aquatic Habitats Within Easement (acres)	**4.84**	**3.46**	**3.46**	**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**	**28.37**	**28.37**

(a) Berglund and McEldowney, 2008.

The 2012 through 2018 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, 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 2012–2018 enhancement AA included 13.22 acres of preexisting wetlands between the Coyote Creek stream restoration and US Highway 2. The AA consists of seasonally and permanently inundated emergent wetland habitat. Functional units in the AA totaled 115.01 in 2018. The AA is rated as a Category I wetland and scored excellent for general wildlife habitat and production export/food chain support and high for MTNHP species habitat, short- and long-term surface-water storage, sediment/shoreline stabilization, groundwater/discharge/recharge, and recreation/education potential.

The 2012–2018 creation AA included 22.43 acres of created wetlands across the site. The AA consists of seasonally inundated emergent wetland and permanently inundated aquatic bed habitat. Functional units in the AA totaled 208.55 in 2018. The AA is rated as a Category I wetland and scored excellent for general wildlife habitat and production export/food chain support and high for MTNHP species habitat, short- and long-term surface-water storage, sediment/shoreline stabilization, groundwater/discharge/recharge, and recreation/education potential.

The current site conditions documented in 2018 are compared to the approved performance standards and success criteria in Table 2-31. The wetlands that were delineated in 2018 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 non-weed species and noxious weeds do not exceed 5 percent cover.

Table 2-31 also 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

Table 2-31. Summary of Wetland Mitigation Credits at the Schrieber Meadows Site From 2013 Through 2018

Mitigation Type	Total Proposed Acreage	Ratio	Proposed 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	2017 Delineated Acreage	2017 Credit Acres	2018 Delineated Acreage	2018 Credit Acres
Creation – USFS/MDT Property	8.91	1:1	8.91	22.43	22.43	22.43	22.43	22.43	22.43	22.43	22.43	22.43	22.43	21.90	21.90
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	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	13.22	4.41
Riparian Buffer[a]		–		8.30	(b)	8.30	(b)	8.30	(b)	8.30	(b)	8.30	(b)	8.30	(b)
Upland Buffer	8.50	5:1	1.70	12.39[c]	2.48	12.39[c]	2.48	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	–0.08	–0.08
Total Mitigation Acreage	**34.01**		**17.25**	**59.72**	**31.54**	**59.72**	**31.54**	**59.72**	**31.54**	**59.72**	**31.54**	**59.72**	**31.54**	**59.72**	**31.01**

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

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 2018. Robust reed canary grass made seeing small shrubs throughout much of the site difficult.

Canada thistle is the primary state-listed Priority 2B noxious weed found in disturbed upland habitat across the site. Ox-eye daisy, houndstongue, orange hawkweed, and spotted knapweed are additional noxious species that have been identified across the site over the last 8 years. Weed infestations occur primarily within upland communities around the perimeter of the site with only a few occurring with the interior of the site, and a weed contractor with MDT treated these areas during May 2018. 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.

2.9 SILICON MOUNTAIN (BUTTE DISTRICT, YEAR 4)

The Silicon Mountain Aquatic Resource Mitigation 2018 Monitoring Report presents the results the fourth 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.

2.9.1 Wetland Mitigation Credits

Table 2-32 summarizes the current estimated wetland credits based on the USACE-approved credit ratios [USACE, 2005] and the wetland delineation completed in June 2018. A total of 28.7 creditable acres were delineated at the Silicon Mountain site in 2018, including 7.1 acres of wetland creation, 10.8 acres of wetland preservation, and 10.8 acres of upland buffer. Applying the USACE-approved ratios to these values, a total of 11.96 acres of mitigation credit have been estimated in 2018; this value exceeds the targeted 11.45 acres anticipated at this site. Accounting for the 4.33 credit acres that Butte Silverbow is seeking from the project, a net of approximately 7.12 credit acres are available for MDT to use as mitigation reserve within Watershed # 2 – Upper Clark Fork River Basin.

2.9.2 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 2-33. 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.

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.

Table 2-32. Wetland Mitigation Credits Estimated for the Silicon Mountain Site From 2015 Through 2018

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)	2017 Delineated Acres	2017 Mitigation Credit (acres)	2018 Delineated Acres	2018 Mitigation Credit (acres)
Creation (Establishment)	Wetland Cells 1, 2, 3, 4, & 5	Palustrine Emergent, Aquatic Bed	6.77	1:1	6.77	6.19	6.19	6.30	6.30	6.30	6.30	7.10	7.10
Preservation	Existing Wetland Areas	Palustrine Emergent, Scrub-Shrub	10.06	4:1	2.52	10.24	2.56	10.30	2.57	10.8	2.70	10.8	2.70
Upland Buffer	50-Foot-Wide Upland Perimeter	N/A	10.80	5:1	2.16	10.8[b]	2.16	10.80	2.16	10.80	2.16	10.80	2.16
Totals			**27.6**		**11.45**	**16.43**	**10.91**	**27.40**	**11.03**	**27.90**	**11.16**	**28.7**	**11.96**

(a) In 2017, two small wetland areas were mapped as part of CT4 (existing wetland) but were not part of the original delineation (because of the land use before the mitigation project).
(b) Actual delineated areas exceeded the creditable acres; therefore, only the requested acreage is reported.

Table 2-33. 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].

2.9.3 Functional Assessment

The 2008 MDT MWAM was used to evaluate the functional values of the created wetlands from 2015 through 2087. Two AAs were assessed in 2015 that included created wetland Cells 2, 3, and 4, and created wetland Cells 1 and 5. From 2016 through 2018, a fourth assessment was completed for wetland Cell 6 (Table 2-34). The created wetland cells were classified into separate AAs based on perennial hydrology and open water observed between 2015 and 2017 in Cells 1 and 5, and seasonal hydrology and saturation observed in Cells 2, 3, and 4 and seasonal hydrology and open water in wetland Cell 6 (2018). As hydrology stabilizes at the site, these AAs will likely shift in subsequent monitoring years, which was noted in 2018 with the addition of open water in portions of Cells 4 and 6. The AA for created wetland Cells 2, 3, and 4 increased slightly from 3.1 acres in 2015 to 3.3 acres in 2016, 2017, and 2018. These cells were characterized by wetland community Types 14 – *Eleocharis palustris/Deschampsia,* 11 – *Typha latifolia, and 16 – Juncus balticus/Eleocharis*; the cells were rated as a Category III wetland with 55 percent of the total possible points in 2018.

This AA received a high functional rating for sediment/nutrient/toxicant removal and moderate ratings for general wildlife habitat, short- and long-term surface water storage, sediment/shoreline stabilization, production export/food chain support, groundwater discharge/recharge, and MTNHP species habitat for Hoary bat and Preble's shrew, both rated as S3. The rating for this AA has increased slightly between 2017 and 2018 because desirable vegetation cover was established in previously disturbed areas and improved hydrology.

The AA for created wetland Cells 1 and 5 encompasses 4.3 acres of excavated wetland cells; the AA is characterized by wetland community Type 7 – Open Water/Aquatic Macrophytes and rated as a Category II wetland with 66 percent of the total possible points in 2018. This AA received high functional ratings for general wildlife habitat, short- and long-term surface water storage, production export/food chain support and groundwater discharge/recharge. Moderate ratings were assessed for flood attenuation, sediment/nutrient/toxicant removal, sediment/shoreline stabilization, and MTNHP species habitat for Hoary bat and Preble's shrew.

The AA for created wetland Cell 6 encompasses 0.09 acre of excavated wetland that is located west of the railroad tracks at the base of a gentle east-facing slope. This AA is characterized by wetland

Table 2-34. Functions and Values of the Silicon Mountain Site From 2015 Through 2018

Function and Value Parameters From the 2008 MDT MWAM[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]	2017 AA 1 (Created Wetland Cells 2, 3, and 4)	2017 AA 2 (Created Wetland Cells 1 and 5)	2017 AA 3 (Preservation Wetlands)[b]	2018 AA 1 (Created Wetland Cells 2, 3, and 4)	2018 AA 2 (Created Wetland Cells 1 and 5)	2018 AA 3 (Preservation Wetlands)[b]	2018 AA 4 (Created Wetland Cell 6)[c]
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)	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)	Mod (0.5)	Mod (0.5)
General Wildlife Habitat	Low (0.3)	Mod (0.5)	Low (0.3)	Mod (0.5)	Mod (0.5)	Low (0.3)	Mod (0.5)	Mod (0.5)	Mod 0.7	High (0.9)	Mod (0.7)	Mod (0.4)
General Fish/Aquatic Habitat	N/A	N/A	N/A	N/A	N/A	N/A	NA	NA	NA	NA	NA	NA
Flood Attenuation	N/A	Mod (0.6)	Mod (0.6)	Mod (0.6)	Mod (0.6)	N/A	Mod (0.6)	NA	NA	Mod (0.6)	NA	NA
Short- and Long-Term Surface Water Storage	Mod (0.6)	High (0.8)	Mod (0.6)	High (0.8)	High (0.8)	Mod (0.6)	High (0.8)	High (0.8)	Mod (0.6)	High (0.8)	High (0.8)	Low (0.3)
Sediment/Nutrient/Toxicant Removal	High (0.8)	Mod (0.7)	High (0.8)	Mod (0.7)	Mod (0.7)	High (0.8)	Mod (0.7)	Mod (0.7)	High (0.8)	Mod (0.7)	Mod (0.7)	Mod (0.7)
Sediment/Shoreline Stabilization	N/A	Low (0.3)	NA	Low (0.3)	Mod (0.7)	N/A	Low (0.3)	Mod (0.7)	Mod (0.6)	Mod (0.7)	Mod (0.7)	Low (0.2)
Production Export/Food Chain Support	Mod (0.7)	Mod (0.7)	Mod (0.7)	Mod (0.7)	Mod (0.7)	Mod (0.7)	Mod (0.7)	Mod (0.7)	Mod (0.7)	High (0.9)	Mod (0.5)	Mod (0.4)
Groundwater Discharge/Recharge	Mod (0.7)	High (1.0)	Mod (0.7)	High (1.0)	High (1.0)	Mod (0.7)	High (1.0)	High (1.0)	Mod (0.7)	High (1.0)	High (1.0)	Mod (0.7)
Uniqueness	Low (0.1)	Low (0.3)	Low (0.1)	Low (0.3)	Low (0.3)	Low (0.1)	Low (0.3)	Low (0.2)	Low (0.3)	Low (0.4)	Mod (0.4)	Low (0.3)
Recreation/Education Potential	Low (0.05)	Low (0.05)	Low (0.05)	Low (0.05)	Low (0.05)	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	**3.75/8**	**5.45/10**	**4.35/9**	**5.45/10**	**5.75/10**	**3.75/8**	**5.45/10**	**5.75/9**	**4.95/9**	**6.55/10**	**5.35/9**	**3.55/9**
% of Possible Score Achieved	**47%**	**55%**	**48%**	**55%**	**58%**	**47%**	**55%**	**64%**	**55%**	**66%**	**59%**	**39%**
Overall Category	**III**	**III**	**III**	**III**	**III**	**III**	**III**	**III**	**III**	**II**	**III**	**III**
Total Acreage of Assessed Wetlands Within Site Boundaries (ac)	**3.1**	**3.1**	**3.3**	**3.0**	**10.3**	**3.3**	**3.5**	**10.8**	**3.3**	**4.31**	**10.8**	**0.09**
Functional Units (acreage × actual points)	**11.63**	**16.90**	**14.35**	**16.35**	**59.22**	**12.37**	**18.93**	**55.62**	**16.33**	**28.22**	**57.78**	**0.32**

(a) Berglund and McEldowney [2008].
(b) Preservation wetlands were assessed in 2016 for the first time.
(c) Created Wetland 6 included in 2018 for the first time.

community Type 7 – Open Water/Aquatic Macrophytes and rated as a Category III wetland with 39 percent of the total possible points in 2018. This AA received moderate ratings for MTNHP species habitat, general wildlife habitat, sediment/nutrient/toxicant removal, production/food chain support, and groundwater discharge/recharge. As the vegetation communities around wetland Cell 6 mature and the hydrology stabilizes, the overall AA rating will improve.

The AA for the preservation wetlands encompassed 10.8 acres, including 0.5 acre of open water. The preservation wetlands include community Types 4 – *Carex spp/Juncus balticus*, 7 – Open Water/Aquatic Macrophytes, 8 – *Salix exigua/Juncus balticus,* and 9 – *Juncus balticus/Elymus repens*. This AA was rated as a Category III wetland with 59 percent of the total possible points for 2018. 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 for Hoary bat and Preble's shrew.

2.9.4 Performance Standards and Success Criteria

Table 2-35 summarizes the site conditions in relation to the established performance standards and success criteria. All of the wetlands delineated within the Silicon Mountain site in 2018 met the three criteria outlined in the 1987 Wetland Manual [Environmental Laboratories, 1987] and 2010 WMVC Regional Supplement [USACE, 2010].

Created wetland areas and the upland buffer exhibited less than 10 percent cover from noxious weeds. MDT implements weed-control measures based on the results of field surveys to minimize and/or eliminate the occurrence of state-listed noxious weed species at the site. Comprehensive site monitoring has occurred for 4 consecutive 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.

2.9.5 Noxious Weeds and Maintenance

A total of 15 infestations of state-listed Priority 2B noxious weeds were mapped at the Silicon Mountain site. Three infestations of spotted knapweed, four infestations of Canada thistle, five infestations of leafy spurge, two infestations of butter-and-eggs (*Linaria vulgaris*), and one infestation of common tansy (*Tanacetum vulgare)* were identified with cover classes that range from trace (less than 1 percent) to moderate (6–25 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. MDT's weed contractor sprayed weed infestations located across the mitigation site on July 6, 2018 In 2018, a significant reduction in Canada thistle, leafy spurge, and spotted knapweed infestations occurred across the uplands.

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 2018 investigation. Several thousand willow sprigs were installed with approximately 18–24 inches of the stems exposed. To date, willow sprig survival is excellent; approximately 85 percent of stems show new stem shoots and leaf growth, increased height, and leaf growth.

Table 2-35. Summary of Performance Standards and Success Criteria at the Silicon Mountain Site in 2018 (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.	Y	Overall, disturbed soil is stable and generally does not exhibit signs of erosion. In 2017, a few rills and gullies were noted on the southern slope of wetland Cell 5, north of the newly constructed bike path, west of DP-2U, which resulted in sediment deposition. In 2018, perennial vegetation was established within and adjacent to the erosion and, with time, the rills and gullies will likely become inactive.
	Soil is able to support plant cover.	Y	Plant cover is establishing within developed wetlands.
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 equal to or 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 that are greater than or equal to 6.

Table 2-35. Summary of Performance Standards and Success Criteria at the Silicon Mountain Site in 2018 (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 with portions of Cells 4 and 6 experience seasonal drawdown; rooted hydrophytic vegetation development has been observed; and wetland Cells 1, 5, and the northern quarter of Cell 4 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.	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 non-weed species by the end of the monitoring period.	Y	Disturbed areas have established greater than 50 percent cover by non-weed 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 post-construction monitoring event. MDT administers an ongoing weed-control program. Noxious weeds were sprayed in July 2018 by MDT's contractor and will continue ongoing weed-control efforts to reduce the existing noxious weed infestations. .

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APPENDIX A
SUMMARY INFORMATION FOR MDT WETLAND MITIGATION SITES

MDT Wetland Mitigation Monitoring
2018 Executive Summary

Site	Year Built	Major Montana Watershed Basin	Pre Project Wetland Acreage & MDT Category	Target Wetland Credit	2018 Wetland / Open Water Acreage and MDT Category	Upland Acreage, Ratio	Total Acreage Credit and Functional Unit as of 2018	SITE NOTES:
MISSOULA DISTRICT:								
Schrieber Meadows South of Libby	Pilot - 2007 Full site - 2011	1- Kootenai River	13.22 ac Category Unknown	17.84 ac	38.58 ac Category I / I / I	12.39 ac 5:1	Creation - 21.9 ac Enhancement - 4.41 ac Restoration - 2.31 ac Upland Buffer - 2.48 ac 351.99 FU	2018 was the eighth monitoring event for the area of the pilot project, and the seventh 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 31.01 wetland credit acres and a total of 35,551 stream mitigation credits in 2018.
Schrieber Lake South of Libby	2014	1- Kootenai River	40.08 ac	13.40 ac	37.7 ac Category I	3.81 ac 5:1	Creation - 4.8 Restoration - 1.62 Enhancement - 1.59 Preservation - 6.42 Upland Buffer - 0.76 515.90 FU	2018 was the fourth 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 15.17 wetland credit acres and a total of 5,059 acres of riparian credits and 13,071 stream restoration credits in 2018. Schrieber Lake is not included in the crediting scheme or totals.
BUTTE DISTRICT:								
Easton Wilsall	2009	13- Upper Yellowstone	1.10 ac	27.41 ac	Create - 8.93 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 - 8.93 ac Upland Buffer - 2.3 ac 70.55 FU	2018 was the ninth 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 12.40 credit acres in 2018 which is a decrease of 0.86 acre from 2017.
Silicon Mountain Silver Bow	2014	2 – Upper Clark Fork of the Columbia River	10.06 ac Category III	11.45 ac	17.9 ac Category II/III	10.8 ac 5:1	Create -7.1 ac Preserve - 10.8 ac 102.65 FU	2018 was the fourth monitoring event for the project area. Anticipated wetland credit acres included 6.77 acres of creation and 10.06 of preservation. Anticipated stream and riparian mitigation credits is 12,369.5. In 2018 the site yielded 11.96 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	28.86 ac Category II	6.76 ac 5:1	Creation - 13.18 ac Re-establishment - 14.62 ac Restoration - 0.54 ac Preservation - 0.06 ac Upland Buffer - 1.35 ac 175.59 FU	2018 was the sixth 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 28.86 credit acres in 2018 following adaptive management implemented at the site in the spring 2017.

Site	Year Built	Major Montana Watershed Basin	Pre Project Wetland Acreage & MDT Category	Target Wetland Credit	2018 Wetland / Open Water Acreage and MDT Category	Upland Acreage, Ratio	Total Acreage Credit and Functional Unit as of 2018	SITE NOTES:
GLENDIVE DISTRICT:								
Fort Peck - Northeast Valley County	Constructed 2015	12- Lower Missouri	0 ac	3.41 ac	2.9 ac Category III	1.6 ac 5:1	Created - 2.9 ac Upland Buffer - 0.32 ac Total - 3.22 ac 9.75 FU	The 2018 monitoring was the second annual monitoring event following construction of the site in the fall of 2015. The site is intended to provide 3.41 acres of compensatory wetland mitigation credits for wetland impacts associated with the Fort Peck – Northeast highway reconstruction project and to serve as a mitigation bank for future transportation projects in Watershed #12 – Lower Missouri River. The site yielded 3.22 credit acres in 2018 which is unchanged from 2017.
Forsyth NW - East Forsyth	2012	14 - Middle Yellowstone	0 ac	1.07 ac	0.56 ac Category III	2.18 ac 5:1	Creation - 0.56 ac Upland Buffer - 0.44 ac	2018 was the sixth 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 1.0 credit acres in 2018.
Forsyth NW - Middle Forsyth	2012	14 - Middle Yellowstone	0 ac	0.34 ac	0.58 ac Category III	1.22 ac 5:1	Creation - 0.58 ac Upland Buffer - 0.24	2018 was the sixth 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 0.82 credit acres in 2018.
Forsyth NW - West Forsyth	2012	14 - Middle Yellowstone	1.29 ac	10.38 ac	10.55 ac Category III	7.8 ac 5:1	Creation - 9.26 ac Preservation - 0.32 ac Upland Buffer - 0.63 ac	2018 was the sixth 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 10.21 credit acres in 2018.
BILLINGS DISTRICT:								
Kindsfater Wetland Laurel	2012	13- Upper Yellowstone	25.9 ac	32.7 ac As ultimately constructed	32.4 ac Category III	22.6 ac 5:1	Creation -407 ac Re-establishment - 6.1 ac Rehabilitation - 0.7 ac Enhancement - 1.0 ac Preservation - 4.4 ac Upland Buffer - 4.52 ac 167.34 FU	2018 was the sixth monitoring year. The project is intended to provide before-the-fact mitigation credits for proposed projects in Watershed 13. The site yielded 21.4 credit acres in 2018.
JTX Tunnicliff Hardin	2015/16	13- Upper Yellowstone	0.03 ac	29.6 ac	8.31 ac Category III	13.32 ac 5:1	Establishment - 8.31 ac Re-establishment - 0.00 ac Preservation - 0.03 ac Upland Buffer - 2.66 ac 49.10 FU	2018 was the third monitoring year following construction in late 2015 and early 2016. At the time of the 2018 monitoring, the site had developed 8.31 acres of emergent wetland and open water habitat to go along with 0.03 acres of existing wetland for a total of 8.34 acres across the site. The site was designed and constructed with the intent to provide 29.6 wetland credit acres.