Sandfire Resources America, Inc.

Black Butte Copper Project

2022 Wetland Mitigation Monitoring Report

Date: December 30, 2022

Prepared For:

Sandfire Resources America, Inc.

17 East Main Street
White Sulphur Springs, MT 59645
406-547-3466
www.sandfire.com

Prepared By:

WESTECH Environmental Services, Inc.

P.O. Box 6045
Helena, MT 59604
406.442.0950
www.westech-env.com

Acronyms and Abbreviations

CFR	Code of Federal Regulations
FQAI	Cover-weighted Floristic Quality Assessment Index
DA	Department of Army
FQAI	Floristic Quality Assessment Index
MARS	Montana Aquatic Resource Services
MDEQ	Montana Department of Environmental Quality
MNHP	Montana Natural Heritage Program
MWAM	Montana Wetland Assessment Method
NRCS	Natural Resource Conservation Service
PEM	Palustrine Emergent
PSS	Palustrine Scrub-Shrub
Project	Black Butte Copper Project
RAM	Riparian Assessment Method
Sandfire	Sandfire Resources America Inc.
USACE	U.S. Army Corps of Engineers

Table of Contents

List of Figures

List of Tables

List of Appendices

1.0 Introduction

Sandfire Resources America Inc. (Sandfire), formerly Tintina Resources, Inc., is developing the Black Butte Copper Project (Project), an underground copper mine and mill located 15 miles north of White Sulphur Springs in Meagher County, Montana. The Montana Department of Environmental Quality (DEQ) approved the Project's mine operating permit application (MOPA) in September 2017 and issued a positive Record of Decision (ROD) in April 2020. Initial site preparations began in June 2020, with limited construction in 2021. There was no construction in 2022; rather, development activities were focused on additional test work, analysis and reporting. This report summarizes the results of the first two years of wetland monitoring at the Project's permittee-responsible wetland mitigation site.

Sandfire submitted a Joint Application to the U.S. Army Corps of Engineers (USACE), the Montana Department of Environmental Quality (MDEQ), and the Meagher County Conservation District on September 14, 2016. The Project received authorization from the USACE for unavoidable fill within 0.85 acres of wetlands and 696 linear feet of stream pursuant to the Joint Application on December 1, 2017, with the issuance of Department of Army (DA) Permit *NWO-2013-01385-MTH*.

The DA Permit includes the following special condition relative to compensatory mitigation:

> "In order to provide compensatory stream and wetland mitigation for the unavoidable impacts to 0.85 acre of wetland and 696 linear feet of stream channel, Tintina [Sandfire] is required to purchase 1.275 acre of advanced or pre-certified wetland credit and 4,750 advanced or pre-certified stream credits from the MARS In-lieu Fee Program."

Following the DA permit issuance, Sandfire identified an additional area of impact within Sheep Creek at the site of a water intake. As a result of that additional action, the USACE modified the permit on August 15, 2018, in a letter to Sandfire and included an additional 33 credits of compensatory stream mitigation. In total, stream mitigation is now required for 706 linear feet of stream channel equating to 4,783 advanced or pre-certified credits.

Subsequent to issuance of the DA Permit and the permit modification, Montana Aquatic Resources Services (MARS) confirmed in a letter of November 18, 2019, to the MDEQ and USACE that they were not obligated to provide wetland or stream credits to the Project. Further, the USACE confirmed to the Project that alternative means of satisfying the compensatory mitigation requirements were acceptable, such as a wetland mitigation bank or permittee-responsible wetland mitigation (pers. comm. Christina Schroeder, USACE Sr. Regulatory Project Mgr to John Beaver, WESTECH Environmental Services, Inc. March 2, 2020; September 29, 2020; January 5, 2021).

There are no wetland mitigation banks with a service area that includes the Project site (USACE 2021). The Sevenmile In-lieu Fee project does include the Project within its service area. However, there are no available wetland credits at this site and only 258.56 stream credits (USACE 2021). In summary, neither wetland nor stream credits are available from a mitigation bank or in-lieu fee program to fulfill the Project's compensatory mitigation requirement. Further, Sandfire is able to develop on-site wetland and

stream compensatory mitigation within the Project boundary. Consequently, Sandfire has determined in consultation with the USACE that permittee-responsible mitigation will adequately address unavoidable impacts to wetlands and streams because of Project construction. The *Sandfire Resources America, Inc. Black Butte Copper Project Permittee-Responsible Wetland and Stream Mitigation Plan* (Mitigation Plan) (WESTECH 2022) was developed for the Project which outlines the means and methods Sandfire will utilize to provide compensatory mitigation for unavoidable impacts to wetlands and streams consistent with the mitigation planning requirements of 33 CFR § 332.4(c) and 40 CFR § 230.92.4(c). Performance standards for wetland and stream mitigation are often based on measuring ecological lift resulting from mitigation actions. However, because the proposed site is already a high-quality wetland and stream complex, significant ecological lift because of mitigation actions is not anticipated. Consequently, performance standards will be based on identifying key indicators of wetland and stream quality and maintaining the site at the upper end of the indicator's scale. Four metrics are proposed as important, relevant indicators of ecological quality and stability at the mitigation site: the Floristic Quality Index, wetland functional assessment, noxious weed prevalence, and the Riparian Sustainability Assessment rating. These metrics will be analyzed through annual monitoring of the mitigation site as specified in the Mitigation Plan.

1.1 Existing Resource Type and Affected Area

As described in the DA Permit, compensatory mitigation is required for unavoidable fill within 0.85 acre of wetlands and 706 linear feet of stream channel. The characteristics of the to-be-impacted wetland and stream are described in the Joint Application and presented in Table 1.1. Figure 1 illustrates the location and extent of the wetlands and stream that will be affected. Figure 2 shows the affected wetland and stream locations, and Figure 3 shows the Strawberry Butte mitigation site.

Table 1.1: Characteristics of Impacted Wetlands and Stream

Wetland Characteristics					
Wetland Type[1]	**Affected Acreage**	**Geomorphic Setting[2]**	**Dominant Vegetation**	**Assessment Area Functional Points[3]**	**Acreage x Functional Points**
PEM1A	0.01	Riverine	*Carex utriculata/ Agrostis stolonifera*	3.20	0.032
PEM1B	0.71	Slope	*Carex utriculata/ Juncus balticus*	3.20	2.272
PEM1E	0.06	Riverine	*Carex utriculata/ Agrostis stolonifera*	3.20	0.192
PSS1B/PSS6B	0.07	Riverine	*Salix bebbiana/ Carex utriculata*	7.40	0.518
Stream Characteristics					
Hydrologic Regime[1]	**Linear Feet**	**Geomorphic Setting[2]**	**Average Water Temperature**	**Water Source**	**Stream Debits[4]**
Intermittent	706	Riverine	Not measured	Groundwater	4,783

[1] Cowardin et al. 1979
[2] Brinson 1993
[3] Berglund and McEldowney 2008.
[4] Per USACE permit NWO-2013-01385-MTH as amended.

Wetlands that will be affected are primarily palustrine emergent (PEM) dominated by native sedges, rushes, and introduced grass. There is a very small palustrine scrub-shrub (PSS) element dominated by Bebb's willow (*Salix bebbiana*). Small slope springs provide the water source of these wetlands. Approximately 84 percent of the wetlands are Category III and 16 percent are Category II, per categories defined in Berglund and McEldowney (2008). These categories range from Category I (highest value wetlands with respect to function) to Category IV (lowest value wetlands) and are discussed below in Section 2.2. Total affected acreage multiplied by functional points equals 3.014.

The stream segment that will be affected is intermittent, flowing a small amount of water where it issues from the hillside springs and proceeding down gradient for approximately 350 feet, at which point there is no longer a defined channel or bed and bank and water moves subsurface.

1.2 Compensatory Resource Type and Area

The compensatory mitigation site is within the Project area and provides the same resource types as those affected but includes wetlands and streams of much higher functional category than those affected. The site totals 18.1 acres and is located within the SE ¼ of the SW ¼ of S 19 T 12N R 07E. Within this area, Sandfire has identified a Category I wetland and stream complex north of Strawberry Butte that is subject to livestock grazing. Characteristics of the compensatory wetlands and stream are presented in Table 1.2. Figure 3 illustrates the location and extent of the compensatory wetlands and stream. These wetlands and streams were delineated and surveyed during the baseline wetland delineation and waterbody survey in 2014 (WESTECH 2015).

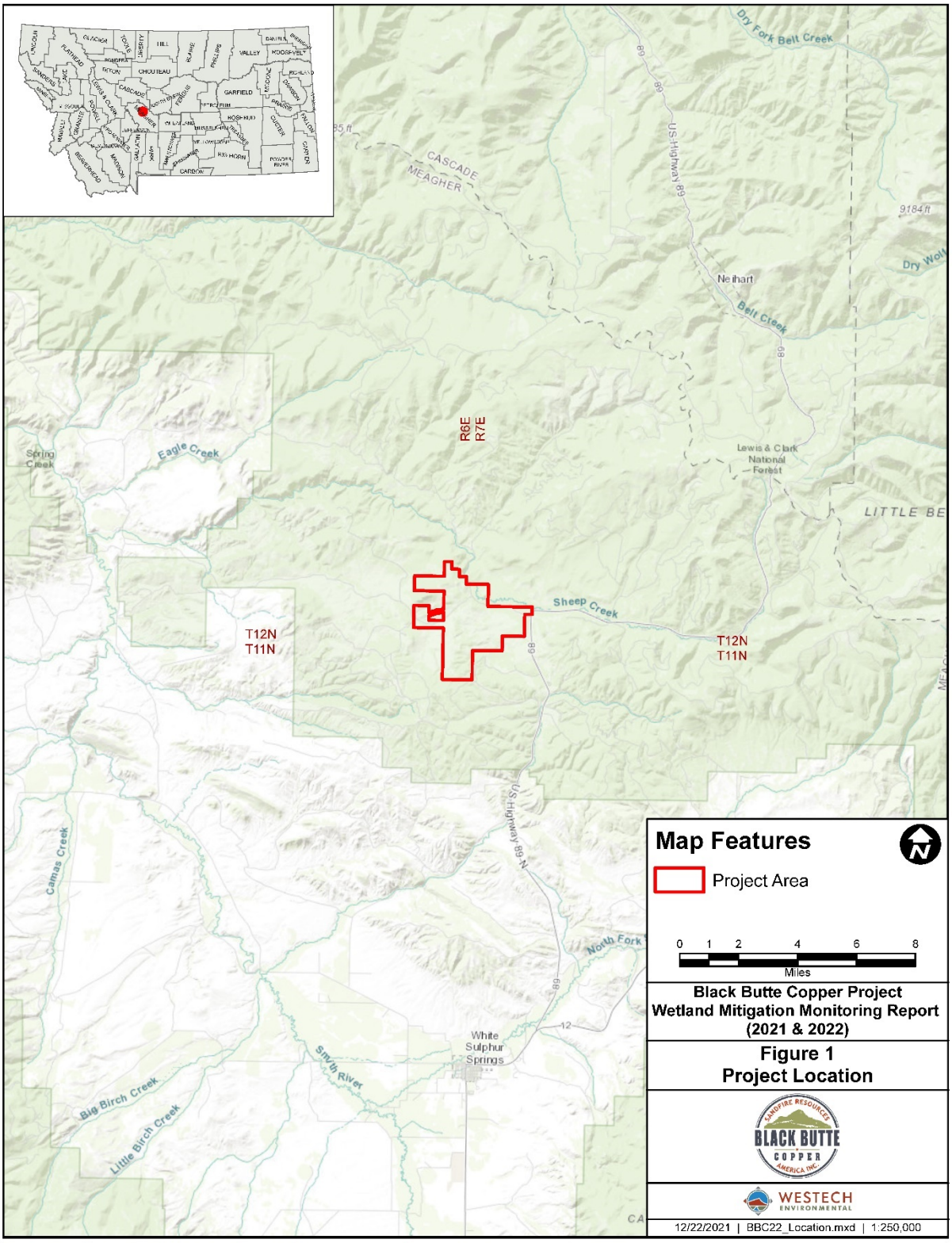


Figure 1: Project Location

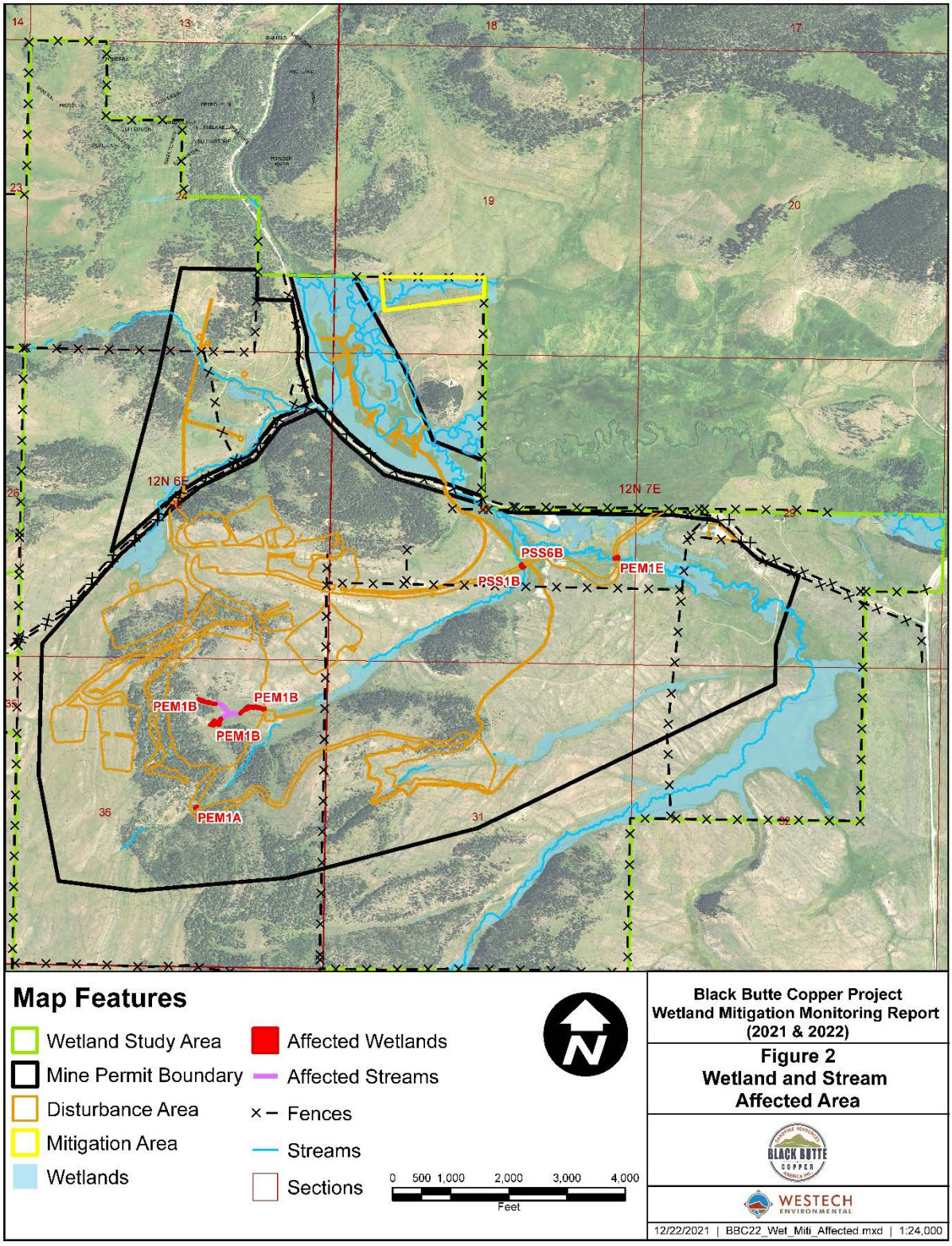


Figure 2: Wetland and Stream Affected Area

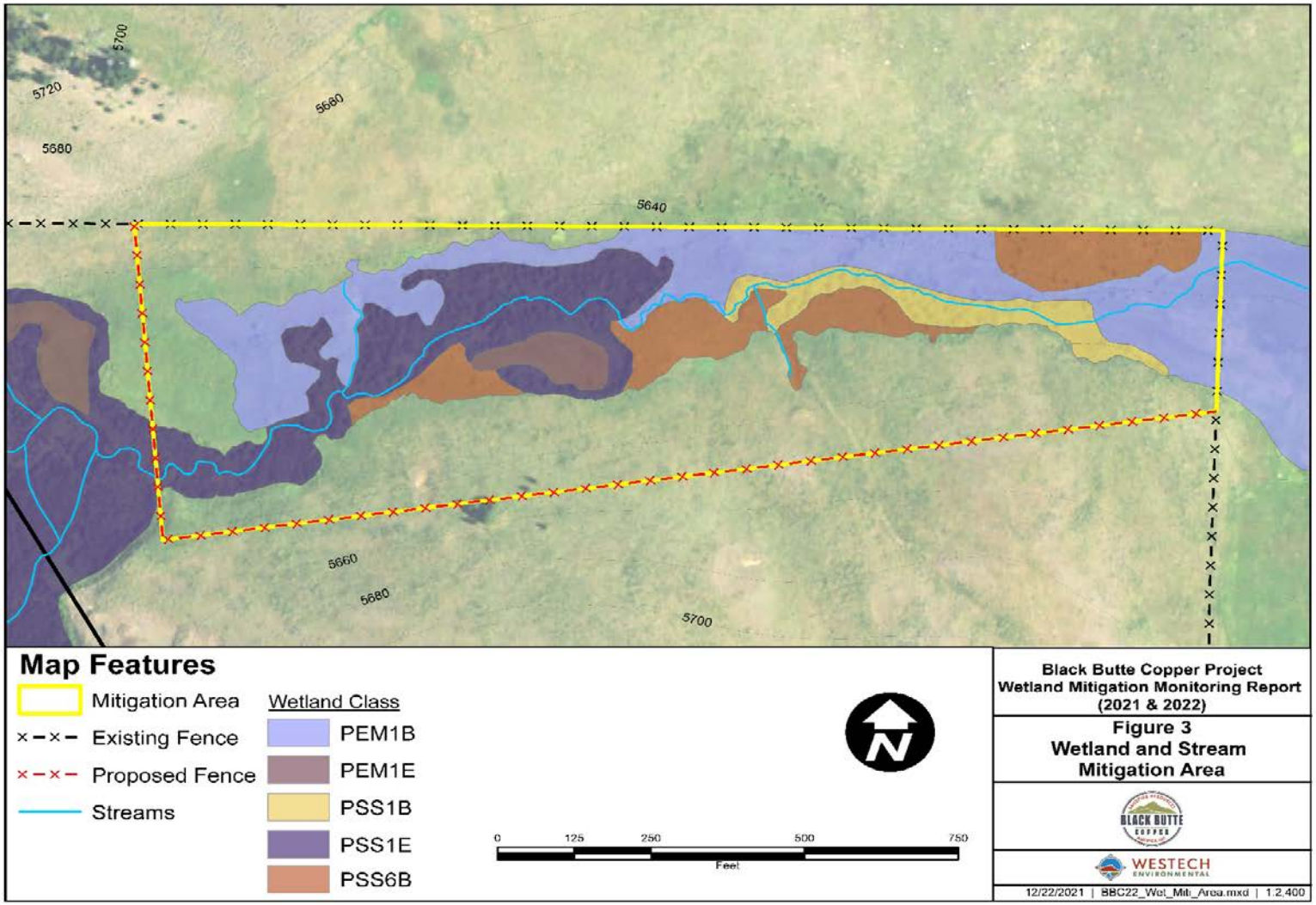


Figure 3: Wetland and Stream Mitigation Area

Table 1.2: Characteristics of Mitigation Wetlands and Streams

Wetland Characteristics					
Wetland Type[1]	**Mitigation Acreage**	**Geomorphic Setting[2]**	**Dominant Vegetation**	**Assessment Area Functional Points[3]**	**Acreage x Functional Points**
PEM1B	3.76	Slope	*Carex nebrascensis/ Carex simulata*	7.30	27.448
PEM1E	0.32	Slope	*Carex nebrascensis/ Carex simulata*	7.30	2.336
PSS1B	0.81	Riverine	*Salix eriocephala/ Carex utriculata*	7.30	5.913
PSS1E	2.66	Slope	*Salix eriocephala/ Carex utriculata*	7.30	19.418
PSS6B	1.88	Slope	*Dasiphora fruticosa/ Juncus balticus*	7.30	13.724
Stream Characteristics					
Hydrologic Regime[1]	**Linear Feet**	**Geomorphic Setting[2]**	**Average Water Temperature**	**Water Source**	**Stream Credits[4]**
Perennial	2,622	Riverine	42.76˚F	Groundwater	5,244

[1] Cowardin et al. 1979
[2] Brinson 1993
[3] Berglund and McEldowney 2008.
[4] Per Montana Stream Mitigation Procedure Section 5.2.

Mitigation wetlands include approximately 43 percent PEM wetlands dominated by native sedges, rushes, and native perennial forbs. Approximately 57 percent of mitigation wetlands are PSS dominated by various willow species such as Mackenzie willow (*Salix eriocephala* var. *mackenzieana*), Geyer's willow (*Salix geyeriana*), and Bebb's willow, as well as shrubby cinquefoil (*Dasiphora fruticosa*). Groundwater is the primary hydrology within the mitigation area. The site is connected to upgradient groundwater as well as a few small perennial stream channels. However, within the mitigation site there are three significant surface springs with substantial output that form surface channels immediately. In addition, there are two upwelling springs that form a sedge-dominated fen in the approximate center of the site. The entire wetland complex also contains highly saturated conditions from other, less distinct groundwater sources. The total acreage of the mitigation site multiplied by functional points equals 68.839 (WESTECH 2022).

There are three stream segments within the mitigation site. The primary stream flows for approximately 2,221 feet within the site. The two spring-fed tributaries flow for 180 and 221 feet respectively from their sources to their confluences with the primary stream which flows into Sheep Creek. Because groundwater is the main source for the streams within the mitigation site, water quality is high and water temperatures are more stable than Sheep Creek. Continuous water temperature monitoring was initiated in 2020 within this tributary, Sheep Creek, and other sites within the Project. Overall, temperature within Sheep Creek immediately upstream of the confluence with the mitigation site stream averaged 48.65˚F between August and September 2020, with a high temperature reading of 63.89˚F. In contrast, within the mitigation site, stream water temperature averaged 45.51˚F between August and September 2020, with

a high temperature reading of 52.11˚F. Between October and December 2020, water temperature within the mitigation site remained more stable and averaged 40.01˚F whereas water temperature in Sheep Creek overall averaged 36.29˚F (Hydrometrics 2021). Consequently, average water temperature within the mitigation stream segment varied only 5.50˚F while that in Sheep Creek varied 12.36˚F. Single observations earlier in 2020 showed a similar pattern. On April 30 water was warmer within the tributary than within Sheep Creek, while observations on July 13 and 20 both showed cooler water within the tributary than within Sheep Creek.

The more consistent water temperature that the mitigation site stream provides to Sheep Creek is an important habitat component in maintaining the local fishery and is an attractant to fish in the spring (pers. comm. Dave Stagliano, Montana Biological Survey Sr. Aquatic Ecologist, with John Beaver, WESTECH Sr. Biologist March 4, 2021).

2.0 Performance Standards

Performance standards for wetland and stream mitigation are often based on measuring ecological lift resulting from mitigation actions. However, because the proposed site is already a high-quality wetland and stream complex, significant ecological lift because of mitigation actions is not anticipated. Consequently, performance standards are based on identifying key indicators of wetland and stream quality and maintaining the site at the upper end of the indicator's scale. Four metrics are proposed as important, relevant indicators of ecological quality and stability at the mitigation site: the Floristic Quality Index, wetland functional assessment, noxious weed prevalence, and the Riparian Sustainability Assessment rating.

2.1 Floristic Quality Index

The floristic quality assessment index (FQAI) is often used to evaluate wetland, or upland, condition relative to disturbance. The FQAI is based on the concept of plant species' habitat affinity and their disturbance tolerance (Jones 2005). Sandfire proposed to use FQAI as one means of assessing the mitigation site's quality and ensuring that mitigation and maintenance actions maintain or improve the FQAI.

The FQAI calculation employs an assigned coefficient of conservatism value, or C-value, for each species. A species C-value is designated by an expert panel of botanists familiar with the regional flora and represents the estimated probability that a plant is likely to occur in a particular plant community type (Table 6). The Montana Natural Heritage Program (MNHP) C-values are used in the FQAI calculation and are summarized below (Pipp 2017).

Table 6: Summary of Montana's Coefficient of Conservatism Scoring Definitions

Non-Native Montana Species	
0	Invasive
1	Relatively benign
Native Montana Species	

Opportunistic, Broad Ecological Tolerance	
2	Exhibits a broad range of ecological tolerance and is more or less restricted to areas of human disturbance.
Non-Opportunistic, Intermediate Ecological Tolerance	
3	Exhibits an intermediate range of ecological tolerance, typifies a stable phase of a native community, and thrives and/or persists under natural or human disturbance.
4	Exhibits an intermediate range of ecological tolerance, typifies a stable phase of a native community, and persists but does not thrive with some natural or human disturbance.
5	Exhibits an intermediate range of ecological tolerance, typifies a stable phase of a native community, and persists but does not thrive with a little natural or human disturbance.
Non-Opportunistic, Narrow Ecological Tolerance	
6	Exhibits a moderate fidelity to a more or less narrow range of ecological tolerance, typifies a stable or near climax community, and tolerates limited natural or human disturbance (unless surrogate for fire or other natural disturbance).
7	Exhibits a moderate fidelity to a somewhat narrow range of ecological tolerance, typifies a stable or near climax community, and does not tolerate disturbance.
8	Exhibits a moderate fidelity to a narrow range of ecological tolerance, typifies a stable or near climax community, and does not tolerate disturbance.
9	Exhibits a high fidelity to a narrow range of ecological tolerance, typifies a stable or near climax community, and does not tolerate disturbance.
10	Exhibits a very high fidelity to a very narrow range of ecological tolerance that typifies a stable or near climax community and does not tolerate disturbance.
Source: Pipp 2017.	

The formula for the FQAI (Jones 2005) is:

$$FQAIj = [\sum(Cij \times aij) / \sum aij] \times \sqrt{nj}$$

where: Cij = C-value of species i at site j
aij = cover of species i at site j
nj = total number of taxa recorded at site j

The C-value for each species is multiplied by the species' total cover, resulting in a cover-weighted C-value (Cij x aij). Summing the cover-weighted C-values and dividing by the sum of cover for all species ($\sum(Cij \times aij) / \sum aij$) results in a relative cover-weighted mean C-value for a site which weights the total score towards the most abundant species. The final step in the calculation of FQAI is to multiply the cover-weighted mean C-value by the square root of all species at a site ($\sqrt{nj}$) which introduces a measure of diversity into the metric. The FQAI calculation includes both native and introduced species (Jones 2005), since exotic species are an important indicator of site quality.

The FQAI may be used to assess floristic quality among and between sites. For example, Taft et al. (1997) reported that wetland sites with a FQAI of less than 20 are usually severely degraded or derelict plant communities, while sites with a FQAI of between 20 and 35 are typically degraded but have the potential to recover. A site with a FQAI between 35 and 45 is usually regionally noteworthy and often distinct from heavily grazed areas in a landscape. Those sites with FQAI greater than 45 are "natural area" quality.

Based on this method, the proposed performance standard for floristic quality is to maintain a FQAI of at least 40, which would rank the site as at least a regionally noteworthy wetland, and potentially a wetland of natural area quality.

2.2 Wetland Functional Assessment

A functional assessment of the wetland mitigation site was completed as part of the baseline wetland delineation (WESTECH 2015a) according to Montana Wetland Assessment Method (MWAM) (Berglund and McEldowney 2008). This method is commonly used to assess wetland function in Montana. The proposed mitigation site, which is referred to in the delineation report as "Sheep Creek Spring Tributary Assessment Area", was scored as a Category I wetland, the highest ranking in this classification system.

Based on this method, the proposed performance standard for wetland function is to maintain the site as a Category I wetland.

2.3 Noxious Weed Prevalence

State- and county-listed noxious weeds will be mapped by species. Vegetation canopy cover and weed density will be determined for each population.

Based on this method, the performance standard for noxious weeds is to maintain noxious weeds within the site at less than one percent aerial extent of the mitigation site and less than one percent relative canopy cover. Weed density will be less than one plant per 0.01 acre.

2.4 Riparian Sustainability Assessment

The Natural Resource Conservation Service (NRCS) has developed a Riparian Assessment Method (RAM) for assessing "physical and ecological attributes that represent thresholds for sustainability. Subsequent ratings over a period of time on the same stream reach can be used to evaluate trend and provide an assessment of conservation practice or management effectiveness" (USDA NRCS 2012). The RAM assigns three ratings for stream reaches according to their physical and ecological attributes: Not-Sustainable, At-Risk, or Sustainable. These ratings can be compared over time and used as a means of evaluating stream and riparian functions in addition to the wetland functions.

Based on this method, the proposed performance standard for riparian function is to maintain the site within the Sustainable Category.

3.0 Monitoring Methods

Wetland monitoring was conducted to assess vegetation and shallow groundwater hydrology at the mitigation site. Performance standards are evaluated based on the data collected during monitoring. Monitoring plots are shown in Figure 4.

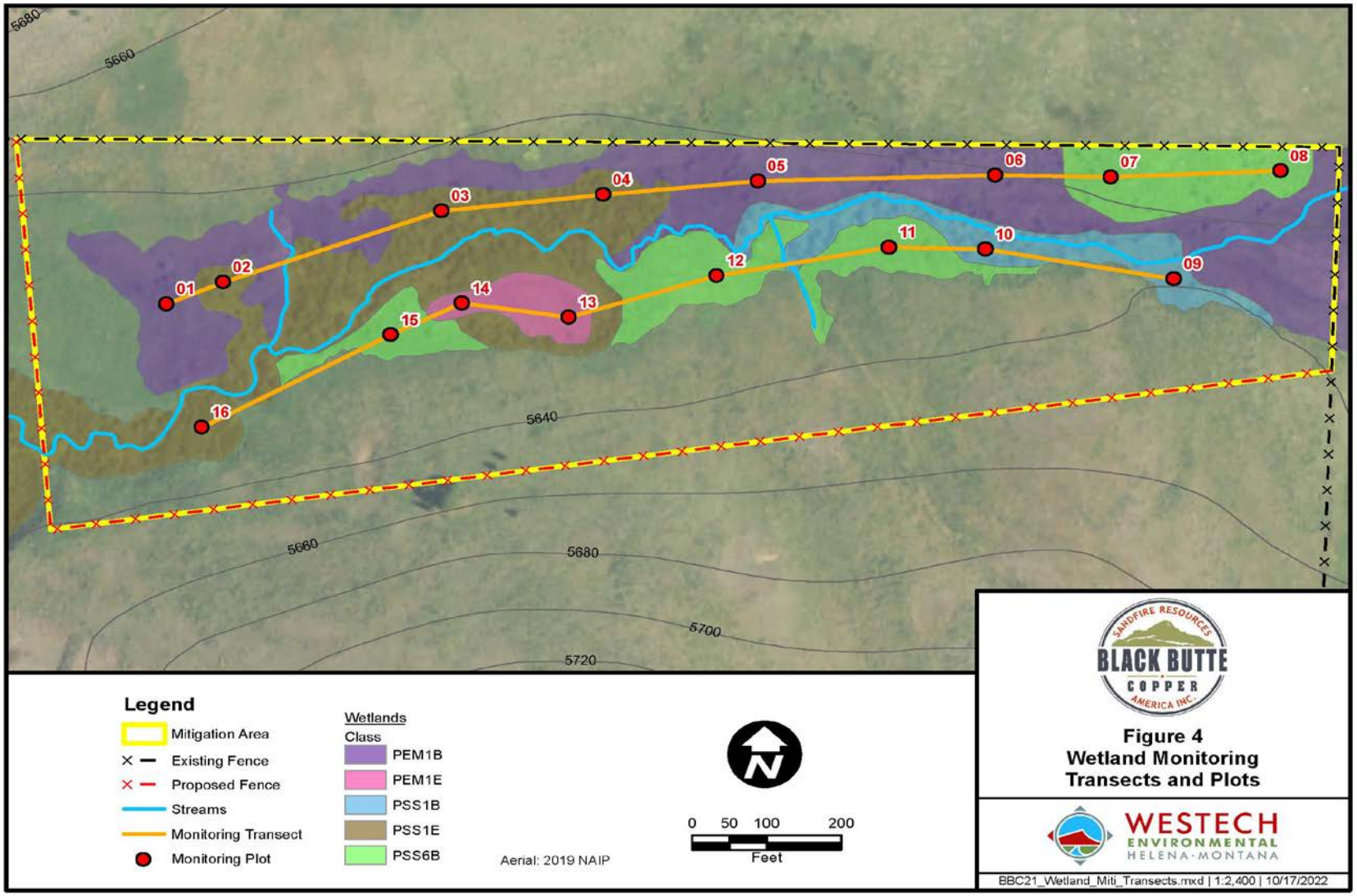


Figure 4: Wetland Monitoring Transects and Plots

3.1 Wetland Vegetation Monitoring Methods

Vegetation sampling occurred on July 5-6, 2021; and September 13, 2022. Canopy cover was recorded within each 0.01-acre (11.8-foot radius) circular plot located along each transect. The plot perimeters were measured with a fiberglass tape and temporarily marked with pin-flags at each sampling event. A digital color photograph was taken in each of the cardinal directions (North, East, South, and West) at each plot per monitoring event. Data were recorded on field forms that included general site information such as: site identification number, date, personnel, percent slope, aspect, topography, and slope configuration. A visual estimate of canopy cover to the nearest percent within each 0.01-acre plot was made for total live vascular plant cover, ground cover classes (bare ground, rock, litter, lichens, moss, water, and basal vegetation), each morphological class category (tree, shrub, perennial graminoid, annual graminoid, perennial forb and annual/biennial forb), and each vascular plant species. Cover estimates included stratified and non-stratified measurements. Stratified cover is the percent contribution of each species to the total plant cover and excludes overlap; therefore, the value may exceed 100 percent (i.e. the sum of cover for each species in the plot). Nonstratified cover is the sum of cover for all plant species and takes into account the overlap of strata (e.g., grasses growing underneath shrubs); it is expressed as a fraction of 100 percent (i.e. the cover of each morphological class relative to the total cover) and may not equal more than 100 percent (Mueller-Dombois and Ellenberg 1974).

All vascular plant species encountered during wetland monitoring were recorded and appended to the comprehensive wetland species list compiled as part of the baseline wetland delineation (WESTECH 2015). Taxonomic references included: Hitchcock et al. (1955-1969), Cronquist et al. (1972-2009), Great Plains Flora Association (1977), Great Plains Flora Association (1986), Flora of North America (1993), Gleason and Cronquist (1991), and Lesica (2012). Wetland species were defined by their wetland indicator status (OBL, FACW, FAC, FACU, UPL) according to the National Wetland Plant List (Lichvar 2016) (Table 3.1).

Table 3.1: National Wetland Plant List Indicator Rating Definitions

Indicator Status	Abbreviation	Definition
Obligate	OBL	Almost always occurs in wetlands.
Facultative Wetland	FACW	Usually occurs in wetlands, but may occur in non-wetlands.
Facultative	FAC	Occurs in wetlands and non-wetlands.
Facultative Upland	FACU	Usually occurs in non-wetlands, but may occur in wetlands.
Upland	UPL	Almost never occurs in wetlands.

Species canopy cover was used as the basis for floristic assessment. Data were analyzed to evaluate diversity, composition, and prevalence, as well as metrics that will be used to compare to performance standards and success criteria. Canopy cover data will be used to assess future change in wetland vegetation and hydrology.

3.2 Hydrology Monitoring Methods

In addition to vegetation data, wetland hydrology at each sample plot was recorded by: 1) measuring depth to water in piezometers (depth in feet above or below ground surface), and 2) observing surface conditions at each plot center.

Sixteen piezometers were installed by Hydrometrics, Inc. in pairs at wetland monitoring sites during 2016 and 2017 to monitor groundwater trends associated with wetlands near the project area and outside of the project area. The piezometers consist of 30-inch long, 1-1/4-inch diameter galvanized steel screen (well points) with 1-1/4-inch diameter galvanized steel riser pipe. The piezometers were installed by driving the well point into the ground using a conventional fence-post driver to a targeted depth of 6.5 feet below ground surface (bgs) or to refusal. Of these 16 piezometers, two piezometers are located within the mitigation site, at Plots 2 and 13.

4.0 Results

Appendix A provides a list of vascular plant species identified for the mitigation site; it includes species scientific and common names, as well as the six-letter abbreviation code and wetland indicator status (Lichvar 2016).

Canopy cover data for all sample sites is provided in Appendix B, and includes total, average, and relative cover calculations, as well as frequency and cover-weighted C-values. Piezometer data are shown in Appendix C. The 2022 wetland functional assessment form is provided in Appendix D. Representative photos of sample plots within the mitigation site are provided in Appendix E. The 2022 RAM form is provided in Appendix F.

4.1 Wetland Vegetation

4.1.1 Dominant Species

The mean percent canopy cover of dominant species within wetland sample plots was calculated to evaluate hydrophytic species within the mitigation area. Dominant species were determined according to the USACE “50/20” method. Species with a wetland indicator status of FAC, FACW, or OBL are considered hydrophytes while species with a wetland indicator status of FACU or UPL are considered non-hydrophytes (USACE 2005). Dominant species in 2021 and 2022 are summarized in Table 4.1.

Table 4.1: Dominant Species Per USACE 50/20 Method within Wetlands (n=16 plots)

Year	Number of Dominant Species	Number of Dominant Hydrophytic Species	Dominant Hydrophytic Species Relative Cover[1]	Dominant Species
2021	5	5	57.2 %	Baltic rush, Shrubby cinquefoil, Mountain-marsh butterweed, Beaked sedge, Geyer's willow
2022	5	5	51.3 %	Baltic rush, Shrubby cinquefoil, Mountain-marsh butterweed, Beaked sedge, Geyer's willow

All dominant species in 2021 and 2022 are native hydrophytes indicative of high-quality wetlands and represent native sedges/rushes, native perennial forbs, and native shrubs.

4.1.2 Percent Cover by Morphological Class

Mean percent cover by morphological class between 2021 and 2022 is presented for the Strawberry Butte wetlands in Table 4.2.

Table 4.2: Mean Percent Canopy Cover by Morphological Class within Wetlands (n=16 plots).

Year	Sedges (all *Carex spp.*)	Other Native Graminoids[1]	Introduced Graminoids	Native Forbs	Introduced Forbs	Shrubs	Trees	Noxious Weeds
2021	29.3	18.6	13.9	26.3	1.2	27.8	0.0	0.0
2022	34.0	20.7	17.8	27.4	0.8	27.4	0.0	0.0

[1] Native graminoids excluding sedges, which are graminoids, but which are to be recorded separately in order to more fully present the floristic composition of the site.

Minimal change occurred within all morphological classes between 2021 and 2022, indicating that site conditions are stable. Overall, native species account for at least 85 percent of vegetation within the site in each year.

4.1.3 Noxious Weeds

The performance standard for noxious weeds is to maintain noxious weeds within the site at less than one percent aerial extent of the mitigation site and less than one percent relative canopy cover. No noxious weeds were observed at wetland plots on the mitigation site in 2021 or 2022. However, Canada thistle (*Cirsium arvense*) was observed in two small populations outside of monitoring plots but within the upland buffer. These two populations total approximately 0.14 acres. Weed density within these populations varied from approximately 20 to 50 stems per 0.01 acre, i.e., relatively dense.

The performance standard states that total aerial extent of noxious weeds within the mitigation site will be less than one percent of the site, or approximately 0.18 acres. Approximately 0.14 acres of noxious weeds were mapped within the site which is less than one percent of the site. However, weed density must be less than one plant per 0.01 acre; noxious weed density is currently much higher than the

performance standard within the two populations. Finally, noxious weeds must be less than one percent relative cover within the mitigation area. No noxious weeds were recorded on monitoring plots, consequently, determining the relative cover of Canada thistle compared to other species cannot be quantitatively assessed. However, a qualitative assessment indicates that if less than one percent of the total area is populated with noxious weeds, then the relative cover of noxious weeds must also be less than one percent which is consistent with the performance standard. In summary, weed density exceeds the performance standard but weed aerial extent and relative cover meet the performance standard. Herbicide treatment at these two populations should reduce weed density to a level that also meets the performance standard.

4.1.4 Conservation Coefficient and FQAI

The Mitigation Plan requires reporting the mean FQAI, which is a measure of vegetation quality (Taft 1997). Larger values indicate more diverse sites dominated by species with a narrower disturbance tolerance. This value can be expressed in two manners: first through the mean C-value for the site, and second through a relative cover-weighted C-value (FQAI), which accounts for the relative amount of each species at a site in addition to simply their C-value. Both C-value and FQAI remained relatively similar from 2021 to 2022 (Table 4.3). The performance standard requires a FQAI of 40; data at the mitigation site show a trend towards that value. The reason the FQAI is higher in 2022 than 2021 while the mean C-value is lower, is because the number of recorded species is higher in 2022 than 2021 (n = 69 in 2022 and n = 53 in 2021).

Table 4.3: Mean C-Value and FQAI within Wetlands (n=16 plots).

Year	Mean C-value	FQAI
2021	4.6	33
2022	4.4	37

4.2 Hydrology

Piezometer data follows the expected annual fluctuations in groundwater levels between seasons at one site (plot 2) with water at or above ground level in the spring and then declining to below ground level throughout the late summer and winter. Fluctuating water levels at this piezometer are not due to streambank overflow, rather fluctuating water is a function of rising and falling groundwater. In contrast, water levels fluctuate very little at plot 13 which is located within the quaking fen and adjacent to a mounded spring. This piezometer measures consistent groundwater at or near the surface throughout the entire year. Appendix C illustrates the groundwater levels throughout the year at these two piezometers.

4.3 Functional Assessment

A functional assessment of the mitigation site was completed during the baseline delineation in 2014 and during annual monitoring in 2022. Results of the 2022 functional assessment are included in Appendix D and summarized in Table 4.4.

Table 4.4: Functional Assessment Score and Category for the Strawberry Butte Mitigation Site

Year	Functional Score	Category
2014	81%	I
2022	82%	I

The mitigation site wetlands were scored as Category I wetlands, the highest ranking in this classification system. There was very little change between years indicating that the site is stable and maintaining a high function.

The performance standard is to maintain the site as a Category I wetland, which continues to be achieved in 2022.

4.4 Stream Assessment

The spring creek within the mitigation was evaluated according to the NRCS RAM. The stream is very stable with minimal channel migration either laterally or vertically. Streambanks are dominated by native, deep-rooted wetland plants. Consequently, the stream rates Sustainable according to the RAM metrics (Table 4.5). A copy of the 2022 RAM form is included in Appendix F.

Table 4.5: Riparian Assessment Method Score for the Strawberry Butte Mitigation Site Stream

Year	Potential Score	Actual Score	Category
2021	50	50	Sustainable
2022	50	50	Sustainable

The stream performance standard requires the site rate Sustainable according to the RAM metrics; that rating was achieved in both 2021 and 2022.

5.0 Summary

Wetland conditions were assessed at the Strawberry Butte mitigation site to evaluate progression towards the Performance Standards and reporting requirements identified in the *NWO-2013-01385-MTH Sandfire Resources America, Inc. Black Butte Copper Project Permittee Responsible Wetland and Stream Mitigation Plan* (Mitigation Plan) (WESTECH 2022). The Project received authorization from the USACE for unavoidable fill within 0.85 acres of wetlands and 706 linear feet of stream pursuant to the Joint Application on December 1, 2017.

Performance standards for wetland and stream mitigation are often based on measuring ecological lift resulting from mitigation actions. However, because the proposed site is already a high-quality wetland and stream complex, significant ecological lift because of mitigation actions is not anticipated. Consequently, performance standards are based on identifying key indicators of wetland and stream quality and maintaining the site at the upper end of the indicator's scale.

Four metrics are measured as important, relevant indicators of ecological quality and stability at the mitigation site: the Floristic Quality Index, wetland functional assessment, noxious weed prevalence, and

the Riparian Sustainability Assessment rating. Table 5.1 summarizes these standards and their current status at the site:

Table 5.1: Performance Standard Status Summary: 2022

FQAI (≥40)	Noxious Weeds: <1% aerial extent of site; <1% relative cover of site; < 1 stem/0.01 acre	Functional Assessment Category I Wetland	Riparian Assessment Method: Sustainable Rating
FQAI = 37	Aerial extent < 1% of site; Relative cover < 1% of site; >1 stem/0.01 acre	Wetland = Category I	RAM = Sustainable

Two of the four performance standard metrics were achieved in 2022. The FQAI is slightly less than the goal of 40; however, the metric increased from 2021 to 2022 and is anticipated to continue increasing as additional monitoring documents more diversity at the site. Further, although noxious weeds are limited within the mitigation site, at the two populations where Canada thistle does occur, weed density is greater than the performance standard.

In summary, the mitigation site continues to rate as a Category I wetland with a Sustainable stream channel and riparian area. Noxious weeds are limited within the site but exceed the density standard where they occur and require treatment to achieve the performance standard. The floristic quality at the site if very high and within the range (35 – 45) or a regionally noteworthy wetland (Taft et al. 1997) but is currently slightly below the standard of 40 prescribed in the Mitigation Plan. It is likely that as additional diversity is recorded at the site this standard will be achieved.

6.0 References

Berglund, J. and R. McEldowney. 2008. *Montana Department of Transportation Montana wetland assessment method*. PBS&J Project B43075.00. Helena, MT. Available at: http://www.mdt.mt.gov/other/environmental/external/wetlands/2008_wetland_assessment/2008_mwam_manual.pdf

Brinson, M. M. 1993. *A hydrogeomorphic classification for wetlands.* Technical Report WRP-DE-4, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS. NTIS No. AD A270 053.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. *Classification of wetlands and deepwater habitats of the United States*. FWS/OBS-79/31. U.S.D.I. Fish and Wildlife Service, Washington D.C. Available at: http://wetlands.fws.gov/Pubs_Reports/Class_Manual/class_titlepg.htm

Cronquist, A., A.H. Holmgren, N.H. Holmgren, J.L. Reveal and P.K. Holmgren. 1972-2009. *Intermountain Flora. Volumes 1-6*. The New York Botanical Garden, New York City.

Flora of North America Editorial Committee, eds. 1993. *Flora of North America North of Mexico.* 13 volumes. Oxford University Press, New York and Oxford.

Gleason, H.A. and A. Cronquist. 1991.
Manual of Vascular Plants of Northeastern United States and Adjacent Canada. Second edition. The New York Botanical Garden, New York City. 910 p.

Great Plains Flora Association. 1977.
Atlas of the Flora of the Great Plains. Iowa State University Press, Ames. 600 p.

Great Plains Flora Association. 1986.
Flora of the Great Plains. University Press of Kansas, Lawrence. 1392 p.

Hitchcock, C.L., A. Cronquist, M. Ownbey and J.W. Thompson. 1955-1969.
Vascular Plants of the Pacific Northwest. Volumes 1-5. University of Washington Press, Seattle.

Hydrometrics, Inc. 2021. *Baseline Water Temperature Monitoring Quarterly Report*. Technical Report for Sandfire Resources America, Inc. Helena, Montana. 16 pp. + appendices.

Jones, W.M. 2005. *A Vegetation Index of Biotic Integrity for Small-order Streams in Southwest Montana and a Floristic Quality Assessment for Western Montana Wetlands*. Montana Natural Heritage Program. 29 p.

Lesica, P. 2012. Manual of Montana Vascular Plants. Botanical Research Institute of Texas.

Lichvar, R.W., D.L. Banks, W.N. Kirchner, and N.C. Melvin. 2016. The National Wetland Plant List: 2016 wetland ratings. Phytoneuron 2016-30: 1-17. Published 28 April 2016. ISSN 2153 733X

Montana Fish, Wildlife, and Parks. 2012. *A Landowner's Guide to Wildlife Friendly Fences: How to Build Fence with Wildlife in Mind*. Second Edition Revised and Updated 2012. Available at: file:///C:/Users/John/Downloads/Wildlife%20Friendly%20Fences%20-%202012.pdf. Accessed on: March 9, 2021.

Montana Natural Heritage Program. 2010. *Field Guide to Montana's Wetland and Riparian Ecological Systems*. Available at: http://mtnhp.org/wetlands/docs/MTWetland_Riparian_EcolSys_Nov2010.pdf. Accessed on: March 4, 2021.

Mueller-Dombois, D. and H. Ellenberg. 1974. Aims *and Methods of Vegetation Ecology*. John Wiley & Sons, Inc. New York. 546 p.Pipp, Andrea. 2017. *Coefficient of Conservatism Rankings for the Flora of Montana: Part III*. December 15th. Report to the Montana Department of Environmental Quality, Helena,Montana. Prepared by the Montana Natural Heritage Program, Helena, Montana. 107 pp.

Taft, J.B., S. Wilhelm, D.M. Ladd, and L.A. Masters. 1997. *Floristic Quality Assessment for Vegetation in Illinois, a Method for Assessing Vegetation Integrity*. Erigenia 15:3-95.

U.S. Army Corps of Engineers. 2005. *Wetland Compensatory Mitigation Ratios, Montana Regulatory Program*. Available at:

https://usace.contentdm.oclc.org/utils/getfile/collection/p16021coll11/id/2674. Accessed on: Multiple occasions.

U.S. Army Corps of Engineers. 2013. *Montana Stream Mitigation Procedure*. Available at: https://usace.contentdm.oclc.org/utils/getfile/collection/p16021coll11/id/2675. Accessed on: Multiple occasions.

U.S. Army Corps of Engineers. 2021. *Regulatory In-lieu Fee and Bank Information Tracking System (RIBITS)*. Available at: https://ribits.ops.usace.army.mil/ords/f?p=107:10:::NO::P10_BANK_ID:4612. Accessed on: March 2, 2021.

U.S. Department of Agriculture. Natural Resource Conservation Service. 2012. *Riparian Assessment Using the NRCS Riparian Assessment Method*. Available at: https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs144p2_050752.pdf. Accessed on: 2012

WESTECH Environmental Services, Inc. 2015. *Baseline Wetland Delineation and Waterbody Survey, Black Butte Copper Project, Meagher County, Montana*. Technical Report for Sandfire Resources America, Inc. Helena, Montana. 16 pp. + appendices. 17 pp. + appendices.

WESTECH Environmental Services, Inc. 2022. NWO-2013-01385-MTH Sandfire Resources America, Inc. Black Butte Copper Project Permittee Responsible Wetland and Stream Mitigation Plan. Prepared for Sandfire Resources America, Inc. Helena, MT.

Appendix A –
List of Vascular Plant Species Identified for the Strawberry Butte Mitigation Site

Binomial	Code	Status	Common Name
NATIVE PERENNIAL GRAMINOIDS (Cool Season)			
Agropyron trachycaulum (Agropyron caninum, Elymus trachycaulus*)	Agr tra	FAC	Slender wheatgrass
Anthoxanthum hirtum* (Hierochloe odorata)	Ant hir	FACW	Northern sweetgrass
Carex aquatilis*	Car aqu	OBL	Water sedge
Carex nebrascensis*	Car neb	OBL	Nebraska sedge
Carex pellita* (Carex lanuginosa)	Car pel	OBL	Woolly sedge
Carex praegracilis*	Car pra	FACW	Clustered field sedge
Carex utriculata* (Carex rostrata)	Car utr	OBL	Southern beaked sedge
Deschampsia cespitosa (Deschampsia caespitosa*)	Des ces	FACW	Tufted hairgrass
Juncus balticus* (Juncus arcticus var. balticus)	Jun bal	FACW	Baltic rush
NATIVE PERENNIAL GRAMINOIDS (Warm Season)			
Catabrosa aquatica*	Cat aqu	OBL	Brookgrass
INTRODUCED PERENNIAL GRAMINOIDS			
Agrostis stolonifera* (Agrostis alba)	Agr sto	FAC	Redtop
Alopecurus arundinaceus*	Alo aru	FAC	Creeping meadow foxtail
Bromus inermis*	Bro ine	UPL	Smooth brome
Phleum pratense*	Phl pra	FAC	Common timothy
Poa palustris*	Poa pal	FAC	Fowl bluegrass
Poa pratensis*	Poa pra	FAC	Kentucky bluegrass
INTRODUCED ANNUAL GRAMINOIDS			
Alopecurus carolinianus*	Alo car	FACW	Carolina foxtail
NATIVE PERENNIAL FORBS AND SUBSHRUBS			
Achillea millefolium*	Ach mil	FACU	Common yarrow
Cirsium flodmanii*	Cir flo	FAC	Flodman's thistle
Epilobium ciliatum* (Epilobium glandulosum)	Epi cil	FACW	Common willow-herb
Fragaria virginiana*	Fra vir	FACU	Virginia strawberry
Galium boreale*	Gal bor	FACU	Northern bedstraw
Geum macrophyllum*	Geu mac	FAC	Large leaf avens
Geum rivale*	Geu riv	FACW	Water avens
Mentha arvensis*	Men arv	FACW	Field mint
Mimulus guttatus*	Mim gut	OBL	Common monkey-flower
Pedicularis groenlandica*	Ped gro	OBL	Elephanthead
Platanthera hyperborea (Habenaria hyperborea, Platanthera aquilonis*)	Pla hyp	FACW	Northern green bog-orchid
Potentilla gracilis*	Pot gra	FAC	Slender cinquefoil
Pyrola asarifolia*	Pyr asa	FACU	Pink wintergreen
Senecio sphaerocephalus*	Sen sph	FACW	Mountain-marsh butterweed
Smilacina stellata (Maianthemum stellatum*)	Smi ste	FAC	Starry false solomon's seal
Solidago canadensis var. gilvocanescens (Solidago altissima*)	Sol cang	FACU	Canada (tall) goldenrod
Solidago mollis	Sol mol		Velvety goldenrod
Stellaria longifolia*	Ste log	FACW	Longleaved starwort
Stellaria longipes*	Ste lon	FACW	Longstalk starwort
Symphyotrichum subspicatum* (Aster subspicatus)	Sym sub	FACW	Douglas' aster
Trifolium longipes*	Tri lon	FAC	Long-stalked clover
Valeriana dioica*	Val dio	FACW	Northern valerian
Veronica americana*	Ver ame	OBL	American speedwell
Viola nephrophylla* (Viola pratincola)	Vio nep	FACW	Northern bog violet

INTRODUCED PERENNIAL FORBS			
Rorippa nasturtium-aquaticum (Nasturtium officinale*)	Ror nas	OBL	Water-cress
Taraxacum laevigatum	Tar lae		Red-seeded dandelion
Taraxacum officinale*	Tar off	FACU	Common dandelion
Trifolium pratense*	Tri pra	FACU	Red clover
Trifolium repens*	Tri rep	FAC	White Dutch clover
NATIVE SHRUBS AND VINES			
Dasiphora fruticosa* (Potentilla fruticosa, Pentaphylloides floribunda)	Das fru	FAC	Shrubby cinquefoil
Ribes setosum (Ribes oxyacanthoides*)	Rib set	FACW	Bristly gooseberry
Rosa woodsii*	Ros woo	FACU	Wood's rose
Salix bebbiana*	Sal beb	FACW	Bebb willow
Salix eriocephala var. watsonii (Salix lutea*)	Sal eriw	OBL	Yellow willow
Salix geyeriana*	Sal gey	FACW	Geyer willow
Salix planifolia* (Salix phylicifolia)	Sal pla	OBL	Planeleaf willow
Salix pseudomonticola* (Salix monticola)	Sal pse	FACW	Mountain willow

Scientific nomenclature follows Lesica (2012). The more recent, most commonly used synonyms, partial synonyms/combinations, and misapplied names are given in parentheses. These, as well as common names, are taken from a variety of sources including:

Cronquist, A., A.H. Holmgren, N. H. Holmgren, J.L. Reveal and P.K. Holmgren. 1972-2012.
Intermountain Flora . 6 volumes. The New York Botanical Garden, New York City.

Flora of North America Editorial Committee, eds. 1993+.
Flora of North America North of Mexico . 16+ volumes. Oxford University Press, New York and Oxford.

Gleason, H.A. and A. Cronquist. 1991.
Manual of Vascular Plants of Northeastern United States and Adjacent Canada . Second edition. The New York Botanical Garden, New York City. 910 p.

Great Plains Flora Association. 1986.
Flora of the Great Plains . University Press of Kansas, Lawrence. 1392 p.

Hitchcock, C.L., A. Cronquist, M. Ownbey and J.W. Thompson. 1955-1969.
Vascular Plants of the Pacific Northwest . 5 volumes. University of Washington Press, Seattle.

Kartesz, J.T. 1994.
A Synonymized Checklist of the Vascular Flora of the United States, Canada and Greenland . Second edition. 2 volumes. Timber Press. Portland, Oregon.

Lesica, P. 2012.
Manual of Montana Vascular Plants . Botanical Research Institute of Texas Press. Fort Worth, Texas. 771 p.

Lichvar, R. 2012.
The National Wetland Plant List . ERDC/CRREL TN-12-11. Hanover, NH: U.S. Army Engineer Research and Development Center, Cold Regions Research and Engineering Laboratory. http://wetland_plants.usace.army.mil/

Lichvar, R.W., D.L. Banks, W.N. Kirchner, and N.C. Melvin. 2016.
The National Wetland Plant List: 2016 wetland ratings . Phytoneuron 2016-30: 1-17. http://wetland_plants.usace.army.mil/

*An asterisk indicates nomenclature appearing on the National Wetland Plant List Great Plains (GP) region (Lichvar 2012, updated 2016). Taxa with no asterisk do not appear on the NWPL, and are to be considered "Upland" species in the context of wetland inventories; additionally, the 2016 NWPL rates wetland plants at only the species level and does not distinguish among infraspecific taxa in assigning wetland ratings.

Appendix B –
Canopy Cover Data for the Strawberry Butte Mitigation Site

APPENDIX B

PLOT CHARACTERISTICS, CANOPY COVER, FREQUENCY, AND COVER-WEIGHTED C-VALUES

[a]Functional Class	
NPGc	Native Perennial Graminoids (Cool Season)
NPGw	Native Perennial Graminoids (Warm Season)
IPG	Introduced Perennial Graminoids
NAG	Native Annual Graminoids
IAG	Introduced Annual Graminoids
NPF	Native Perennial Forbs and Subshrubs
IPF	Introduced Perennial Forbs
FA	Ferns and Allies
NABF	Native Annual/Biennial Forbs
IABF	Introduced Annual/Biennial Forbs
NS	Native Shrubs and Vines
IS	Introduced Shrubs and Vines
NT	Native Trees
IT	Introduces Trees

[b]Indicator Status		% Occurrence
OBL	Obligate	>99
FACW	Facultative Wetland	67–99
FAC	Facultative	34–66
FACU	Facultative Upland	1–33
UPL	Upland	<1

[c]C-Values		
0	Non-Native Montana Species	invasive
1	Non-Native Montana Species	relatively benign
2	Opportunistic, Broad Ecological Tolerance	exhibits a broad range of ecological tolerance and is more or less restricted to areas of human disturbance
3	Non-Opportunistic, Intermediate Ecological Tolerance	exhibits an intermediate range of ecological tolerance, typifies a stable phase of a native community, and thrives and/or persists under natural or human disturbance
4	Non-Opportunistic, Intermediate Ecological Tolerance	exhibits an intermediate range of ecological tolerance, typifies a stable phase of a native community, and persists but does not thrive with some natural or human disturbance
5	Non-Opportunistic, Intermediate Ecological Tolerance	exhibits an intermediate range of ecological tolerance, typifies a stable phase of a native community, and persists but does not thrive with a little natural or human disturbance
6	Non-Opportunistic, Narrow Ecological Tolerance	exhibits a moderate fidelity to a more or less narrow range of ecological tolerance, typifies a stable or near climax community, and tolerates limited natural or human disturbance (unless surrogate for fire or other natural disturbance)
7	Non-Opportunistic, Narrow Ecological Tolerance	exhibits a moderate fidelity to a somewhat narrow range of ecological tolerance, typifies a stable or near climax community, and does not tolerate disturbance
8	Non-Opportunistic, Narrow Ecological Tolerance	exhibits a moderate fidelity to a narrow range of ecological tolerance, typifies a stable or near climax community, and does not tolerate disturbance
9	Non-Opportunistic, Narrow Ecological Tolerance	exhibits a high fidelity to a narrow range of ecological tolerance, typifies a stable or near climax community, and does not tolerate disturbance
10	Non-Opportunistic, Narrow Ecological Tolerance	exhibits a very high fidelity to a very narrow range of ecological tolerance that typifies a stable or near climax community and does not tolerate disturbance

d Frequency presented as a count of the number of times a species occurred in the sample sites.

e Cover-weighted C-value calculated by multiplying the species cover by its assigned C-value.

**Solidago canadensis var. salebrosa* and *Symphyotrichum lanceolatum var. hesperium* were not assigned C-Values by the Montana Natural Heritage Program; however, based on professional judgement, they were given the C-Values assigned to *Solidago canadensis* and *Symphyotrichum lanceolatum*, respectively.

Appendix B
Table B1 - Wetland Mitigation Plot Characteristics
2021

Plot	BB-PRM1	BB-PRM2	BB-PRM3	BB-PRM4	BB-PRM5	BB-PRM6	BB-PRM7	BB-PRM8
Season	Summer 2021	Summer 2021	Summer 2021	Summer 2021	Summer 2021	Summer 2021	Summer 2021	Summer 2021
Slope	3	3	2	3	2	1	6	2
Aspect	134	190	171	176	178	180	181	250
Topography	Lower Slope	Toe Slope	Lower Slope	Lower Slope	Toeslope	Lower Slope	Lower Slope	Drainage
Configuration	Undulating	Undulating	Concave	Straight	Flat/hummocky	Hummocky	Convex	concave
Investigator	JA, DC, DB, JB	JA	JA, DC, DB, JB	JA, JB, DB, DC	JA, JB, DC, DB	JA, JB, DC, DB	JA, DC, JB, DB	JA, DC, JB, DB
Bare Ground	1	8	1	0.3	0.3	0.3	0.3	0.3
Rock	0	0	0	0	0	0	0	0
Litter	86	80	66	73	55	78	83	80
Lichens	0	0	0	0	0	0	0	0
Moss	5	0	7	2	0.3	2	0.3	0.3
Water	3	0	10	10	30	5	0	2
Basal Vegetation	15	12	16	15	14	15	16	18
Total Vegetation	91	87	90	94	85	89	95	96

Plot	BB-PRM9	BB-PRM10	BB-PRM11	BB-PRM12	BB-PRM13	BB-PRM14	BB-PRM15	BB-PRM16
Season	Summer 2021	Summer 2021	Summer 2021	Summer 2021	Summer 2021	Summer 2021	Summer 2021	Summer 2021
Slope	4	0	2	2	2	1	2	6
Aspect	336	279	348	205	30	12	260	350
Topography	Lower Slope	Lower Bench	Lower Slope	Terrace	Mounded spring	Lower Slope	Terrace	Drainage
Configuration	Straight	Concave	Straight	Straight	Convex	Concave	Undulating	Convex
Investigator	JA, DC, JB, DB	JA, DC, JB	JA, DC, JB	JA, DC, JB	JA	JA, JB, DC	JA, DC, JB	JA, DC, JB
Bare Ground	0.3	1	0.3	2	0.3	0	0.3	0.3
Rock	0	0	0	0.3	0	0	0	0
Litter	72	88	82	80	45	64	64	70
Lichens	0	0	0	0	0	0	0	0
Moss	0.3	0	0.3	1	25	4	20	20
Water	0.3	0	0	2	15	20	0	0
Basal Vegetation	18	11	18	15	15	12	16	10
Total Vegetation	95	95	94	86	88	72	87	93

Appendix B
Table B1 - Wetland Mitigation Plot Characteristics
2022

Plot	BB-PRM1	BB-PRM2	BB-PRM3	BB-PRM4	BB-PRM5	BB-PRM6	BB-PRM7	BB-PRM8
Season	Summer 2022	Summer 2022	Summer 2022	Summer 2022	Summer 2022	Summer 2022	Summer 2022	Summer 2022
Slope	3	3	2	3	2	1	6	2
Aspect	134	190	171	176	178	180	181	250
Topography	Lower Slope	Toe Slope	Lower Slope	Lower Slope	Toeslope	Lower Slope	Lower Slope	Drainage
Configuration	Undulating	Undulating	Concave	Straight	Flat/hummocky	Hummocky	Convex	concave
Investigator	JB	JA, DC	JA, DC	JA, DC	JB	JB	JB	JB
Bare Ground	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Rock	0	0	0	0	0	0	0	0
Litter	80	79	67	78	70	82	87	85
Lichens	0	0.3	0.3	0.3	0	0	0	0
Moss	0	3	7	4	1	0	0	0
Water	0	0	0	0	14	0	0	0
Basal Vegetation	20	18	26	22	15	18	13	15
Total Vegetation	96	88	91	91	89	91	95	97

Plot	BB-PRM9	BB-PRM10	BB-PRM11	BB-PRM12	BB-PRM13	BB-PRM14	BB-PRM15	BB-PRM16
Season	Summer 2022	Summer 2022	Summer 2022	Summer 2022	Summer 2022	Summer 2022	Summer 2022	Summer 2022
Slope	4	0	2	2	2	1	2	6
Aspect	336	279	348	205	30	12	260	350
Topography	Lower Slope	Lower Bench	Lower Slope	Terrace	Mounded spring	Lower Slope	Terrace	Drainage
Configuration	Straight	Concave	Straight	Straight	Convex	Concave	Undulating	Convex
Investigator	JB	JB	JB	JB	JA, JB	JB	JB	JB
Bare Ground	0.3	0	0.3	1	0	1	0.3	0.3
Rock	0	0	6	1	0	0	0	0
Litter	85	80	82	75	22	41	65	72
Lichens	0	0	0	0	0	0	0	0
Moss	0	0	0	0.3	30	5	20	18
Water	0	0	0	5	30	45	0	0
Basal Vegetation	15	20	18	18	18	8	15	10
Total Vegetation	98	97	95	89	81	77	81	98

Appendix B -

Table B-2. Canopy Cover Data for the Strawberry Butte Mitigation Site (2021)

Species	Class[a]	Indicator Status[b]	C-Value[c]	BB-PRM1	BB-PRM2	BB-PRM3	BB-PRM4	BB-PRM5	BB-PRM6	BB-PRM7
				Summer 2021	Summer 2021	Summer 2021	Summer 2021	Summer 2021	Summer 2021	Summer 2021
Achillea millefolium	NPF	FACU	3							
Agropyron trachycaulum	NPGc	FAC	5							
Agrostis stolonifera	IPG	FAC	0		7	15	1		2	2
Alopecurus arundinaceus	IPG	FAC	0	2		3	7	5		2
Alopecurus carolinianus	IAG	FACW	4							1
Anthoxanthum hirtum	NPGc	FACW	8							8
Bromus inermis	IPG	UPL	0						0.3	
Carex aquatilis	NPGc	OBL	5							
Carex nebrascensis	NPGc	OBL	4	3	4	4	3	1		0.3
Carex pellita	NPGc	OBL	4				18	5		0.3
Carex praegracilis	NPGc	FACW	4	3						6
Carex utriculata	NPGc	OBL	6	20	5	45	4	40	18	
Catabrosa aquatica	NPGw	OBL	6							
Cirsium flodmanii	NPF	FAC	3							
Dasiphora fruticosa	NS	FAC	4	2		15	3	0.3		20
Deschampsia cespitosa	NPGc	FACW	7	2		8	2	2	3	0.3
Epilobium ciliatum	NPF	FACW	4			0.3		1	0.3	
Fragaria virginiana	NPF	FACU	4							
Galium boreale	NPF	FACU	4							
Geum macrophyllum	NPF	FAC	5	0.3		0.3	1	3	0.3	0.3
Geum rivale	NPF	FACW	7	20	40	17	1	2		0.3
Juncus balticus	NPGc	FACW	4	28	20	12	40	22	26	22
Mentha arvensis	NPF	FACW	4			0.3				
Mimulus guttatus	NPF	OBL	5							
Pedicularis groenlandica	NPF	OBL	7	5	0.3	2				
Phleum pratense	IPG	FAC	0		6					0.3
Platanthera hyperborea	NPF	FACW	5			1				
Poa palustris	IPG	FAC	3			3		1		0.3
Poa pratensis	IPG	FAC	0	7	2	1	2	0.3		30
Potentilla gracilis	NPF	FAC	4		2		0.3	1	0.3	0.3
Pyrola asarifolia	NPF	FACU	6				0.3			
Ribes setosum	NS	FACW	3							
Rorippa nasturtium-aquaticum	IPF	OBL	0					7	0.3	
Rosa woodsii	NS	FACU	3							

Appendix B -

Table B-2. Canopy Cover Data for the Strawberry Butte Mitigation Site (2021)

Species	Class[a]	Indicator Status[b]	C-Value[c]	BB-PRM1	BB-PRM2	BB-PRM3	BB-PRM4	BB-PRM5	BB-PRM6	BB-PRM7
				Summer 2021	Summer 2021	Summer 2021	Summer 2021	Summer 2021	Summer 2021	Summer 2021
Salix bebbiana	NS	FACW	4				1			
Salix eriocephala var. watsonii	NS	OBL	6							
Salix geyeriana	NS	FACW	6	13	4	16	11			
Salix planifolia	NS	OBL	7				3			
Salix pseudomonticola	NS	FACW	7							
Senecio sphaerocephalus	NPF	FACW	6	7	2	5	12	13	60	25
Smilacina stellata	NPF	FAC	4							
Solidago canadensis var. salebrosa	NPF	FAC	4		1					
Stellaria longifolia	NPF	FACW	6		0.3		0.3	1		0.3
Stellaria longipes	NPF	FACW	7			0.3			0.3	
Symphyotrichum subspicatum	NPF	FACW	6		4					
Taraxacum laevigatum	IPF	(UPL)	0		0.3					
Taraxacum officinale	IPF	FACU	0				0.3	0.3	0.3	0.3
Trifolium longipes	NPF	FAC	6	1	2		0.3			0.3
Trifolium pratense	IPF	FACU	0	5						
Trifolium repens	IPF	FAC	0		0.3					
Valeriana dioica	NPF	FACW	5							
Veronica americana	NPF	OBL	5			0.3				
Viola nephrophylla	NPF	FACW	8		1	0.3				
Total Cover (Stratified)				118.3	101.2	148.8	110.5	104.9	111.1	119.3

Appendix B -
Table B-2. Canopy Cover Data for the Strawberry Butte Mitigation Site (2021)

Species	Class[a]	Indicator Status[b]	C-Value[c]	BB-PRM8	BB-PRM9	BB-PRM10	BB-PRM11	BB-PRM12	BB-PRM13	BB-PRM14	BB-PRM15	BB-PRM16
				Summer 2021	Summer 2021	Summer 2021	Summer 2021	Summer 2021	Summer 2021	Summer 2021	Summer 2021	Summer 2021
Achillea millefolium	NPF	FACU	3	0.3	0.3			0.3				
Agropyron trachycaulum	NPGc	FAC	5					0.3				
Agrostis stolonifera	IPG	FAC	0	3	7			1	0.3		3	
Alopecurus arundinaceus	IPG	FAC	0			1						
Alopecurus carolinianus	IAG	FACW	4									
Anthoxanthum hirtum	NPGc	FACW	8									
Bromus inermis	IPG	UPL	0									
Carex aquatilis	NPGc	OBL	5			5		2				
Carex nebrascensis	NPGc	OBL	4			2		0.3	55	58	4	3
Carex pellita	NPGc	OBL	4	2		2	4	4			19	
Carex praegracilis	NPGc	FACW	4		4		8	3	40	2		2
Carex utriculata	NPGc	OBL	6	15	1	4		4	2	4		40
Catabrosa aquatica	NPGw	OBL	6					2				
Cirsium flodmanii	NPF	FAC	3					0.3				
Dasiphora fruticosa	NS	FAC	4	10	20	8	75	65		2	20	
Deschampsia cespitosa	NPGc	FACW	7	4	5	5	1	1		0.3	1	
Epilobium ciliatum	NPF	FACW	4	0.3				0.3	1	0.3		
Fragaria virginiana	NPF	FACU	4	0.3				1				1
Galium boreale	NPF	FACU	4	0.3	0.3	0.3	3	0.3				
Geum macrophyllum	NPF	FAC	5	0.3	1	0.3	0.3					
Geum rivale	NPF	FACW	7	0.3	0.3	12	14	9			4	12
Juncus balticus	NPGc	FACW	4		48	1	4	2	5	3	20	
Mentha arvensis	NPF	FACW	4									
Mimulus guttatus	NPF	OBL	5					0.3				
Pedicularis groenlandica	NPF	OBL	7		1			1				
Phleum pratense	IPG	FAC	0					2				
Platanthera hyperborea	NPF	FACW	5					0.3				
Poa palustris	IPG	FAC	3	3	2	35	10	3			1	1
Poa pratensis	IPG	FAC	0	4	12	20	5	5			4	
Potentilla gracilis	NPF	FAC	4	0.3	1	1	2	2			0.3	
Pyrola asarifolia	NPF	FACU	6									
Ribes setosum	NS	FACW	3			3						3
Rorippa nasturtium-aquaticum	IPF	OBL	0						0.3			
Rosa woodsii	NS	FACU	3									1

Appendix B -

Table B-2. Canopy Cover Data for the Strawberry Butte Mitigation Site (2021)

Species	Class[a]	Indicator Status[b]	C-Value[c]	BB-PRM8	BB-PRM9	BB-PRM10	BB-PRM11	BB-PRM12	BB-PRM13	BB-PRM14	BB-PRM15	BB-PRM16
				Summer 2021	Summer 2021	Summer 2021	Summer 2021	Summer 2021	Summer 2021	Summer 2021	Summer 2021	Summer 2021
Salix bebbiana	NS	FACW	4								0.3	
Salix eriocephala var. watsonii	NS	OBL	6									8
Salix geyeriana	NS	FACW	6	4		60		2			12	35
Salix planifolia	NS	OBL	7							2		25
Salix pseudomonticola	NS	FACW	7								2	
Senecio sphaerocephalus	NPF	FACW	6	28	51		1	15				
Smilacina stellata	NPF	FAC	4									1
Solidago canadensis var. salebrosa	NPF	FAC	4		0.3		0.3					
Stellaria longifolia	NPF	FACW	6			0.3						0.3
Stellaria longipes	NPF	FACW	7	0.3	1		0.3	0.3				
Symphyotrichum subspicatum	NPF	FACW	6			0.3	2	1			1	0.3
Taraxacum laevigatum	IPF	(UPL)	0									
Taraxacum officinale	IPF	FACU	0	0.3	0.3		0.3	3				0.3
Trifolium longipes	NPF	FAC	6		0.3	0.3	0.3	1				
Trifolium pratense	IPF	FACU	0					0.3				
Trifolium repens	IPF	FAC	0									
Valeriana dioica	NPF	FACW	5					2				
Veronica americana	NPF	OBL	5					0.3	1			
Viola nephrophylla	NPF	FACW	8					0.3		0.3	2	0.3
Total Cover (Stratified)				75.7	155.8	160.5	130.5	134.6	104.6	71.9	93.6	133.2

Appendix B -
Table B-3. Canopy Cover Data for the Strawberry Butte Mitigation Site (2022)

Species	Class[a]	Indicator Status[b]	C-Value[c]	BB-PRM1 Summer 2022	BB-PRM2 Summer 2022	BB-PRM3 Summer 2022	BB-PRM4 Summer 2022	BB-PRM5 Summer 2022	BB-PRM6 Summer 2022	BB-PRM7 Summer 2022	BB-PRM8 Summer 2022	BB-PRM9 Summer 2022
Achillea millefolium	NPF	FACU	3							0.3		
Agropyron smithii	NPGc	FACU	4									
Agropyron trachycaulum	NPGc	FAC	5									
Agrostis stolonifera	IPG	FAC	0		12	16	10	15	18	3	6	
Alopecurus arundinaceus	IPG	FAC	0	0.3		0.3	2	2	3	1	40	
Alopecurus carolinianus	IAG	FACW	4									
Anthoxanthum hirtum	NPGc	FACW	8							7		
Bromus carinatus	NPGc	(UPL)	5						2			
Bromus pumpellianus	NPGc	(UPL)	-		0.3		1	0.3				
Calamagrostis canadensis	NPGc	FACW	5									
Calamagrostis stricta	NPGc	FACW	6									
Carex aquatilis	NPGc	OBL	5									
Carex nebrascensis	NPGc	OBL	4	3	5	3	3	4	1	3	10	
Carex pellita	NPGc	OBL	4				25		1	3	5	
Carex praegracilis	NPGc	FACW	4		4					3		
Carex utriculata	NPGc	OBL	6	35		32	2	35	15	1	30	
Catabrosa aquatica	NPGw	OBL	6									
Cirsium flodmanii	NPF	FAC	3									
Cirsium hookerianum	NPF	(UPL)	4									
Dasiphora fruticosa	NS	FAC	4	2		14	2				12	
Deschampsia cespitosa	NPGc	FACW	7	1		3	1	3	6		1	
Elymus macounii	NPGc	FACU	-						0.3			
Epilobium ciliatum	NPF	FACW	4		0.3			1	0.3	1		
Equisetum laevigatum	FA	FACW	4	0.3								
Festuca idahoensis	NPGc	FACU	4									
Festuca rubra	NPGc	FAC	4		5	0.3						
Fragaria virginiana	NPF	FACU	4			0.3						
Galium boreale	NPF	FACU	4							1		
Geum macrophyllum	NPF	FAC	5	4				0.3	1	1	1	
Geum rivale	NPF	FACW	7	20	45	28	2	3			1	
Juncus balticus	NPGc	FACW	4	30	20	16	45	25	35	25		
Lycopus americanus	NPF	OBL	8								0.3	
Mentha arvensis	NPF	FACW	4			0.3						
Mimulus guttatus	NPF	OBL	5									
Pedicularis groenlandica	NPF	OBL	7	1	0.3	1						
Phleum pratense	IPG	FAC	0	0.3	18	2	4	2	1	1		
Platanthera hyperborea	NPF	FACW	5	0.3								
Platanthera stricta	NPF	FACW	7				1					

Appendix B -
Table B-3. Canopy Cover Data for the Strawberry Butte Mitigation Site (2022)

Species	Class[a]	Indicator Status[b]	C-Value[c]	BB-PRM1 Summer 2022	BB-PRM2 Summer 2022	BB-PRM3 Summer 2022	BB-PRM4 Summer 2022	BB-PRM5 Summer 2022	BB-PRM6 Summer 2022	BB-PRM7 Summer 2022	BB-PRM8 Summer 2022	BB-PRM9 Summer 2022
Poa palustris	IPG	FAC	3	1			0.3	1		0.3	0.3	
Poa pratensis	IPG	FAC	0	10	3	1				20	3	
Potentilla gracilis	NPF	FAC	4		1	0.3	0.3	1	1	2	3	
Ribes setosum	NS	FACW	3									
Rorippa nasturtium-aquaticum	IPF	OBL	0					0.3				
Rosa woodsii	NS	FACU	3									
Rumex crispus	IPF	FAC	1		0.3	3						
Rumex occidentalis	NPF	FACW	4					3	2		0.3	
Rumex salicifolius	NPF	FAC	7	0.3								
Sagittaria cuneata	NPF	OBL	7								0.3	
Salix bebbiana	NS	FACW	4	18			1					
Salix eriocephala var. watsonii	NS	OBL	6									
Salix geyeriana	NS	FACW	6	10		11	8				4	
Salix planifolia	NS	OBL	7			2	4					
Salix pseudomonticola	NS	FACW	7									
Senecio sphaerocephalus	NPF	FACW	6	5	5	8	15	12	25	28	5	
Smilacina stellata	NPF	FAC	4									
Solidago canadensis var. salebrosa	NPF	FAC	4		3	0.3	1					
Spiranthes romanzoffiana	NPF	FACW	6			1						
Stellaria longifolia	NPF	FACW	6			0.3	0.3	0.3				
Stellaria longipes	NPF	FACW	7					1	3		1	
Symphyotrichum boreale	NPF	OBL	7									
Symphyotrichum lanceolatum var. hesperium	NPF	OBL	4									
Symphyotrichum subspicatum	NPF	FACW	6					1	8	1		
Taraxacum officinale	IPF	FACU	0							0.3	0.3	
Thalictrum occidentale	NPF	FACU	5									
Trifolium longipes	NPF	FAC	6	2								
Trifolium pratense	IPF	FACU	0	4	0.3							
Valeriana dioica	NPF	FACW	5									
Veronica americana	NPF	OBL	5									
Viola nephrophylla	NPF	FACW	8			0.3		0.3			0.3	
Total Cover (Stratified)				147.5	122.5	143.4	127.9	110.5	122.6	101.9	123.8	168.5

Appendix B -
Table B-3. Canopy Cover Data for the Strawberry Butte Mitigation Site (2022)

Species	Class[a]	Indicator Status[b]	C-Value[c]	BB-PRM10 Summer 2022	BB-PRM11 Summer 2022	BB-PRM12 Summer 2022	BB-PRM13 Summer 2022	BB-PRM14 Summer 2022	BB-PRM15 Summer 2022	BB-PRM16 Summer 2022
Achillea millefolium	NPF	FACU	3			0.3				
Agropyron smithii	NPGc	FACU	4							
Agropyron trachycaulum	NPGc	FAC	5							
Agrostis stolonifera	IPG	FAC	0		0.3	1	1		1	3
Alopecurus arundinaceus	IPG	FAC	0	0.3	0.3	0.3				
Alopecurus carolinianus	IAG	FACW	4		0.3					
Anthoxanthum hirtum	NPGc	FACW	8			0.3				
Bromus carinatus	NPGc	(UPL)	5			0.3				
Bromus pumpellianus	NPGc	(UPL)	-							0.3
Calamagrostis canadensis	NPGc	FACW	5			0.3				
Calamagrostis stricta	NPGc	FACW	6				8			
Carex aquatilis	NPGc	OBL	5	4	0.3	2				
Carex nebrascensis	NPGc	OBL	4	4		1	40	68	5	2
Carex pellita	NPGc	OBL	4	3	4	5			45	
Carex praegracilis	NPGc	FACW	4		6	2	30	1	1	1
Carex utriculata	NPGc	OBL	6	4	3	4		2		70
Catabrosa aquatica	NPGw	OBL	6				0.3			
Cirsium flodmanii	NPF	FAC	3			1				
Cirsium hookerianum	NPF	(UPL)	4			0.3				
Dasiphora fruticosa	NS	FAC	4	8	78	65		2	18	0.3
Deschampsia cespitosa	NPGc	FACW	7	2	1	1		1	2	
Elymus macounii	NPGc	FACU	-							
Epilobium ciliatum	NPF	FACW	4			0.3	0.3			
Equisetum laevigatum	FA	FACW	4							
Festuca idahoensis	NPGc	FACU	4			1				
Festuca rubra	NPGc	FAC	4							0.3
Fragaria virginiana	NPF	FACU	4			2				2
Galium boreale	NPF	FACU	4	1	1	1			0.3	
Geum macrophyllum	NPF	FAC	5	1	1	1				
Geum rivale	NPF	FACW	7	15	15	10			3	18
Juncus balticus	NPGc	FACW	4	1	5	2	2	3	12	
Lycopus americanus	NPF	OBL	8							
Mentha arvensis	NPF	FACW	4							
Mimulus guttatus	NPF	OBL	5			0.3	0.3			
Pedicularis groenlandica	NPF	OBL	7			0.3				
Phleum pratense	IPG	FAC	0	2	1	2				
Platanthera hyperborea	NPF	FACW	5					0.3		
Platanthera stricta	NPF	FACW	7							

Appendix B -
Table B-3. Canopy Cover Data for the Strawberry Butte Mitigation Site (2022)

Species	Class[a]	Indicator Status[b]	C-Value[c]	BB-PRM10 Summer 2022	BB-PRM11 Summer 2022	BB-PRM12 Summer 2022	BB-PRM13 Summer 2022	BB-PRM14 Summer 2022	BB-PRM15 Summer 2022	BB-PRM16 Summer 2022
Poa palustris	IPG	FAC	3	30	7	3				
Poa pratensis	IPG	FAC	0	10	2	5				1
Potentilla gracilis	NPF	FAC	4	1	3	2			1.3	
Ribes setosum	NS	FACW	3	3						2
Rorippa nasturtium-aquaticum	IPF	OBL	0	0.3						
Rosa woodsii	NS	FACU	3							1
Rumex crispus	IPF	FAC	1							
Rumex occidentalis	NPF	FACW	4	0.3						
Rumex salicifolius	NPF	FAC	7							
Sagittaria cuneata	NPF	OBL	7							
Salix bebbiana	NS	FACW	4						1	
Salix eriocephala var. watsonii	NS	OBL	6							8
Salix geyeriana	NS	FACW	6	60		3			15	35
Salix planifolia	NS	OBL	7					2		25
Salix pseudomonticola	NS	FACW	7						2	
Senecio sphaerocephalus	NPF	FACW	6	3	2	15				2
Smilacina stellata	NPF	FAC	4							0.3
Solidago canadensis var. salebrosa	NPF	FAC	4			1				1
Spiranthes romanzoffiana	NPF	FACW	6					0.3		
Stellaria longifolia	NPF	FACW	6							
Stellaria longipes	NPF	FACW	7	0.3		0.3				
Symphyotrichum boreale	NPF	OBL	7					0.3		
Symphyotrichum lanceolatum var. hesperium	NPF	OBL	4				2			
Symphyotrichum subspicatum	NPF	FACW	6	2	3	2			1	3
Taraxacum officinale	IPF	FACU	0	1	0.3	0.3				0.3
Thalictrum occidentale	NPF	FACU	5		2	1				
Trifolium longipes	NPF	FAC	6	0.3	0.3	1				
Trifolium pratense	IPF	FACU	0			0.3				
Valeriana dioica	NPF	FACW	5			2				
Veronica americana	NPF	OBL	5				1			
Viola nephrophylla	NPF	FACW	8			1.3		0.3	0.3	1
Total Cover (Stratified)				156.5	135.8	140.9	84.9	80.2	107.9	176.5

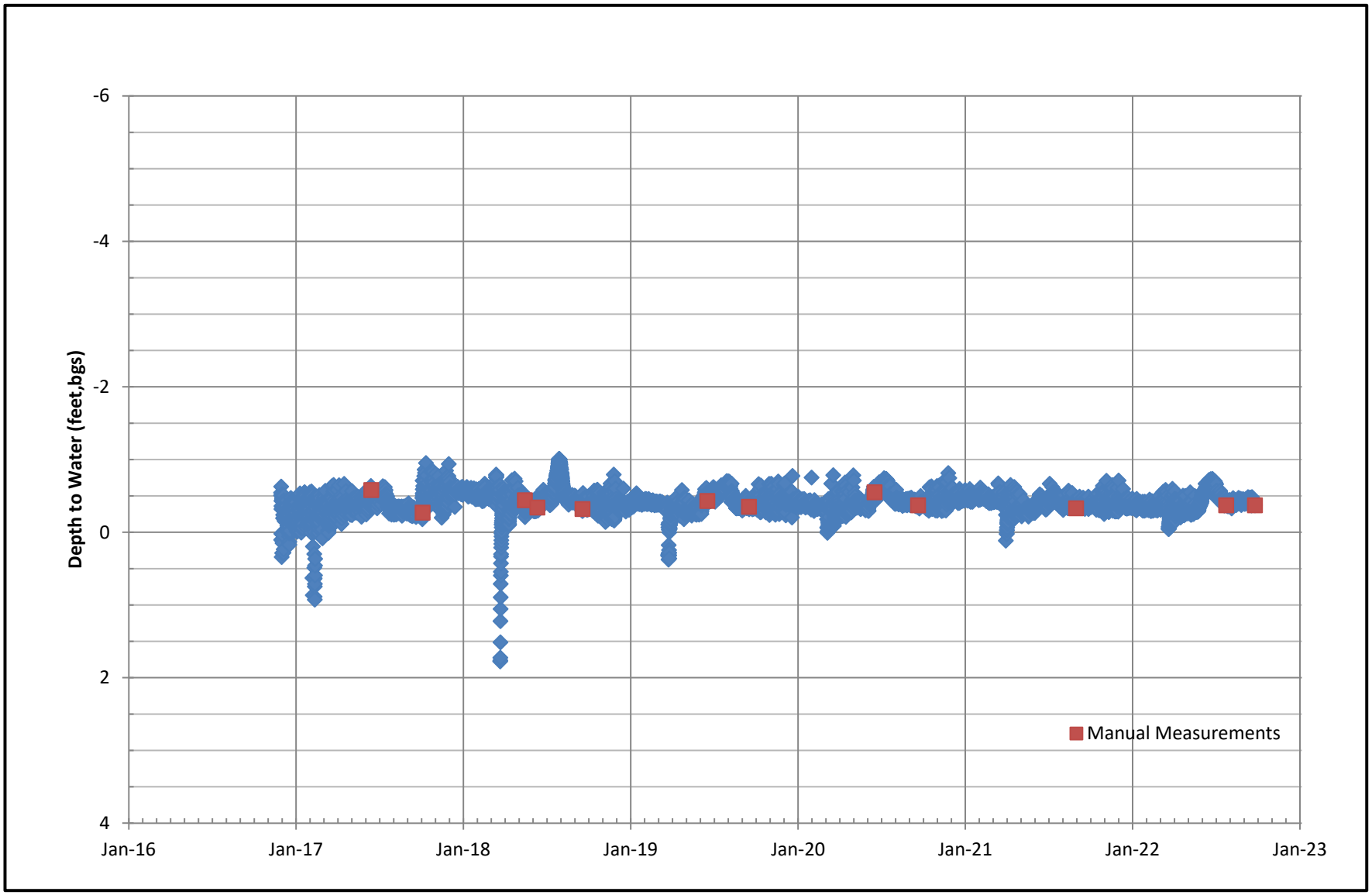
Appendix B
Table B4 - Wetland Mitigation Average and Relative Cover, Frequency, and Cover-Weighted C-Value - 2021 and 2022

Species	Class	Indicator Status	C-Value	Total Cover	Total Cover	Average Cover	Average Cover	Relative Cover	Relative Cover	Frequency	Frequency	Cover-Weighted C-Value	Cover-Weighted C-Value
				2021	2022	2021	2022	2021	2022	2021	2022	2021	2022
Achillea millefolium	NPF	FACU	3	0.9	0.6	0.06	0.04	0.05	0.03	3	2	2.7	1.8
Agropyron smithii	NPGc	FACU	4		1		0.06		0.05		1		4
Agropyron trachycaulum	NPGc	FAC	5	0.3	0.3	0.02	0.02	0.02	0.02	1	1	1.5	1.5
Agrostis stolonifera	IPG	FAC	0	41.3	91.3	2.58	5.71	2.20	4.45	10	13	0	0
Alopecurus arundinaceus	IPG	FAC	0	20	49.5	1.25	3.09	1.07	2.41	6	10	0	0
Alopecurus carolinianus	IAG	FACW	4	1	0.3	0.06	0.02	0.05	0.02	1	1	4	1.2
Anthoxanthum hirtum	NPGc	FACW	8	8	7.3	0.5	0.46	0.43	0.36	2	2	64	58.4
Bromus carinatus	NPGc	(UPL)	5		2.3		0.14	0.00	0.11		2		11.5
Bromus inermis	IPG	UPL	0	0.3		0.02		0.02		1		0	
Bromus pumpellianus	NPGc	(UPL)	-		1.9		0.12		0.09		4		
Calamagrostis canadensis	NPGc	FACW	5		0.3		0.02		0.02		1		1.5
Calamagrostis stricta	NPGc	FACW	6		8		0.5		0.39		1		48
Carex aquatilis	NPGc	OBL	5	7	6.3	0.44	0.39	0.38	0.30	2	3	35	31.5
Carex nebrascensis	NPGc	OBL	4	137.6	154	8.6	9.62	7.34	7.50	12	15	550.4	616
Carex pellita	NPGc	OBL	4	54.3	94	3.39	5.88	2.89	4.59	9	9	217.2	376
Carex praegracilis	NPGc	FACW	4	68	53	4.25	3.31	3.63	2.58	8	9	272	212
Carex utriculata	NPGc	OBL	6	202	237	12.62	14.81	10.77	11.55	13	13	1212	1422
Catabrosa aquatica	NPGw	OBL	6	2	0.3	0.12	0.02	0.10	0.02	1	1	12	1.8
Cirsium flodmanii	NPF	FAC	3	0.3	1	0.02	0.06	0.02	0.05	1	1	0.9	3
Cirsium hookerianum	NPF	(UPL)	4		0.3		0.02		0.02		1		1.2
Dasiphora fruticosa	NS	FAC	4	240.3	223.3	15.02	13.96	12.82	10.89	12	11	961.2	893.2
Deschampsia cespitosa	NPGc	FACW	7	34.6	27	2.16	1.69	1.84	1.32	13	12	242.2	189
Elymus macounii	NPGc	FACU	-		0.3		0.02		0.02		1		
Epilobium ciliatum	NPF	FACW	4	3.5	3.2	0.22	0.2	0.19	0.16	7	6	14	12.8
Equisetum laevigatum	FA	FACW	4		0.3		0.02		0.02		1		1.2
Festuca idahoensis	NPGc	FACU	4		1		0.06		0.05		1		4
Festuca rubra	NPGc	FAC	4		5.6		0.35		0.27		3		22.4
Fragaria virginiana	NPF	FACU	4	2.3	4.3	0.14	0.27	0.12	0.21	3	3	9.2	17.2
Galium boreale	NPF	FACU	4	4.2	4.6	0.26	0.29	0.22	0.23	5	6	16.8	18.4
Geum macrophyllum	NPF	FAC	5	7.1	11.3	0.44	0.71	0.38	0.55	10	9	35.5	56.5
Geum rivale	NPF	FACW	7	131.9	161	8.24	10.06	7.03	7.85	13	12	923.3	1127
Juncus balticus	NPGc	FACW	4	253	276	15.81	17.25	13.50	13.45	14	14	1012	1104
Lycopus americanus	NPF	OBL	8		0.3		0.02	0.00	0.02		1		2.4
Mentha arvensis	NPF	FACW	4	0.3	0.3	0.02	0.02	0.02	0.02	1	1	1.2	1.2
Mimulus guttatus	NPF	OBL	5	0.3	0.6	0.02	0.04	0.02	0.03	1	2	1.5	3
Pedicularis groenlandica	NPF	OBL	7	9.3	2.9	0.58	0.18	0.50	0.14	5	5	65.1	20.3
Phleum pratense	IPG	FAC	0	8.3	37.3	0.52	2.33	0.44	1.82	3	11	0	0
Platanthera hyperborea	NPF	FACW	5	1.3	0.6	0.08	0.04	0.07	0.03	2	2	6.5	3
Platanthera stricta	NPF	FACW	7		1		0.06		0.05		1		7
Poa palustris	IPG	FAC	3	59.3	44.9	3.71	2.81	3.17	2.19	10	9	177.9	134.7
Poa pratensis	IPG	FAC	0	92.3	63	5.77	3.94	4.93	3.07	12	10	0	0
Potentilla gracilis	NPF	FAC	4	10.5	16.9	0.66	1.06	0.56	0.83	11	13	42	67.6
Pyrola asarifolia	NPF	FACU	6	0.3		0.02		0.02	0.00	1		1.8	
Ribes setosum	NS	FACW	3	6	5	0.38	0.31	0.32	0.24	2	2	18	15
Rorippa nasturtium-aquaticum	IPF	OBL	0	7.6	0.6	0.48	0.04	0.41	0.03	3	2	0	0
Rosa woodsii	NS	FACU	3	1	1	0.06	0.06	0.05	0.05	1	1	3	3
Rumex crispus	IPF	FAC	1		3.3		0.21		0.16		2		3.3
Rumex occidentalis	NPF	FACW	4		5.6		0.35		0.27		4		22.4
Rumex salicifolius	NPF	FAC	7		0.3		0.02		0.02		1		2.1
Sagittaria cuneata	NPF	OBL	7		0.3		0.02		0.02		1		2.1
Salix bebbiana	NS	FACW	4	1.3	20	0.08	1.25	0.07	0.97	2	3	5.2	80

Appendix B
Table B4 - Wetland Mitigation Average and Relative Cover, Frequency, and Cover-Weighted C-Value - 2021 and 2022

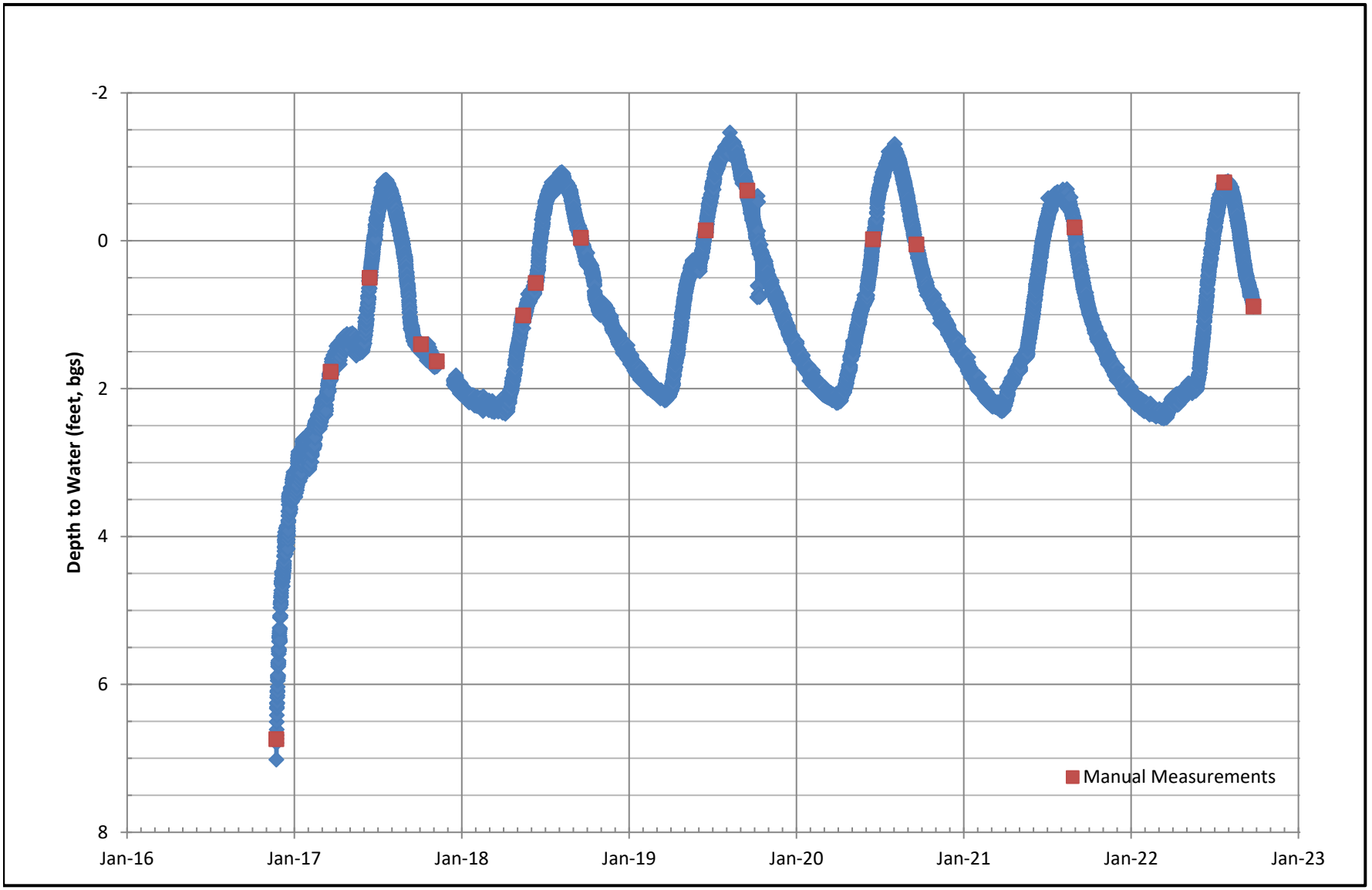
Species	Class	Indicator Status	C-Value	Total Cover	Total Cover	Average Cover	Average Cover	Relative Cover	Relative Cover	Frequency	Frequency	Cover-Weighted C-Value	Cover-Weighted C-Value
				2021	2022	2021	2022	2021	2022	2021	2022	2021	2022
Salix eriocephala var. watsonii	NS	OBL	6	8	8	0.5	0.5	0.43	0.39	1	1	48	48
Salix geyeriana	NS	FACW	6	157	146	9.81	9.12	8.37	7.11	9	9	942	876
Salix planifolia	NS	OBL	7	30	33	1.88	2.06	1.60	1.61	3	4	210	231
Salix pseudomonticola	NS	FACW	7	2	2	0.12	0.12	0.10	0.09	1	1	14	14
Senecio sphaerocephalus	NPF	FACW	6	219	170	13.69	10.62	11.69	8.28	11	13	1314	1020
Smilacina stellata	NPF	FAC	4	1	0.3	0.06	0.02	0.05	0.02	1	1	4	1.2
Solidago canadensis var. salebrosa	NPF	FAC	4	1.6	6.6	0.1	0.41	0.09	0.32	3	6	6.4	26.4
Spiranthes romanzoffiana	NPF	FACW	6		1.3		0.08		0.06		2		7.8
Stellaria longifolia	NPF	FACW	6	2.5	0.9	0.16	0.06	0.14	0.05	6	3	15	5.4
Stellaria longipes	NPF	FACW	7	2.5	6.6	0.16	0.41	0.14	0.32	6	6	17.5	46.2
Symphyotrichum boreale	NPF	OBL	7		0.3		0.02	0.00	0.02		1		2.1
Symphyotrichum lanceolatum var. hesperium	NPF	OBL	4		2		0.12	0.00	0.09		1		8
Symphyotrichum subspicatum	NPF	FACW	6	8.6	21.3	0.54	1.33	0.46	1.04	6	9	51.6	127.8
Taraxacum laevigatum	IPF	(UPL)	0	0.3		0.02		0.02	0.00	1		0	
Taraxacum officinale	IPF	FACU	0	5.4	3.5	0.34	0.22	0.29	0.17	9	7	0	0
Thalictrum occidentale	NPF	FACU	5		3		0.19	0.00	0.15		2		15
Trifolium longipes	NPF	FAC	6	5.5	4.6	0.34	0.29	0.29	0.23	8	5	33	27.6
Trifolium pratense	IPF	FACU	0	5.3	4.6	0.33	0.29	0.28	0.23	2	3	0	0
Trifolium repens	IPF	FAC	0	0.3		0.02		0.02	0.00	1		0	
Valeriana dioica	NPF	FACW	5	2	2	0.12	0.12	0.10	0.09	1	1	10	10
Veronica americana	NPF	OBL	5	1.6	1	0.1	0.06	0.09	0.05	3	1	8	5
Viola nephrophylla	NPF	FACW	8	4.2	3.8	0.26	0.24	0.22	0.19	6	8	33.6	30.4

Appendix C –
Piezometer Well Data for the Strawberry Butte Mitigation Site



Hydrometrics, Inc.
Consulting Scientists and Engineers

Figure 1
BB-WM1 (Plot 13)
Hydrograph Black Butte Copper Project Meagher County, Montana



Hydrometrics, Inc.
Consulting Scientists and Engineers

Figure 2
BB-WM2 (Plot 2)
Hydrograph Black Butte Copper Project Meagher County, Montana

Appendix D – Montana Wetland Assessment Method, Functional Assessment forms for the Strawberry Butte Mitigation Site

MDT Montana Wetland Assessment Form (revised March 2008)

1. Project Name: Sandfire Resources - Black Butte Copper
2. MDT Project #:
Control #:
3. Evaluation Date: 09/13/2022
4. Evaluator(s): Beaver
5. Wetlands/Site #(s): Strawberry Butte Mitigation Site
6. Wetland Location(s): i. Legal: T12N,R7E,SW 1/4 19
Latitude/Longitude:
ii. Approx. Stationing or Mileposts:
iii. Watershed: Missouri-Sun-Smith
Watershed Name, County: Missouri-Sun-Smith, Meagher

7. a. Evaluating Agency:
b. Purpose of Evaluation:
1. ___ Wetlands potentially affected by MDT project
2. X Mitigation wetlands; pre-construction
3. ___ Mitigation wetlands; post-construction
4. ___ Other:

8. Wetland size: 80.000 acres (estimated)
9. Assessment area (AA): 18.100 acres (measured)

10. Classification of Wetland and Aquatic Habitats in AA

HGM Class (Brinson)	Class (Cowardin)	Modifier (Cowardin)	Water Regime	% of AA
S	EM	NA	PP	43.00
R	SS	NA	PP	8.00
S	SS	NA	PP	48.00

Abbreviations: *(see manual for definitions)*

HGM Classes: Riverine (**R**), Depressional (**D**), Slope (**S**), Mineral Soil Flats (**MSF**), Organic Soil Flats (**OSF**), Lacustrine Fringe (**LF**);

Cowardin Classes: Rock Bottom (**RB**), Unconsolidated bottom (**UB**), Aquatic Bed (**AB**), Unconsolidated Shore (**US**), Moss-lichen Wetland (**ML**), Emergent Wetland (**EM**), Scrub-Shrub Wetland (**SS**), Forested Wetland (**FO**)

Modifiers: Excavated (**E**), Impounded (**I**), Diked (**D**), Partly Drained (**PD**), Farmed (**F**), Artificial (**A**)

Water Regimes: Permanent / Perennial (**PP**), Seasonal / Intermittent (**SI**), Temporary / Ephemeral (**TE**)

11. Estimated relative abundance: (of similarly classified sites within the same Major Montana Watershed Basin, see definitions)
RARE

12. General condition of AA:
i. Disturbance: (use matrix below to determine [circle] appropriate response – see instructions for Montana-listed noxious weed and aquatic nuisance vegetation species (**ANVS**) list)

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

Comments: (types of disturbance, intensity, season, etc.): Shrub/herbaceous wetland complex. Numerous springs and seeps throughout wetland complex including two upwelling springs that create fen conditions. Some evidence of cattle grazing in and adjacent to wetland. Also some areas with extensive elk traffic through wetland.
ii. Prominent noxious, aquatic nuisance, & other exotic vegetation species: Timothy is prevalent in the upland buffer, there are some small areas of Canada thistle within upland buffer and edge of wetland as well.
iii. Provide brief descriptive summary of AA and surrounding land use/habitat: Native upland and irrigated hay meadow. Some cattle grazing throughout. Some Canada thistle populations in surrounding uplands.

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

Existing # of "Cowardin" Vegetated Classes in AA	**Initial Rating**	**Is current management preventing (passive) existence of additional vegetated classes?**		**Modified Rating**
>= 3 (or 2 if 1 is forested) classes	H	NA	NA	NA
2 (or 1 if forested) classes	**M**	NA	NA	NA
1 class, but not a monoculture	M	<-- NO	YES -->	L
1 class, monoculture (1 species comprises >= 90% of total cover)	L	NA	NA	NA

Comments: Mature willow wetland complex with areas of emergent, herbaceous vegetation

SECTION PERTAINING to FUNCTIONS & VALUES ASSESSMENT

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

i. AA is Documented (D) or Suspected (S) to contain (circle one based on definitions contained in instructions): No usable habitat

Primary or critical habitat (list species) **Secondary habitat (list species)** **Incidental habitat (list species)**

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

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

Sources for documented use (e.g. observations, records, etc): No documented use by federally-listed species, although grizzly bear could be present in the future and use travel through the area.

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

i. AA is Documented (D) or Suspected (S) to contain (circle one based on definitions contained in instructions):

Primary or critical habitat (list species) **Secondary habitat (list species)** **Incidental habitat (list species)**

Viola nephrophylla(D) - S2S3
Anthoxanthum hirtum(D) - S2S3
Salix pseudomonticola(D) - S2S3

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

Highest Habitat Level	*doc/primary*	*sus/primary*	*doc/secondary*	*sus/secondary*	*doc/incidental*	*sus/incidental*	*None*
***S1 Species:** Functional Points and Rating*	1H	.8H	.7M	.6M	.2L	.1L	0L
***S2 and S3 Species:** Functional Points and Rating*	**.9H**	.7M	.6M	.5M	.2L	.1L	0L

Sources for documented use (e.g. observations, records, etc): AA contains a quaking fen that likely contains S1 or S2 vascular or non-vascular plant species although none have been documented to date. Several S3 species have been documented.

14C. General Wildlife Habitat Rating:

i. Evidence of overall wildlife use in the AA (circle substantial, moderate, or low based on supporting evidence):

Substantial (based on any of the following [check]):
- ___ observations of abundant wildlife #s or high species diversity (during any period)
- ___ abundant wildlife sign such as scat, tracks, nest structures, game trails, etc.
- ___ presence of extremely limiting habitat features not available in the surrounding area
- ___ interviews with local biologists with knowledge of the AA

Minimal (based on any of the following [check]):
- ___ few or no wildlife observations during peak use periods
- ___ little to no wildlife sign
- ___ sparse adjacent upland food sources
- ___ interviews with local biologists with knowledge of the AA

Moderate (based on any of the following [check]):
- X observations of scattered wildlife groups or individuals or relatively few species during peak periods
- X common occurrence of wildlife sign such as scat, tracks, nest structures, game trails, etc.
- X adequate adjacent upland food sources
- X interviews with local biologists with knowledge of the AA

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

Structural diversity (see #13)	High								Moderate								Low			
Class cover distribution (all vegetated classes)	Even				Uneven				Even				Uneven				Even			
Duration of surface water in >=10% of AA	P/P	S/I	T/E	A	P/P	S/I	T/E	A	P/P	S/I	T/E	A	P/P	S/I	T/E	A	P/P	S/I	T/E	A
Low disturbance at AA (see #12i)	E	E	E	H	E	E	H	H	**E**	H	H	M	E	H	M	M	E	H	M	M
Moderate disturbance at AA (see #12i)	H	H	H	H	H	H	H	M	H	H	M	M	H	M	M	L	H	M	L	L
High disturbance at AA (see #12i)	M	M	M	L	M	M	L	L	M	M	L	L	M	L	L	L	L	L	L	L

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

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

Comments: Excellent wildlife habitat, numerous observations of elk, deer, moose, beaver, and neotropical birds.

14D. General Fish Habitat Rating: (Assess this function if the AA is used by fish or the existing situation is "correctable" such that the AA could be used by fish [i.e., fish use is precluded by perched culvert or other barrier, etc.]. If the AA is not used by fish, fish use is not restorable due to habitat constraints, or is not desired from a management perspective [such as fish entrapped in a canal], then mark ___ **NA** and proceed to 14E.)

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

i. Habitat Quality and Known / Suspected Fish Species in AA (use matrix to arrive at [circle] the functional points and rating)

Duration of surface water in AA	Permanent / Perennial						Seasonal / Intermittent						Temporary / Ephemeral					
Aquatic hiding / resting / escape cover	Optimal		Adequate		Poor		Optimal		Adequate		Poor		Optimal		Adequate		Poor	
Thermal cover optimal / suboptimal	O	S	O	S	O	S	O	S	O	S	O	S	O	S	O	S	O	S
FWP Tier I fish species	1E	.9H	.8H	.7M	.6M	.5M	.9H	.8H	.7M	.6M	.5M	.4M	.7M	.6M	.5M	.4M	.3L	.2L
FWP Tier II or Native Game fish species	.9H	.8H	.7M	.6M	.5M	.5M	.8H	.7M	.6M	.5M	.4M	.4M	.6M	.5M	.4M	.3L	.2L	.2L
FWP Tier III or Introduced Game fish	**.8H**	.7M	.6M	.5M	.5M	.4M	.7M	.6M	.5M	.4M	.4M	.3L	.5M	.4M	.3L	.2L	.2L	.1L
FWP Non-Game Tier IV or No fish species	.5M	.5M	.5M	.4M	.4M	.3L	.4M	.4M	.4M	.3L	.3L	.2L	.2L	.2L	.2L	.1L	.1L	.1L

Sources used for identifying fish sp. potentially found in AA: Dave Stagliano baseline data.

ii. Modified Rating (NOTE: Modified score cannot exceed 1 or be less than 0.1)

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

b) Does the AA contain a documented spawning area or other critical habitat feature (i.e., sanctuary pool, upwelling area, etc.- specify in comments) for native fish or introduced game fish? ___ *If yes, add 0.1 to the adjusted score in **i** or **iia.***

iii. Final Score and Rating: 0.8H **Comments:** Although the creek that flows out of the AA to Sheep Creek is very small, it is spring-fed and provides excellent water quality (via temperature primarily) to Sheep Creek and may provide critical spawning habitat in the lower pools.

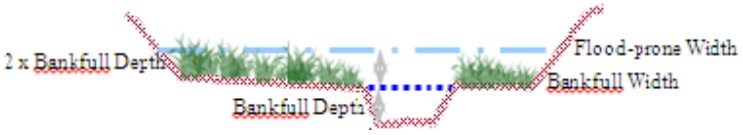
14E. Flood Attenuation: (Applies only to wetlands subject to flooding via in-channel or overbank flow. If wetlands in AA are not flooded from in-channel or overbank flow, mark **X** **NA** and proceed to 14F.)

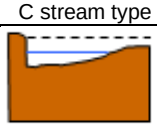
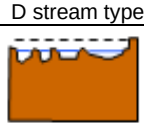
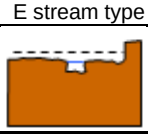
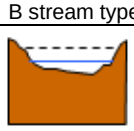
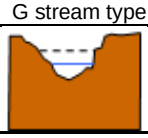
i. Rating (working from top to bottom, use the matrix below to arrive at [circle] the functional points and rating)

Estimated or Calculated Entrenchment (Rosgen 1994, 1996)	Slightly entrenched - C, D, E stream types			Moderately entrenched – B stream type			Entrenched-A, F, G stream types		
% of flooded wetland classified as forested and/or scrub/shrub	75%	25-75%	<25%	75%	25-75%	<25%	75%	25-75%	<25%
AA contains **no outlet or restricted outlet**	1H	.9H	.6M	.8H	.7M	.5M	.4M	.3L	.2L
AA contains **unrestricted outlet**	.9H	.8H	.5M	.7M	.6M	.4M	.3L	.2L	.1L

Entrenchment ratio (ER) estimation – see User's Manual for additional guidance. Entrenchment ratio = (flood-prone width)/(bankfull width) Flood-prone width = estimated horizontal projection of where 2 x maximum bankfull depth elevation intersects the floodplain on each side of the stream.

/	=	
Flood-prone width	*Bankfull width*	*Entrenchment ratio (ER)*



Slightly Entrenched ER = >2.2			**Moderately Entrenched ER = 1.41 – 2.2**	**Entrenched ER = 1.0 – 1.4**		
C stream type	D stream type	E stream type	B stream type	A stream type	F stream type	G stream type
						

ii. Are ≥10 acres of wetland in the AA subject to flooding **AND** are man-made features which may be significantly damaged by floods located within 0.5 mile downstream of the AA (circle)? ___ **Comments:** Water within the spring creek is essentially constant, spring snow melt raises water levels but overbank flow is relatively minimal.

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

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

Estimated maximum acre feet of water contained in wetlands within the AA that are subject to periodic flooding or ponding	>5 acre feet			1.1 to 5 acre feet			<=1 acre foot		
Duration of surface water at wetlands within the AA	P/P	S/I	T/E	P/P	S/I	T/E	P/P	S/I	T/E
Wetlands in AA flood or pond **>= 5 out of 10 years**	1H	.9H	.8H	.8H	.6M	.5M	.4M	.3L	.2L
Wetlands in AA flood or pond **< 5 out of 10 years**	.9H	.8H	.7M	.7M	.5M	.4M	.3L	.2L	.1L

Comments: No evidence of flooding or ponding beyond what is present from spring flow, which is relatively constant.

14G. Sediment/Nutrient/Toxicant Retention and Removal: (Applies to wetlands with potential to receive sediments, nutrients, or toxicants through influx of surface or ground water or direct input. If no wetlands in the AA are subject to such input, mark **NA** and proceed to 14H.)

i. Rating

Sediment, nutrient, and toxicant input levels within AA	AA receives or surrounding land use with potential to deliver levels of sediments, nutrients, or compounds at levels such that other functions are not substantially impaired. Minor sedimentation, sources of nutrients or toxicants, or signs of eutrophication present.				Waterbody on MDEQ list of waterbodies in need of TMDL development for "probable causes" related to sediment, nutrients, or toxicants or AA receives or surrounding land use with potential to deliver high levels of sediments, nutrients, or compounds such that other functions are substantially impaired. Major sedimentation, sources of nutrients or toxicants, or signs of eutrophication present.			
% cover of wetland vegetation in AA	>= 70%		< 70%		>= 70%		< 70%	
Evidence of flooding / ponding in AA	Yes	No	Yes	No	Yes	No	Yes	No
AA contains **no or restricted outlet**	1H	.8H	.7M	.5M	.5M	.4M	.3L	.2L
AA contains **unrestricted outlet**	.9H	**.7M**	.6M	.4M	.4M	.3L	.2L	.1L

Comments: Manure from cattle and wildlife are only clear nutrient inputs to system, other inputs would likely be from geologic sources (if any).

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

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

*% Cover of **wetland** streambank or shoreline by species with stability ratings of >=6 (see **Appendix F**).*	*Duration of surface water adjacent to rooted vegetation*		
	Permanent / Perennial	Seasonal / Intermittent	Temporary / Ephemeral
>= 65%	**1H**	.9H	.7M
35-64%	.7M	.6M	.5M
35%	.3L	.2L	.1L

Comments: Banks are highly stable with only limited caving and trampling at a small crossing that is used, primarily, by elk.

14I. Production Export/Food Chain Support:

i. Level of Biological Activity (synthesis of wildlife and fish habitat ratings [circle])

General Fish Habitat Rating (14D.iii.)	**General Wildlife Habitat Rating (14C.iii.)**		
	E/H	M	L
E/H	**H**	H	M
M	H	M	M
L	M	M	L
N/A	H	M	L

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

A	Vegetated component >5 acres						Vegetated component 1-5 acres						Vegetated component < 1 acre					
B	High		Moderate		Low		High		Moderate		Low		High		Moderate		Low	
C	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
P/P	**1H**	.7M	.8H	.5M	.6M	.4M	.9H	.6M	.7M	.4M	.5M	.3L	.8H	.6M	.6M	.4M	.3L	.2L
S/I	.9H	.6M	.7M	.4M	.5M	.3L	.8H	.5M	.6M	.3L	.4M	.2L	.7M	.5M	.5M	.3L	.3L	.2L
T/E/A	.8H	.5M	.6M	.3L	.4M	.2L	.7M	.4M	.5M	.2L	.3L	.1L	.6M	.4M	.4M	.2L	.2L	.1L

iii. Modified Rating (NOTE: Modified score cannot exceed 1 or be less than 0.1.) **Vegetated Upland Buffer (VUB):** Area with >= 30% plant cover, = 15% noxious weed or ANVS cover, and that is not subjected to periodic mechanical mowing or clearing (unless for weed control).

a) Is there an average >= 50 foot-wide vegetated upland buffer around >= 75% of the AA circumference? **X** *If yes, add 0.1 to the score in ii above.*

iv. Final Score and Rating: **1.00H** **Comments:** This is a productive wetland in terms of biomass.

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

i. Discharge Indicators

- X The AA is a slope wetland
- X Springs or seeps are known or observed
- ___ Vegetation growing during dormant season/drought
- X Wetland occurs at the toe of a natural slope
- ___ AA permanently flooded during drought periods
- X Wetland contains an outlet, but no inlet
- X Shallow water table and the site is saturated to the surface
- ___ Other:

ii. Recharge Indicators

- X Permeable substrate present without underlying impeding layer
- ___ Wetland contains inlet but no outlet
- ___ Stream is a known 'losing' stream; discharge volume decreases
- ___ Other:

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

	Duration of saturation at AA Wetlands *FROM GROUNDWATER DISCHARGE OR WITH WATER THAT IS RECHARGING THE GROUNDWATER SYSTEM*			
Criteria	P/P	S/I	T	None
Groundwater Discharge or Recharge	**1H**	.7M	.4M	.1L
Insufficient Data/Information	N/A			

Comments: Numerous large springs within AA as well as an unknown number of diffuse seeps that maintain saturation in much of the wetland. Springs produce significant amounts of water and create small streams in less than 50 feet.

14K. Uniqueness:

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

Replacement potential	AA contains fen, bog, warm springs or mature (>80 yr-old) forested wetland **or** plant association listed as "S1" by the MTNHP			AA does not contain previously cited rare types **and** structural diversity (#13) is high **or** contains plant association listed as "S2" by the MTNHP			AA does not contain previously cited rare types or associations **and** structural diversity (#13) is low-moderate		
Estimated relative abundance (#11)	rare	common	abundant	rare	common	abundant	rare	common	abundant
Low disturbance at AA (#12i)	**1H**	.9H	.8H	.8H	.6M	.5M	.5M	.4M	.3L
Moderate disturbance at AA (#12i)	.9H	.8H	.7M	.7M	.5M	.4M	.4M	.3L	.2L
High disturbance at AA (#12i)	.8H	.7M	.6M	.6M	.4M	.3L	.3L	.2L	.1L

Comments: The AA contains a quaking fen. Organic, saturated soils present that are more than 20 inches thick. Two upwelling springs are present within the fen that saturate soil to the point where it is spongy or quaky to walk on.

14L. Recreation/Education Potential: (affords "bonus" points if AA provides recreation or education opportunity)

i. Is the AA a known or potential rec./ed. site: (circle) **X** (if 'Yes' continue with the evaluation; if 'No' then mark ___ **NA** and proceed to the overall summary and rating page)

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

iii. Rating:

Known or Potential Recreation or Education Area	Known	Potential
Public ownership or public easement with general public access (no permission required)	.2H	.15H
Private ownership with general public access (no permission required)	.15H	.1M
Private or public ownership without general public access, or requiring permission for public access	.1M	**.05L**

Comments: This site could be an outdoor classroom for studying wetland ecology. Both Tintina and the landowner are open to school groups visiting the site. Students could take water samples and assess water chemistry, aquatic insects could also be collected as could wetland flora.

General Site Notes
This AA is an interesting and highly productive wetland with significant groundwater inputs that contribute to water quality in Sheep Creek. The plant community is primarily native and includes Species of Concern. Wildlife habitat is high, particularly for neotropical birds. Stream provides good fish habitat due to constant water temperatures.

FUNCTION & VALUE SUMMARY & OVERALL RATING FOR WETLAND/SITE #(S): Strawberry Butte Mitigation Site

Function & Value Variables	Rating	Actual Functional Points	Possible Functional Points	Functional Units: (Actual Points x Wetland Acreage)	Indicate the four most prominent functions with an asterisk (*)
A. Listed/Proposed T&E Species Habitat	L	0.00	1	0.00	
B. MT Natural Heritage Program Species Habitat	H	0.90	1	16.29	*
C. General Wildlife Habitat	H	0.90	1	16.29	
D. General Fish Habitat	H	0.80	1	14.48	
E. Flood Attenuation	NA				
F. Short and Long Term Surface Water Storage	NA				
G. Sediment/Nutrient/Toxicant Removal	M	0.70	1	12.67	
H. Sediment/Shoreline Stabilization	H	1.00	1	18.10	
I. Production Export/Food Chain Support	H	1.00	1	18.10	*
J. Groundwater Discharge/Recharge	H	1.00	1	18.10	*
K. Uniqueness	H	1.00	1	18.10	*
L. Recreation/Education Potential (bonus points)	L	0.05	1	0.91	
Totals:		7.35	9.00	133.04	
Percent of Possible Score			82%		

Category I Wetland: (must satisfy one of the following criteria; otherwise go to Category II)

___ Score of 1 functional point for Listed/Proposed Threatened or Endangered Species; **or**

X Score of 1 functional point for Uniqueness; **or**

___ Score of 1 functional point for Flood Attenuation and answer to Question 14E.ii is "yes"; **or**

X Percent of possible score > 80% (round to nearest whole #).

Category II Wetland: (Criteria for Category I not satisfied and meets any one of the following criteria; otherwise go to Category IV)

___ Score of 1 functional point for MT Natural Heritage Program Species Habitat; **or**

X Score of .9 or 1 functional point for General Wildlife Habitat; **or**

___ Score of .9 or 1 functional point for General Fish Habitat; **or**

___ "High" to “Exceptional” ratings for **both** General Wildlife Habitat **and** General Fish/Aquatic Habitat; **or**

___ Score of .9 functional point for Uniqueness; **or**

X Percent of possible score > 65% (round to nearest whole #).

Category III Wetland: (Criteria for Categories I, II, or IV not satisfied)

Category IV Wetland: (Criteria for Categories I or II are not satisfied and all of the following criteria are met; otherwise go to Category III)

___ "Low" rating for Uniqueness; **and**

___ Vegetated wetland component 1 acre (do not include upland vegetated buffer); **and**

___ Percent of possible score 35% (round to nearest whole #).

OVERALL ANALYSIS AREA RATING: I

Summary Comments: Overall this site rates highly due to groundwater inputs and uniqueness. Maintaining this area in excellent condition as compensatory mitigation for impacts to much lower quality wetlands is a benefit to wetland ecology and water quality in the immediate watershed.

Appendix E –
Monitoring Photographs for the Strawberry Butte Mitigation Site

Appendix F
Black Butte Wetland Mitigation Plot Photographs – September 13, 2022

Plot: BB-PRM1 **Azimuth: North**

Site: BB-PRM1 **Azimuth: East**

Site: BB-PRM1 **Azimuth: South**

Site: BB-PRM1 **Azimuth: West**

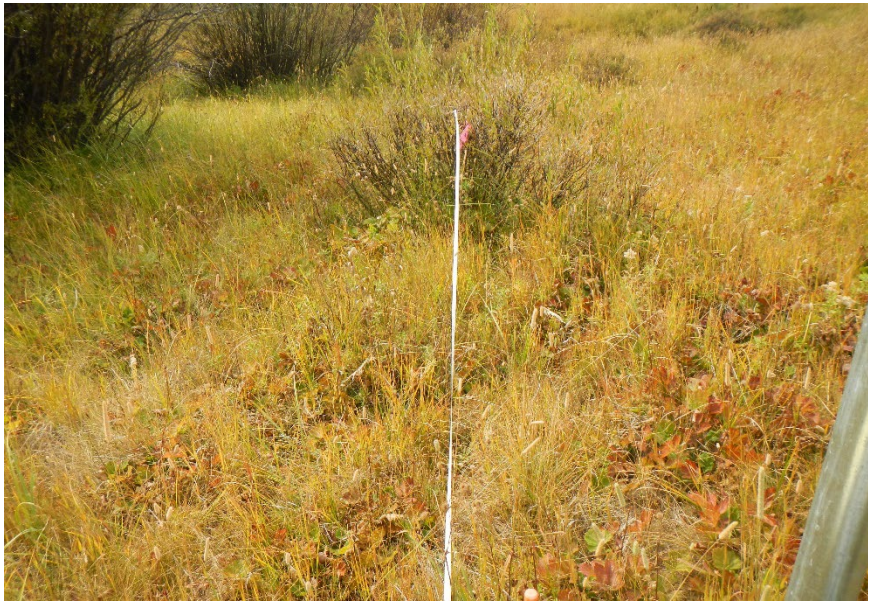
Appendix F
Black Butte Wetland Mitigation Plot Photographs – September 13, 2022

Plot: BB-PRM2 **Azimuth: North**

Site: BB-PRM2 **Azimuth: East**

Site: BB-PRM2 **Azimuth: South**

Site: BB-PRM2 **Azimuth: West**

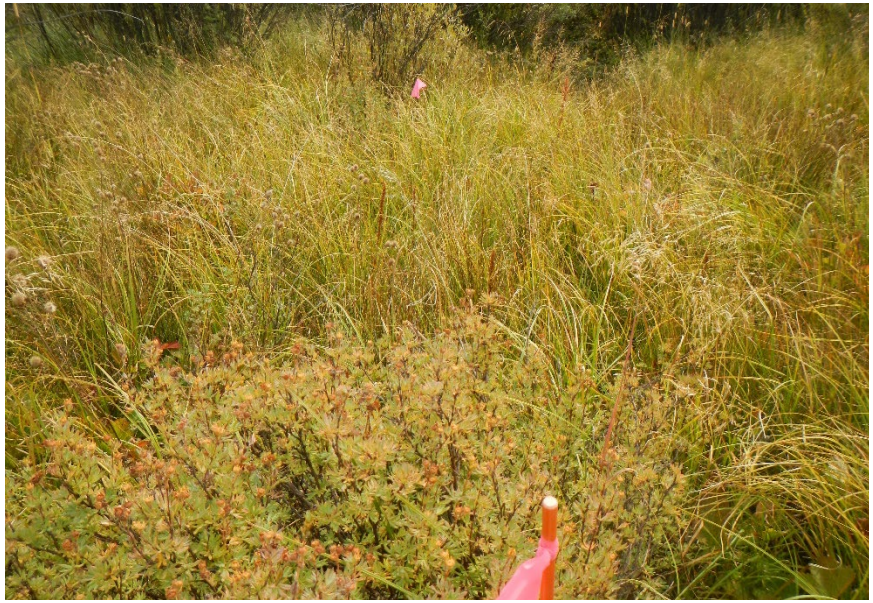


Appendix F
Black Butte Wetland Mitigation Plot Photographs – September 13, 2022

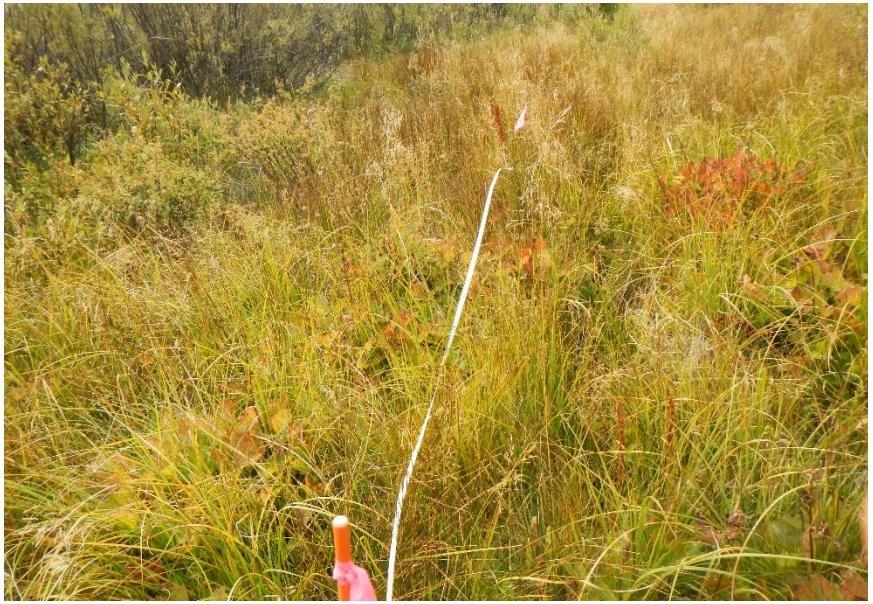
Plot: BB-PRM3 **Azimuth: North**

Site: BB-PRM3 **Azimuth: East**

Site: BB-PRM3 **Azimuth: South**



Site: BB-PRM3 **Azimuth: West**



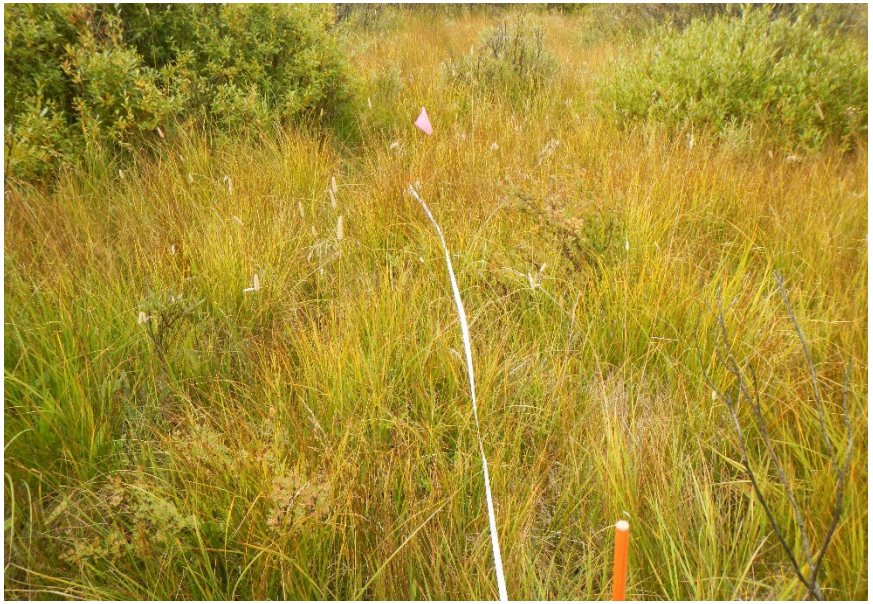
Appendix F
Black Butte Wetland Mitigation Plot Photographs – September 13, 2022

Plot: BB-PRM4 **Azimuth: North**

Site: BB-PRM4 **Azimuth: East**

Site: BB-PRM4 **Azimuth: South**

Site: BB-PRM4 **Azimuth: West**



Appendix F
Black Butte Wetland Mitigation Plot Photographs – September 13, 2022

Plot: BB-PRM5 **Azimuth: North**

Site: BB-PRM5 **Azimuth: East**

Site: BB-PRM5 **Azimuth: South**

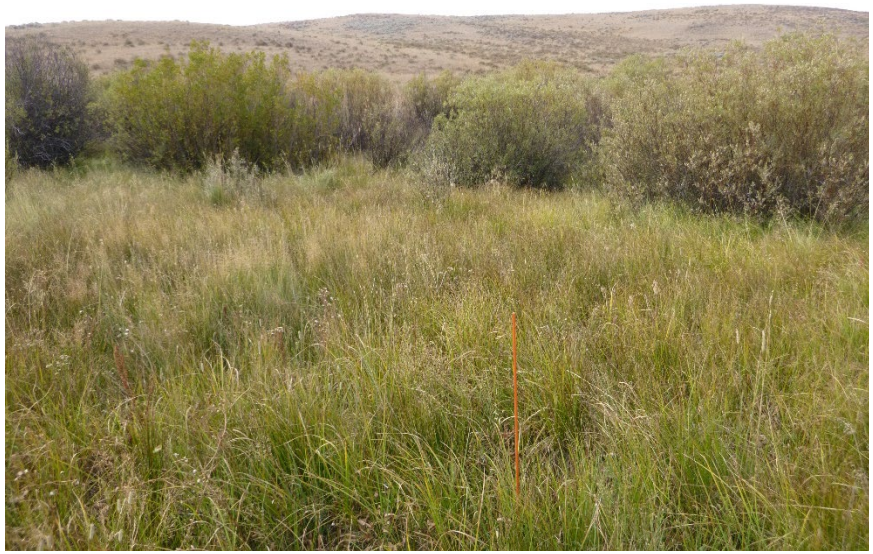
Site: BB-PRM5 **Azimuth: West**

Appendix F
Black Butte Wetland Mitigation Plot Photographs – September 13, 2022

Plot: BB-PRM6 **Azimuth: North**

Site: BB-PRM6 **Azimuth: East**

Site: BB-PRM6 **Azimuth: South**



Site: BB-PRM6 **Azimuth: West**

Appendix F
Black Butte Wetland Mitigation Plot Photographs – September 13, 2022

Plot: BB-PRM7 **Azimuth: North**

Site: BB-PRM7 **Azimuth: East**

Site: BB-PRM7 **Azimuth: South**

Site: BB-PRM7 **Azimuth: West**

Appendix F
Black Butte Wetland Mitigation Plot Photographs – September 13, 2022

Plot: BB-PRM8 **Azimuth: North**

Site: BB-PRM8 **Azimuth: East**

Site: BB-PRM8 **Azimuth: South**

Site: BB-PRM8 **Azimuth: West**

Appendix F
Black Butte Wetland Mitigation Plot Photographs – September 13, 2022

Plot: BB-PRM9 **Azimuth: North**

Site: BB-PRM9 **Azimuth: East**

Site: BB-PRM9 **Azimuth: South**

Site: BB-PRM9 **Azimuth: West**

Appendix F
Black Butte Wetland Mitigation Plot Photographs – September 13, 2022

Plot: BB-PRM10 **Azimuth: North**

Site: BB-PRM10 **Azimuth: East**

Site: BB-PRM10 **Azimuth: South**

Site: BB-PRM10 **Azimuth: West**

Appendix F
Black Butte Wetland Mitigation Plot Photographs – September 13, 2022

Plot: BB-PRM11 **Azimuth: North**

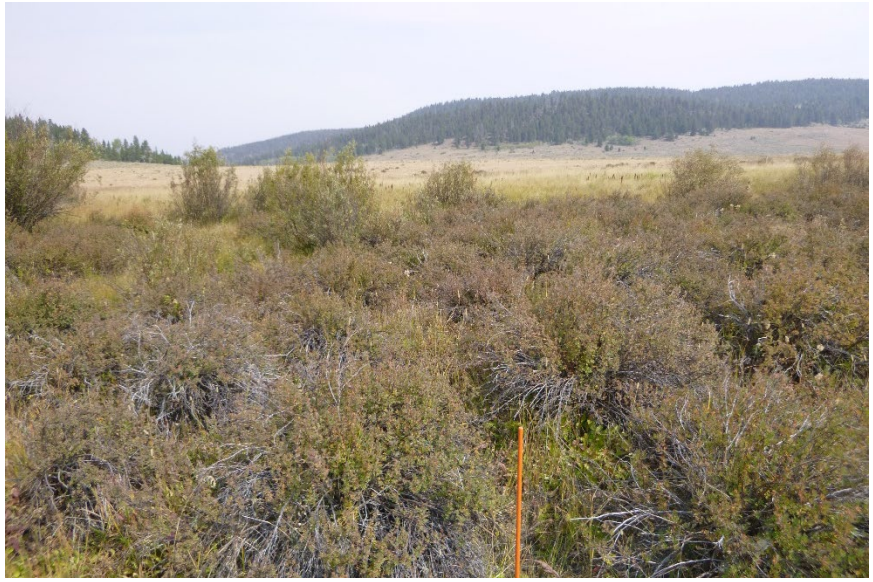
Site: BB-PRM11 **Azimuth: East**

Site: BB-PRM11 **Azimuth: South**

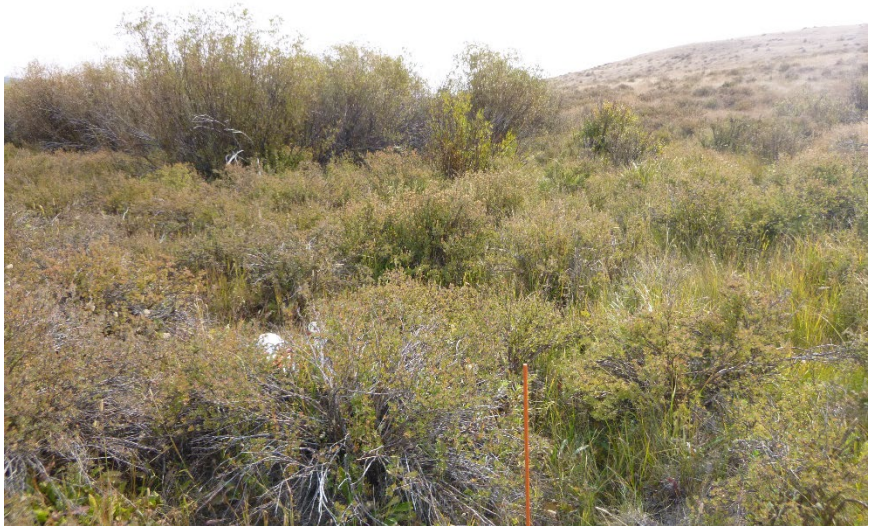
Site: BB-PRM11 **Azimuth: West**

Appendix F
Black Butte Wetland Mitigation Plot Photographs – September 13, 2022

Plot: BB-PRM12 **Azimuth: North**



Site: BB-PRM12 **Azimuth: East**



Site: BB-PRM12 **Azimuth: South**

Site: BB-PRM12 **Azimuth: West**

Appendix F
Black Butte Wetland Mitigation Plot Photographs – September 13, 2022

Plot: BB-PRM13 **Azimuth: North**

Site: BB-PRM13 **Azimuth: East**

Site: BB-PRM13 **Azimuth: South**

Site: BB-PRM13 **Azimuth: West**

Appendix F
Black Butte Wetland Mitigation Plot Photographs – September 13, 2022

Plot: BB-PRM14 **Azimuth: North**

Site: BB-PRM14 **Azimuth: East**

Site: BB-PRM14 **Azimuth: South**

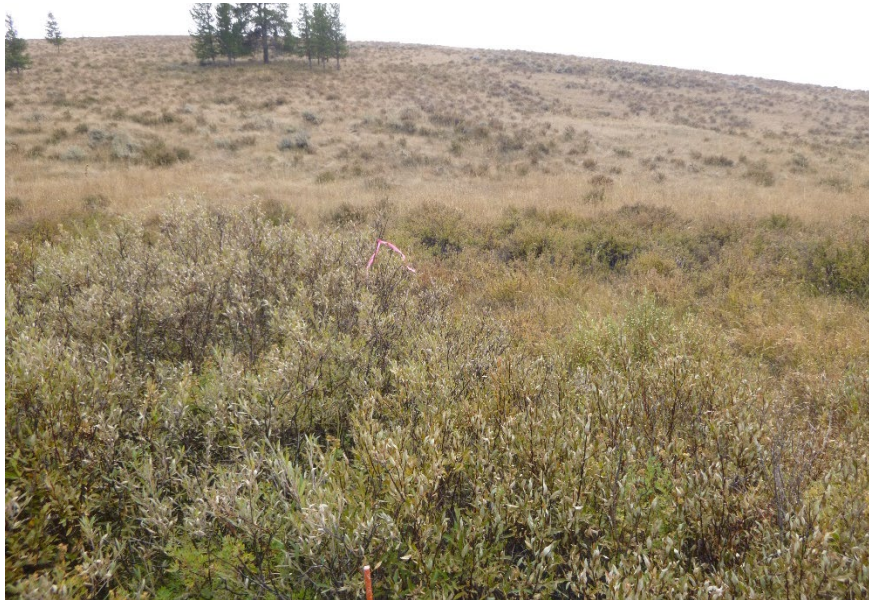
Site: BB-PRM14 **Azimuth: West**

Appendix F
Black Butte Wetland Mitigation Plot Photographs – September 13, 2022

Plot: BB-PRM15 **Azimuth: North**

Site: BB-PRM15 **Azimuth: East**

Site: BB-PRM15 **Azimuth: South**



Site: BB-PRM15 **Azimuth: West**

Appendix F
Black Butte Wetland Mitigation Plot Photographs – September 13, 2022

Plot: BB-PRM16 **Azimuth: North**

Site: BB-PRM16 **Azimuth: East**

Site: BB-PRM16 **Azimuth: South**

Site: BB-PRM16 **Azimuth: West**

Appendix F –
USDA/NRCS Riparian Assessment Method (RAM) Forms for the Strawberry Butte Mitigation Site

RIPARIAN ASSESSMENT WORKSHEET

NAME OF STREAM: Strawberry Butte Wetland Mitigation Site: Sheep Creek Spring Tributary

REACH LOC OR ID: NA **DATE:** 9/13/2022

ID TEAM/OBSERVERS: John Beaver

LENGTH OF REACH: 2,622 **LAT/LONG - BEGIN/END:** see Map

MAP OR QUAD NAME: NA **PHOTO #S:** App. E **PRIMARY LAND USE:** Rangeland

PLANT COMMUNITY: Carneb/Carsim & Saleri/Carutr **ROSGEN CHANNEL TYPE:** E

BANKFULL DEPTH: 3-4' **BANKFULL WIDTH:** 4-8'

WIDTH/DEPTH RATIO: 1.3 - 2.0 **CHANNEL SUBSTRATE:** Gravel, rock, silt

Geomorphic Considerations

Question 1. Stream Incisement (Downcutting)

8 = Channel stable, no active downcutting occurring; or, old downcutting apparent but a new, stable riparian area has formed within the incised channel. There is perennial riparian vegetation well established in the riparian area (Stage 1 and 5, Schumm's Model, Figure 2).

6 = Channel has evidence of old downcutting that has begun stabilizing, vegetation is beginning to establish, even at the base of the falling banks, soil disturbance evident (Stage 4, Schumm's Model, Figure 2).

4 = Small head cut, in early stage, is present. Immediate action may prevent further degradation (Early Stage 2, Schumm's Model, Figure 2).

2 = Unstable, channel incised, actively widening, limited new riparian area/flood plain, flood plain not well vegetated. The vegetation that is present is mainly pioneer species. Bank failure is common (Stage 3, Schumm's Model, Figure 2).

0 = Channel deeply incised, resembling a gully, little or no riparian area, active downcutting is clearly occurring. Only occasional or rare flood events access the flood plain. Tributaries will also exhibit downcutting or signs of downcutting (Stage 2, Schumm's Model, Figure 2).

The presence of active head cuts should nearly always keep the stream reach from being rated Sustainable.

SCORE: Potential 8 **Actual** 8

Please clarify the rationale for your score, including comments regarding *potential* and *capability* and document with photograph if appropriate.

Comments:

There is minimal, to no, active downcutting within the primary stream channel or within the small spring tributaries that feed into the primary spring creek. Banks are extremely well vegetated.

Question 2. Streambanks with Active Lateral Cutting (inspect banks on both sides of the stream)

8 = Lateral bank erosion is in balance with the stream and its setting.

5 = There is a minimal amount of human-induced, active lateral bank erosion occurring, primarily limited to outside banks.

3 = There is a moderate amount of human-induced active lateral bank erosion occurring on either or both outside and inside banks.

0 = There is extensive human-induced lateral bank erosion occurring on outside and inside banks and straight sections.

SCORE: Potential 8 **Actual** 8

Please clarify the rationale for your score, including comments regarding *potential* and *capability* and document with photograph if appropriate.

Comments:

There is no discernible lateral movement.

Question 3. The Stream is in Balance with the Water and Sediment Supplied by the Watershed

6 = The width to depth ratio appears to be appropriate for the stream type and its geomorphic setting. There is no evidence of excess sediment removal or deposition. There are no indications that the stream is widening or getting shallower. There may be some well-washed gravel and cobble bars present. Pools are common. Rosgen “B” and naturally occurring “D” channel types are exceptions.

4 = The stream has widened and/or has become shallower due to disturbances that have caused the banks to become unstable or from dewatering which reduces the amount of water and energy needed to effectively move the sediment through the channel. *(Note: Sediment sources may also be from offsite sources.)* Point bars are often enlarged by gravel with silt and sand common, and new bars are forming. Pools are common, but may be shallow. Rosgen “B” and naturally occurring “D” channel types are exceptions.

2 = The width to depth ratio exceeds what is appropriate for the stream type. Point bars are enlarged by gravel with abundant sand and silt, and new bars are forming that often force lateral movement of the stream. Mid-channel bars are often present. For prairie streams there is often a deep layer of sediment on top of the gravel substrate. The frequency of pools is low. Rosgen “B” and naturally occurring “D” channel types are exceptions.

0 = The stream has poor sediment transport capability which is reflected by poor channel definition. The channel is often braided having at least 3 active channels. Naturally occurring Rosgen “D” channels types are exceptions. Pools are filled with sediment or are not existent.

SCORE: Potential 6 **Actual** 6

Please clarify the rationale for your score, including comments regarding *potential* and *capability* and document with photograph if appropriate.

Comments:

The width and depth is appropriate for the stream type and setting. The relatively constant water flow results in slow lateral movement or downcutting that is in balance with vegetation growth and sediment deposition.

Vegetative Considerations

Question 4. Streambank with Vegetation (Kind) having a Deep, Binding Root Mass

Note: For stream types where riparian vegetation is not required for sustainability, this question can be skipped and given an N/A, with an explanatory note or comment. Be sure to adjust the potential score if this question is skipped. (See Appendix I for stability ratings for most riparian, and other, species.) Presence generally means more than one or two, healthy individuals of a species in the reach.

6 = The streambank vegetative communities are comprised of at least four plant species with deep, binding root masses.

4 = The streambank vegetative communities are comprised of at least three plant species with deep, binding root masses.

2 = The streambank vegetative communities are comprised of two plant species with deep, binding root masses.

0 = The streambank vegetative communities are comprised of one or no plant species with deep, binding root masses.

SCORE: Potential 6 **Actual** 6

Please clarify the rationale for your score, including comments regarding *potential* and *capability* and document with photograph if appropriate.

Comments:

Almost entirely dominated by native species with deep binding root masses, including: beaked sedge, Nebraska sedge, Mackenzie willow, planeleaf willow, and variety of other native sedges, rushes, and willows.

Question 5. Riparian/Wetland Vegetative Cover (Amount) in the Riparian/Flood plain Area

Note: For stream types where riparian vegetation is not required for sustainability, this question can be skipped and given an N/A, with an explanatory note or comment. Be sure to adjust the potential score if this question is skipped.

6 = More than 85% of the riparian/wetland canopy cover has a stability rating ≥ 6.

4 = 75%-85% of the riparian/wetland canopy cover has a stability rating ≥ 6.

2 = 65%-75% of the riparian/wetland canopy cover has a stability rating ≥ 6.

0 = Less than 65% of the riparian/wetland canopy cover has a stability rating ≥ 6.

Note: A low score for this item may be enough to keep the stream reach from being rated Sustainable.

SCORE: Potential 6 **Actual** 6

Please clarify the rationale for your score, including comments regarding *potential* and *capability* and document with photograph if appropriate.

Comments:

Riparian and wetland vegetation cover is much greater than 85% and consists primarily of native species with high stability ratings.

Question 6. Noxious Weeds in the Riparian Area

3 = None of the riparian area has noxious weeds present.

2 = Up to 5% of the riparian area has noxious weeds (a few are present).

1 = Up to 10% of the riparian area has noxious weeds present (abundant).

0 = Over 10% of the riparian area has noxious weeds (very apparent and extensive distribution).

SCORE: Potential 2 **Actual** 2

Please clarify the rationale for your score, including comments regarding *potential* and *capability* and document with photograph if appropriate.

Comments (NOTE--List all noxious weed species):

Canada thistle is present in small populations at the drier margins of the riparian/wetland complex surrounding the stream.

Question 7. Disturbance-Caused Undesirable Plants in the Riparian Area

3 = 5% or less of the riparian area with undesirable plants (very few present).

2 = 5-10% of the riparian area with undesirable plants (few are present).

1 = 10-15% of the riparian area with undesirable plants (commonly distributed).

0 = Over 15% of the riparian area with undesirable plants (abundant over much of the area).

SCORE: Potential 2 **Actual** 2

Please clarify the rationale for your score, including comments regarding *potential* and *capability* and document with photograph if appropriate.

Comments (NOTE--List all nuisance weeds and undesirable plants):

Few non-natives are present other than redtop and creeping meadow foxtail.

Question 8. Woody Species Establishment and Regeneration

Note: For stream types where riparian vegetation is not required for sustainability, this question can be skipped and given an N/A, with an explanatory note or comment. Be sure to adjust the potential score if this question is skipped. At least 10 individuals in a class should be present in the reach to count. Count only 1+ years of age. Do not count seedlings of the year as mortality is very high the first year.

8 = All age classes of desirable woody riparian species present (Table 3).

6 = One age class of desirable woody riparian species is clearly absent, all others well represented. Often, it will be the middle age group(s) absent. For sites with potential for both trees and shrubs there may be one age class of each absent. Having mature individuals and at least one younger age class present indicates the potential for recovery.

4 = Two age classes (seedlings and saplings) of native riparian shrubs and/or two age classes of native riparian trees are clearly absent, or the stand is comprised of mainly mature species. Other age classes well represented.

2 = Disturbance induced, (i.e. facultative, facultative upland species such as rose, or snowberry) or non-riparian species dominate. Woody species present consist of decadent/dying individuals. (Refer back to Question 1 if this is the situation. The channel may have incised.)

0 = A few woody species are present (<10% canopy cover), but herbaceous species dominate (at this point, the site potential should be re-evaluated to ensure that it has potential for woody vegetation); or, the site has at ≥ 5% canopy cover of Russian olive and/or salt cedar. On sites with long-term manipulation or disturbance, woody species potential is easily underestimated.

SCORE: Potential 8 **Actual** 8

Please clarify the rationale for your score, including comments regarding *potential* and *capability* and document with photograph if appropriate.

Comments:

Woody species are very well represented within the AA, primarily different willow species but also shrubby cinquefoil.

Functional Considerations

Question 9. Utilization of Trees and Shrubs

Note: For stream types where riparian vegetation is not required for sustainability, this question can be skipped and given an N/A, with an explanatory note or comment. Be sure to adjust the potential score if this question is skipped.

4 = 0-5% of the available second year and older stems are browsed.

3 = 5%-25% of the available second year and older stems are browsed (lightly).

2 = 25%-50% of the available second year and older stems are browsed (moderately).

1 = More than 50% of the available second year and older stems are browsed (heavily). Many of the shrubs have either a "clubbed" growth form, or they are high-lined or umbrella shaped.

0 = There is noticeable use (10% or more) of unpalatable and normally unused woody species.

SCORE: Potential 4 **Actual** 4

Please clarify the rationale for your score, including comments regarding *potential* and *capability* and document with photograph if appropriate.

Comments:

Minimal current woody plant utilization, almost exclusively by wildlife.

Question 10. Flood plain Characteristics for Dissipating Energy and Capturing Sediment

8 = Active flood or overflow channels exist in the flood plain. Large rock, woody debris, and/or riparian vegetation appropriate for the setting are sufficient to adequately dissipate stream energy and trap sediment on the flood plain. There is little evidence of excessive erosion or disturbance that reduces energy dissipation and sediment capture on the flood plain. There are no head cuts where either overland flow and/or flood channel flows return to the main channel.

6 = The flood plain meets the characteristics of the description in Question 8 above, but demonstrates slight limitations in the kind and amount of large rock, woody debris, and/or riparian vegetation present. Riparian vegetation structure is below that required to dissipate energy. There may be occasional evidence of surface erosion and disturbance, but generally not extensive enough to have affected channel development.

4 = Large rock, woody debris, and/or riparian vegetation is present, but generally insufficient (quality or quantity) to fully dissipate stream energy. Some sediment may be captured, but greater evidence of incipient erosion and/or head cuts is readily present.

2 = Inadequate Large rock, woody debris, and/or riparian vegetation is available for dissipation of energy or sediment capture. There is very little evidence of sediment capture. There is some streambank erosion due to human disturbance or alterations, and occasional head cuts where overland flows or flood channel flows return to the main channel.

0 = Flood plain area reflects the following conditions: 1) The flood plain area is very limited or not present and is inadequate to dissipate energy; 2) flood or overflow channels do not exist; and 3) large rock, woody debris, and/or riparian vegetation is not adequate to dissipate stream energy and trap sediment on the flood plain. Streambank and/or flood plain erosion and/or evidence of human alteration are common. “G”- and “F”-type channels (Rosgen) typically reflect these conditions.

SCORE: Potential 0 **Actual** 0

Please clarify the rationale for your score, including comments regarding *potential* and *capability* and document with photograph if appropriate.

Comments:

There is minimal flooding and overbank flow because the stream is spring-fed and flows are relatively constant throughout the year.

NAME OF STREAM: Strawberry Butte Wetland Miti **REACH ID:** NA **DATE:** 9/13/2022

SUMMARY

		SCORE		
		POTENTIAL	**ACTUAL**	**POSSIBLE**
QUESTION 1:	Stream Incisement	8	8	0, 2, 4, 6, 8
QUESTION 2:	Lateral Cutting	8	8	0, 3, 5, 8
QUESTION 3:	Stream Balance	6	6	0, 2, 4, 6
QUESTION 4:	Deep, Binding Root Mass	6	6	N/A, 0, 2, 4, 6
QUESTION 5:	Riparian/Wetland Vegetative Cover *	6	6	N/A, 0, 2, 4, 6
QUESTION 6:	Noxious Weeds	2	2	0, 1, 2, 3
QUESTION 7:	Undesirable Plants	2	2	0, 1, 2, 3
QUESTION 8:	Woody Species Establishment	8	8	N/A, 0, 2, 4, 6, 8
QUESTION 9:	Browse Utilization	4	4	N/A, 0, 1, 2, 3, 4
QUESTION 10:	Riparian Area/Flood plain Characteristics *	0	0	N/A, 0, 2, 4, 6, 8
	TOTAL	50	50	(60 total possible)

(POTENTIAL SCORE FOR MOST BEDROCK OR BOULDER STREAMS) (36)
(Questions 1, 2, 3, 6, 7, 10)

(POTENTIAL SCORE FOR MOST LOW ENERGY "E" STREAMS) (48)
(Questions 1 - 7, 10)

RATING: = $\frac{\text{Actual Score}}{\text{Potential Score}}$ X 100 = % rating

80-100% = SUSTAINABLE
50-80% = AT RISK
LESS THAN 50% = NOT SUSTAINABLE

* Only in certain, specific situations can both of these receive an "N/A".

Please clarify the rationale for your rating, including comments regarding potential. Can the limitations be addressed by the decision maker?

NOTES:

Rating = 50/50 or 100% = SUSTAINABLE.

This riparian area and spring creek stream is extremely stable and sustainable. There are only minimal impacts, primarily through some cattle grazing in the adjacent uplands and minimal trailing within the wetland/riparian area. This site is a highly functioning spring creek/wetland complex and is in excellent condition.

TREND: Does the reach appear to be improving or declining? Explain.

The trend within the mitigation site spring creek and tributaries is stable, there has not been any discernible change in these primary indicators in 8 years of observation.

Reset Form Print Form