



BIG HOLE
WATERSHED COMMITTEE
Conservation Through Consensus.

LOWER FRENCH CREEK
SEDIMENT REDUCTION PROJECT
BOR WaterSmart Phase II Grant Application

Big Hole Watershed Committee

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1. Technical Proposal and Evaluation Criteria

1a. Executive Summary

Date

February 19, 2019

Organization

Big Hole Watershed Committee
Divide, Beaverhead County, Montana

Project Summary

The Lower French Creek sediment reduction project will address mining-related damages to French Creek, which has been pinned against a high eroding bank by an unnatural dike feature, causing annual deposition of an estimated 800+ tons of sediment per year, affecting downstream fish and mussel habitat. Our restoration approach for this project is to replicate reference conditions by constructing an unconfined stream channel east of the channel's current location, connecting the unconfined reaches above and below the project area. Approximately 4,000 feet of lineal feet of new stream channel will be constructed in the floodplain away from the eroding hillslope and through an area of healthy riparian vegetation. The new channel alignment will also go through aggraded floodplain areas where mining activities left large cobbles on the surface and now grow sagebrush. By placing the new channel through these upland areas, removing placer-like cobbles and reclaiming the abandoned channel, we will create a minimum of 5 acres of new wetlands. Native sods and existing willow transplants will be used to construct the banks of the new stream channel. Bioengineered meander bends will also be used where native vegetation may be lacking to both temporarily ensure stability until vegetation is re-established and to create complex cover habitats. Conifer root wads will be used for these structures, which are already on site following a donation by the BLM from a nearby timber thinning project. No other imported materials will be used in the construction to provide a cost-effective project.

This project is a critical piece of a larger initiative by Montana Fish, Wildlife and Parks to establish a native fish stronghold for Westslope cutthroat trout and the Arctic grayling over 40 miles of headwaters tributaries. The substantial sediment reductions and habitat improvements from this project will support the success of the native fish, and the new wetlands created from the project will mitigate for the 3.5 acres of lost wetlands from the installation of a fish barrier downstream. Secondary benefits include increasing potential for natural water storage, reducing water temperatures in the drainage and the Big Hole River, and improving Big Hole River streamflow.

The Lower French Creek project has been developed by the Big Hole Watershed Committee in partnership with Montana Fish, Wildlife and Parks and informed by designs produced by professional engineering firm, Morrison-Maierle, Inc. It will address critical water supply needs,

water quality concerns, and restoration needs. It will also help water users meet competing demands and avoid conflicts over water by investing in natural water storage and creating additional recreational opportunities in the Big Hole River watershed. Bureau of Reclamation (BOR) funds will pay for the construction of the new stream channel.

Monitoring

The Big Hole Watershed Committee (BHWC) is committed to documenting and monitoring the resource benefits of this project far beyond the funding calendar of our partners. To that end, we have already installed stream gauges and shallow groundwater wells to document the project's benefits for natural water storage and late-season water availability. The Lower French Creek Sediment Reduction project is currently at a 75% design and construction cost estimates have been finalized. The project will be put out for bid in April 2019 and construction is planned for Fall 2019 with estimated completion by summer 2020. Education and outreach will take place throughout 2019 and 2020, as will monitoring activities. BHWC will provide video drone monitoring of pre-project conditions, project construction and post-project results. Our engineers have flown the project area with high resolution UAS (Unmanned Aerial Survey) technology and will repeat this flight post construction to provide survey-grade topographic documentation of project results. We will monitor the project closely for 2 years with additional wetland delineation planned for 5 years past project completion per United States Army Corps of Engineers section 404 authority (likely but not confirmed). In addition, Montana Fish, Wildlife and Parks will monitor this project for the foreseeable future as it is related to habitat improvements that support the French Creek fish barrier, one of that agency's more important projects in SW Montana.

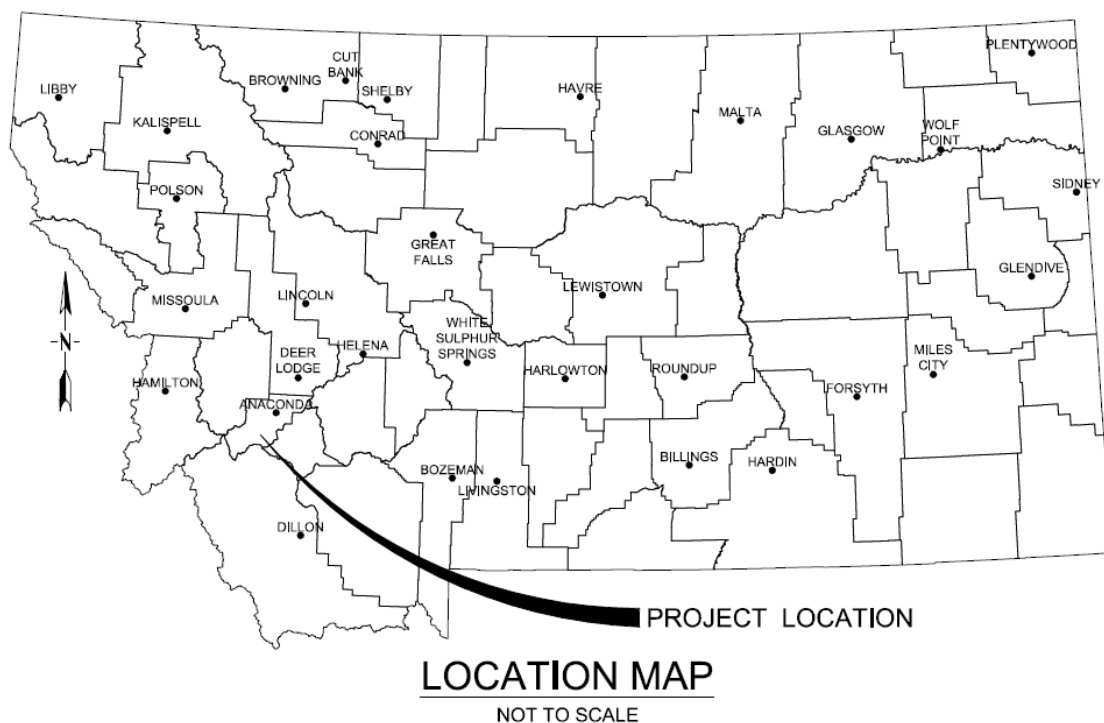
Federal Lands/Facilities

The project is not on Federal land; however, it is located on state-owned land in a designated Wildlife Management Area that is fully accessible by the public.

1b. Background Data

General Geographic Location Map

Deer Lodge County, Montana:



Description of Watershed Group

Established in 1995, BHWC is a watershed group and central hub of diverse viewpoints on resource and community concerns. We are a consensus-based nonprofit organization dedicated to conservation of the Big Hole River and surrounding watershed. Our work is comprehensive, spanning floodplains, communities, wildlife, water, and fisheries. We provide education, facilitate conversations and planning for issues in our area, and put meaningful restoration work on the ground.

BHWC is composed of a Governing Board that represents diverse interests including: ranching, utilities, local government, sportsmen, conservationists, tourism, and outfitters.

Representatives from local, state, and federal agencies participate as technical advisers. We are a multi-stakeholder entity that works closely with other conservation organizations as well as local, state, and federal agencies on watershed restoration and management plans.

We are committed to:

- Involving all interests that are willing to seek practical solutions that benefit all interests;
- Promoting a common understanding among individuals and groups with diverse viewpoints;

- Fostering the ability of local individuals and groups to create effective solutions to local problems; and
- Seeking long-term solutions based on sound information.

Description of Watershed and Water Use

The Big Hole River watershed is located in Southwest Montana. The Big Hole River is a headwater tributary to the Missouri River, with the bulk of its water supplied by snowpack. It runs 159 miles from its source near Jackson, Montana to its mouth near Twin Bridges, Montana.

The Middle-Lower Big Hole River watershed is a high elevation valley. The landscape is rural. The valley bottom is primarily private lands used for cattle ranching and hay production sustained by flood irrigation. The uplands are primarily public lands managed by the United States Forest Service, the Bureau of Land Management, and the State of Montana. Public lands are often leased by ranches for cattle grazing. The Anaconda-Pintler Wilderness is located at the most upstream portion of the Middle-Lower Big Hole watershed. Population is sparse. Several small towns dot the river bottom, including Wise River, Dewey, Divide, Melrose, and Glen.

Current water use is primarily agricultural, as the majority of land use is cattle ranching with pasture grazing and hay/alfalfa production. Ranches are large and intact; most are descendants of the 1880s homesteads with families owning large expanses of land. A portion of water use is municipal as approximately 300 million gallons are pumped out of the watershed annually to supply the City of Butte. Domestic use within the watershed is limited as there are only approximately 2,000 year-round residents in the watershed. The nearest cities are Butte, Dillon, and Anaconda, which are each about 20 miles outside of the watershed boundary.

The primary water quality issues of concern in the Middle-Lower Big Hole River watershed are high water temperature, often attributed to low flows due to drought and irrigation withdrawals and the lack of riparian vegetation, and high sediment loads resulting from channel and bank erosion changes that occur as a result of riparian vegetation loss. Improvement in water temperature and sediment issues are often difficult to track given that changes occur over years or decades and varies with natural changes in precipitation and air temperature. In some cases, high nutrients and high metals may also be a water quality issue, but typically on a local scale (Middle-Big Hole WRP 2013).

BHWC introduced the Big Hole River Drought Management Plan in 1997 to address low flows and high temperatures in the Big Hole River. The plan designates voluntary flow restrictions for irrigators and mandatory fishing restrictions for anglers (enforced by Montana Fish, Wildlife and Parks) during periods of low flow or high temperatures. BHWC has also invested significant time and resources into improving natural water storage opportunities in the watershed through the restoration of wetlands, reconnection of streams to their floodplains, use of beaver mimicry, and sediment reduction projects.

Water Quality Issues

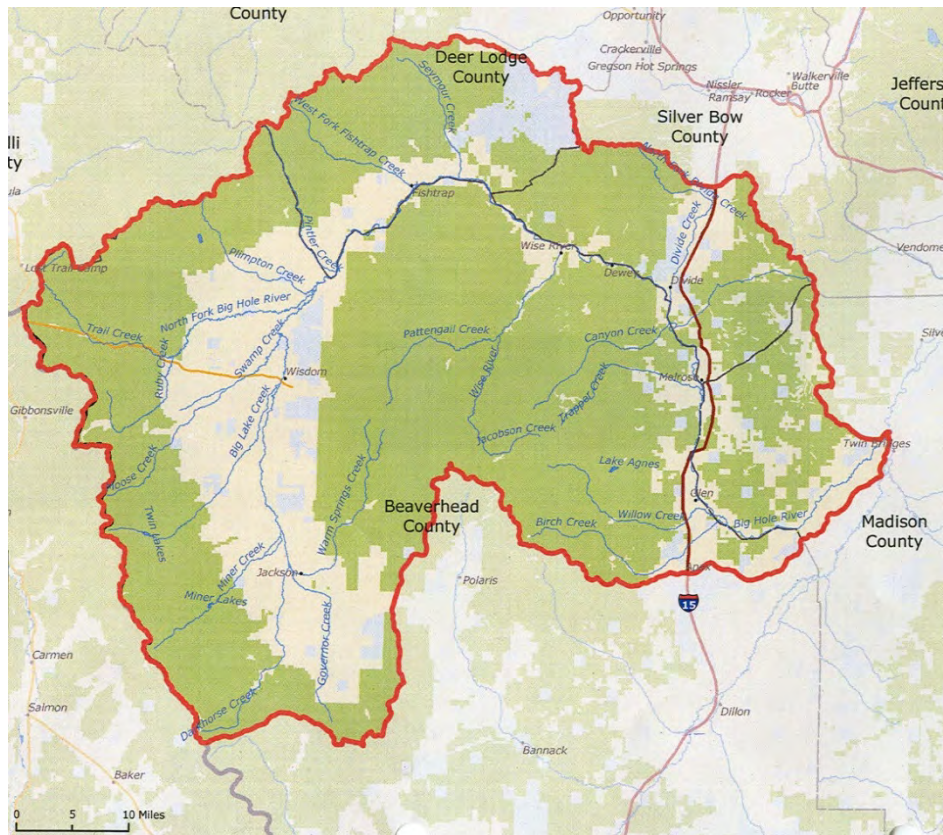
French Creek is listed as an impaired water as a result of copper, arsenic, and sedimentation/siltation as a result of mining related activities. Downstream Deep Creek is also listed as an impaired water for sediment/siltation. Our Middle-Lower Big Hole Watershed Restoration Plan, accepted by Montana DEQ in 2013, identifies the French Creek area as highest priority for water quality and wetland improvements. Since 2014 we have focused considerable resources in this watershed to remove the major sediment sources from our stream systems and create hydrologically connected stream systems with large floodplains to capture sediments and provide natural water retention. In the coming years we will request that the DEQ assess French Gulch, French Creek, and California Creek for de-listing of their sediment impairments.

Threatened and Endangered Species Considerations

The Big Hole River and its tributaries are home to native Arctic grayling and Westslope cutthroat trout. This project area is considered suitable grayling habitat for the C.C.A.A program on the Big Hole (*See Arctic grayling history and project considerations in Section 3, Environmental and Cultural Resource Considerations*). The Westslope cutthroat trout is considered a Species of Concern by the State of Montana. The Western Pearlshell mussel, another Montana Species of Concern, is present in this drainage and will benefit from native fish reintroduction, as native Westslope cutthroat trout are required for their reproduction and they are extremely sensitive to excess sediment.

Montana Fish, Wildlife and Parks has proposed to construct a native fish barrier in French Creek that will protect 40 miles of native fish habitat and create a publicly accessible stronghold for Westslope Cutthroat trout and Arctic grayling. It will be the second largest native fish restoration project in the state. The barrier is planned for construction in 2019 and comes on the heels of more than 5 years of habitat restoration work in the area. BHWC supports the French Creek Fish Barrier and native fish restoration project.

Watershed Map



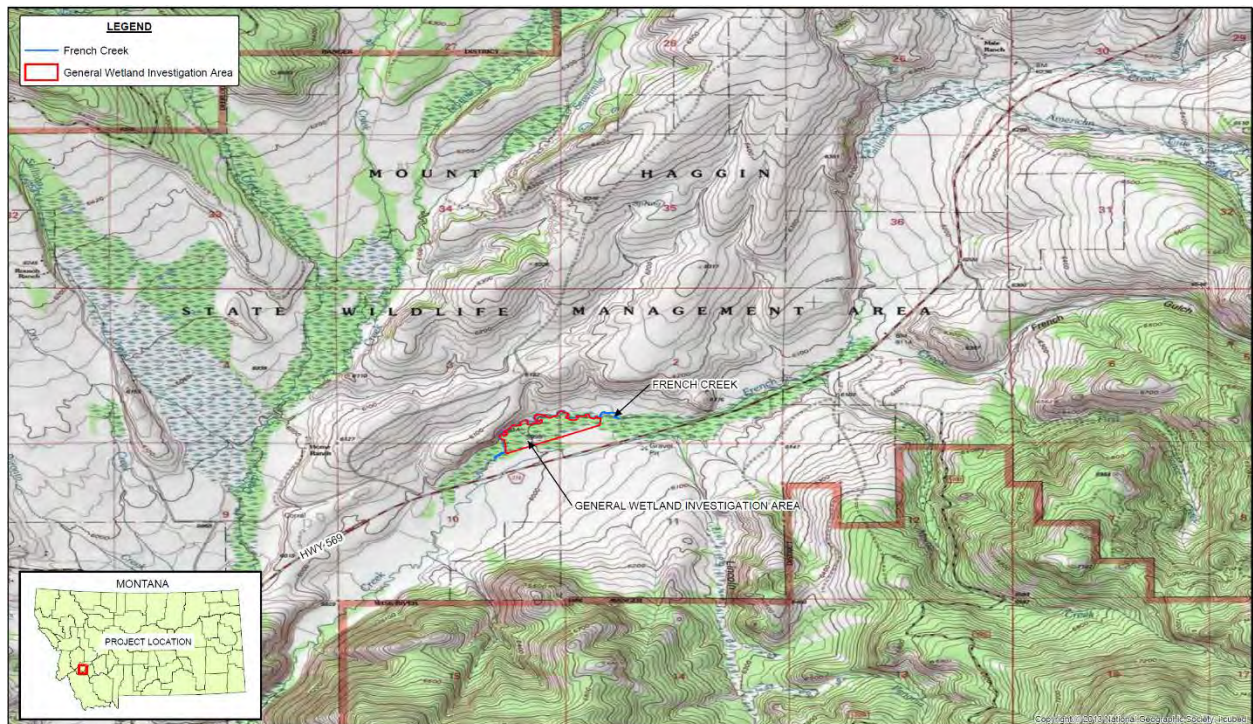
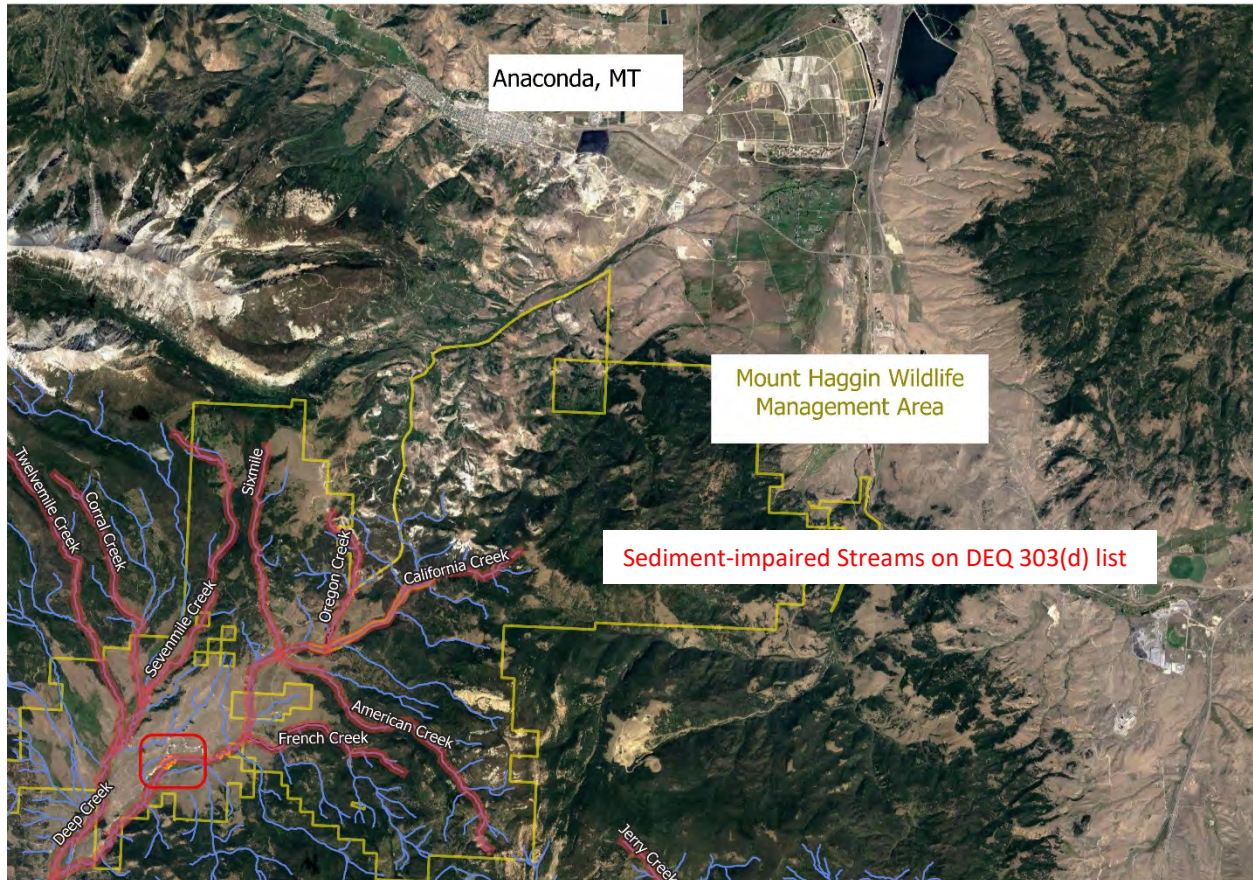
Past Working Relationships with the Bureau of Reclamation

- 2017-2018 BOR Drought Planning Grant (\$20,000) – used to support and operate the Big Hole River Drought Management Plan, build capacity of our drought coordinator, and participate in Upper Missouri Headwaters Basin drought planning sessions.
- 2008 BOR Emergency Drought Relief Act

1c. Project Location

The Lower French Creek project is located in Montana in Deer Lodge County, approximately 22.5 miles southwest from the city of Anaconda and 16.2 miles northeast from the town of Wise River. The project latitude is 45.94653 and longitude is -113.07099. The project is located on the state-owned Mount Haggin Wildlife Management Area, an area that experienced heavy mining and logging pressure from the mid-1800s to the mid-1900s. The area was logged to feed nearby smelters and placer mined for gold and silver. Removal of vegetation through logging and subsequent poisoning by smelter emissions left the landscape highly degraded. Placer mined streams were left straightened, aggraded, and confined in place by large piles of mine tailings.

Project Maps



1d. Technical Project Description

Goals & Objectives:

- Reduce fine sediment loads in French Creek and Big Hole River.
- Restore French Creek where impacted by past mining & logging operations.
- Improve native fish and aquatics habitat.
- Reconnect floodplain & wetlands to surface water in lower French Creek.
- Restore public lands.
- Increase overbank deposition and groundwater recharge for late season base-flow.

Methods

The French Creek Sediment Reduction project proposes to construct 4,000 lineal feet of new stream channel away from a high eroding bank, which constitute a large-scale sediment source to the stream and remove historic mining-related gravel features from the floodplain. The existing channel is unnaturally pinned between these eroding banks and linear gravel piles, clearly the result of placer mining activities. The gravel piles continue to act as a dike, limiting proper stream function and forcing the channel into the erosive banks. The overall project goal is to provide a long-term sediment reduction solution for French Creek (French Creek>Deep Creek>Middle Big Hole River) from the largest contributing source of erosion in the drainage. By reconnecting the channel to its larger floodplain and wetlands, proper stream function will be restored, sedimentation/siltation will be drastically reduced, and fish habitat conditions will be improved in French Creek.

Various approaches were analyzed to address impairments and provide verifiable sediment load reductions. Stabilization of the high banks were determined to be excessively costly, with low confidence for achieving sediment load reductions. Our construction approach targets outside meander bends adjacent to robust native vegetation and relies on existing sod mats and willow transplants to provide bank stability.

Expected Outcomes

The project will reduce chronic sedimentation inputs from numerous high eroding banks from entering the stream and thus improve water quality. An estimated 132% of bank erosion of the sediment goals for French Creek in the Total Maximum Daily Load (TMDL) will be achieved, as shown in Table 1 below).

Table 1: Expected Sediment Load Reductions

GOAL	AMOUNT
French Creek TMDL	3,772 tons
Bank Erosion TMDL	1,735 tons
% Reduction TMDL	36%
Total TMDL Bank Erosion Reduction	625 tons
Project Reach Load (prelim. BEHI)	823 tons
% of Bank Erosion TMDL Achieved	132%

By relocating the stream channel to a section of floodplain with a flourishing riparian area characterized by abundant willows and sedges, natural stream function will be enhanced. This project will relocate the stream to a more appropriate location on the floodplain, creating a diverse, functional, fluvial system where no net aggradation or degradation occurs over the expected ranges of flows and sediment load.

The project will also improve quality and quantity of spawning habitat and diversity conditions beyond the 4,000 feet of reconstructed channel. These improvements will likely result in increased fish populations. Reduced water temperature from active floodplain function and increased late season flows will benefit fish in both the French Creek drainage and the Big Hole River.

1e. Evaluation Criteria

1e.1. Evaluation Criterion A— Project Benefits

Will the project make more water available to meet water needs or make water available at a more advantageous time or location? If so, how and to what extent?

- This project will benefit French Creek's floodplain by creating 4000' of new channel with a hydrologically active floodplain. It will create a minimum of 5 new acres of wetland and the channel geometry will allow high flows to overtop banks annually. An additional 5 acres of aggraded floodplain could be removed depending on contractor bid price. By re-connecting the stream's floodplain and maximizing wetland creation, natural water storage will increase, making more, colder water available during late season flows.

Will the project result in long-term improvements to water quality? For example, will the project decrease sediment or nutrient pollution, improve water temperature, or mitigate impacts from floods or drought? If so, how and to what extent?

- The project will result in significant reductions of sediment entering French Creek. Over 800 tons of sediment is estimated to be reduced within the project reach, constituting 132% of the total TMDL sediment reduction. This will in turn improve aquatic habitat due to the reduced amount of large sediment loads filling pools and clogging spawning gravels. Reduced sediment will benefit native spawning fish, aquatic invertebrates and Pearlshell mussels. Expanding and maximizing the floodplain and wetland connectivity will also decrease water temperatures by allowing for greater storage capacity as well as improving shaded regions along the stream bank. By re-connecting the stream to its historic floodplain and creating improved wetland acreage, impacts from floods will be diminished due to greater holding capacity. This improved storage capacity, resulting from enhanced floodplain functionality, will also alleviate drought impacts. More sediment deposition may also attenuate metals levels in the stream.

Will the project benefit aquatic or riparian ecosystems within the watershed? For example, will the project reduce flood risk, reduce bank erosion, increase biodiversity, or preserve native species? If so, how and to what extent?

- The project will greatly benefit aquatic and riparian ecosystems. This project will re-locate the stream to a more appropriate location on the floodplain, create a diverse, functional, fluvial system where no net aggradation or degradation occurs over the expected ranges of flows and sediment load. After several seasons of overbank stream events in the new channel, floodplain and riparian habitat will be substantially improved. Moving the confined stream away from the high eroding banks, will reduce bank erosion and sedimentation to the stream. The decrease in fine sediment loads will improve native fish habitat and support the successful introduction of native fish species as part of FWPs French Creek fish barrier project. Biodiversity will increase by improving intact habitat for wildlife, such as, moose, black bear, elk, mule deer, ruffed grouse and numerous songbird species that nest in riparian habitats.

Will the project benefit specific species and habitats? If so, describe the species and/or type of habitat that will benefit. How and to what extent will the project benefit the species or habitat? Please explain the status of species and habitat that will benefit (e.g., native species, game species, federally threatened or endangered, state listed, and whether critical habitat has been designated).

- The project will have enormous benefits to Westslope Cutthroat, Arctic Grayling, Western Pearlshell mussels and the varied aquatic invertebrates and amphibians that inhabit French Creek. Native salmonids (Westslope Cutthroat and Arctic Grayling) are not as tolerant to habitat alterations and fine sediment loading as non-native brook trout. Once restored to a native fish population, French Creek will represent the second largest interconnected stream system (over 40 miles of stream) in the upper Missouri River drainage with a native fish community.
- The Westslope Cutthroat Trout (*Oncorhynchus clarkii lewisi*) is one of two Cutthroat trout species in Montana. The cutthroat is the Montana state fish. The fish is identified by red throat slashes and black spots on the body. The Cutthroat population is significantly reduced, now occupying less than 3% of its original range. The decline is attributed to hybridization and competition from non-native trout and from habitat degradation. The Cutthroat trout requires cool waters with little sediment. They spawn in the spring leaving their eggs in redds made in the gravels. Westslope Cutthroat trout restoration is active in the Big Hole watershed (Montana Field Guide). The project will result in advancing the goal of restoring Westslope Cutthroat trout to 400 miles of stream in the Big Hole Drainage (Statewide Fisheries Management Plan 2011).
- The fluvial Arctic grayling (*Thymallus arcticus*) is a member of the trout family. The Big Hole River is the last remaining native population in the lower 48 states. They spawn in the spring and their diet is largely made up of aquatic insects. While the grayling can be found throughout the Big Hole River drainage, the majority of the population resides in the Upper Big Hole and the upper portion of the Middle Big Hole. Therefore, much of the restoration effort and future needs are driven by the habitat needs of the Arctic

grayling. Grayling require cold and clear waters. They are typically a small fish with an identifiable large, iridescent dorsal fin (Montana Field Guide). With their successful reintroduction to the French Creek drainage and upstream tributaries, this project area will likely become the best stream system in the lower 48 states to catch a grayling and the only river system with grayling and no non-native trout species.

- French Creek is also home to a native population of Pearlshell mussels. The Western Pearlshell (*Margaritifera falcata*) is the only mussel to live in Montana's cold-water streams in habitats that typically also house Westslope Cutthroat trout. Their typical size range is between 50-80mm long. Threats to this species include impoundments, siltation and eutrophication (resulting from high nutrients) (Montana Field Guide). Pearlshell mussels have been documented downstream of the project area, but their numbers are few. It is likely that the altered habitat conditions and fine sediment inputs from upstream reaches limits mussel populations in the area. It may be possible to restore Pearlshell mussels to French Creek once water quality and aquatic and riparian habitat is improved and Cutthroat are reintroduced.

Will the project benefit multiple water uses within the watershed (e.g., agricultural, municipal, tribal, environmental, recreation uses)? If so, how and to what extent?

- Landowners present in the Deep Creek and French Creek drainages downstream of the project area are affected by increased sediment loading and maintenance at irrigation diversions; these conditions should improve as a result of this project.
- The citizens of Butte, who consume water pumped from the Big Hole River, are also affected by poor water quality from French Creek. Butte-Silver Bow County Water Utility Division pumps approximately 300 gallons of water per year from the Big Hole River annually to supply the City of Butte (approximately 40% of the city's water supply).
- Because the project area is located on public property that is accessible year-round, affected people include all Montanans that recreate on the Mount Haggin Wildlife Management Area. Recreation opportunities for Montanans to observe, and in some cases harvest, wildlife species will be increased through the restoration of French Creek. Upon completion, this project will provide anglers the unique opportunity to fish for native species in a healthy, functioning stream system that excludes nonnative fish species, which may also reduce angling pressure and competition for resources on the Big Hole River. Habitat conditions for ungulates such as deer, elk, and moose will improve as a result of restoring wetlands and native vegetation, potentially improving hunting opportunities.

Will the project benefit watershed stakeholders in ways not addressed in the preceding questions? If so, how? Will the project reduce water conflicts within the watershed? Will the project increase resiliency to drought? Will the project provide benefits to other water uses not mentioned above? If so, how and to what extent?

- The project will increase resiliency to drought by improving natural water storage capacity in the upper watershed, which should increase late-season flows in the Big Hole River. By storing additional clean, cool water in this drainage, more water will be

available to the overall watershed, which should help to reduce water conflicts among irrigators and recreationists (e.g. anglers).

Will the project address multiple issues of concern within the watershed (e.g., both water supply and fish habitat issues)?

- The project will address multiple issues of concern within the watershed including water quality, water quantity, fish and wildlife habitat, and riparian health.

1e.2. Evaluation Criterion B— Watershed Restoration Planning

Describe your watershed restoration plan. When was the restoration plan prepared and for what purpose?

- The Big Hole River, Montana Watershed Restoration Plan (Part 2: Middle-Lower Big Hole Watershed) was compiled by BHWC and completed on August 29, 2013. The BHWC serves as a coordination hub and communication group between interests in the Big Hole Valley, including private land owners, residents, agencies, conservation groups, sportsman, and guides/outfitters. The goal of this plan is to provide a coordinated approach to restoration in the middle-lower Big Hole River watershed. This area is unique in that there are several active restoration plans already in place, including the United States Forest Service's (USFS) Beaverhead-Deer Lodge National Forest Plan, the Bureau of Land Management's (BLM) Watershed Assessments and Land Health Evaluations, the Upper Big Hole Candidate Conservation Agreement with Assurances (CCAA) program plan, and the Montana Fish, Wildlife and Parks' Statewide Fisheries Management Plan. These existing plans have varied goals, such as to improve the fishery, forest health, or range production. However, many of the activities used to achieve these goals also have a positive effect on water quality. Identifying plan goals and activities that include water quality benefits can be a cost-effective way to improve water quality in the Middle-Lower Big Hole. The BHWC determined the best approach to accomplish watershed restoration in the Middle-Lower Big Hole was to:
 1. Compile the existing efforts into one concise resource (this plan).
 2. Coordinate efforts among interests and encourage communication.
 3. Support planned activity, either with in-kind, implementation, financial, or other support.
 4. Advocate including water quality benefits in planned projects.

What types of watershed management issues are addressed in the plan? For example, does the restoration plan address water quantity issues, water quality issues, and/or issues related to ecosystem health or the health of species and habitat within the watershed?

- The Middle-Lower Big Hole River Watershed Restoration Plan is a guiding document that outlines watershed restoration goals and needs to address non-point source pollution. Factors that contribute to water quality impairments are largely human caused due to agriculture (grazing and hay production), historic mining, development, and forest land practices (roads and timber harvest); however, weather patterns and natural causes

also are contributing factors. Impairments in the Middle-Lower Big Hole watershed can largely be attributed to a loss of riparian vegetation resulting in channel changes. Other water quality issues include dewatering, nutrient influx, abandoned mines and unpaved roads

Who was involved in preparing the plan? Was the plan prepared with input from stakeholders with diverse interests (e.g., water, land or forest management interests, or agricultural, municipal, tribal, environmental, recreation uses)? What was the process used for interested stakeholders to provide input during the planning process?

- The Middle-Lower WRP was compiled by the BHWC. BHWC serves as a coordination hub and communication group between interests in the Big Hole Valley, including private land owners, residents, agencies, conservation groups, sportsman, and guides/outfitters. The BHWC met with its board members, residents, landowners, agencies, counties and conservation groups to determine the top priorities and methods for watershed restoration planning.
- The Middle-Lower Big Hole WRP also incorporated the goals and actions identified in the other four restoration plans [the United States Forest Service's (USFS) Beaverhead-Deer Lodge National Forest Plan, the Bureau of Land Management's (BLM) Watershed Assessments and Land Health Evaluations, the Upper Big Hole Candidate Conservation Agreement with Assurances (CCAA) program plan, and the Montana Fish, Wildlife and Parks' Statewide Fisheries Management Plan] in order to create a coordinated approach to watershed restoration. The Middle-Lower Big Hole WRP was prepared with input from these stakeholders and partners.

If the restoration plan was prepared by an entity other than the applicant, explain why the watershed group applying did not prepare its own plan. In cases where the applicant did not prepare the restoration plan, the applicant must provide documented support for the proposed project by the entity that authored the plan.

- N/A – The restoration plan was prepared by the applicant.

Describe how the existing restoration plan provides support for your proposed watershed management project. Does the proposed project implement a goal or need identified in the restoration plan?

- French Creek [Headwaters to mouth (Deep Creek)] is listed in Montana Department of Environmental Quality's list of impaired waters and was listed as a priority focus watershed in our restoration plan. The listed probable causes of impairment are Arsenic, Copper, and sedimentation/siltation. Restoration priorities specifically include: repairing sediment issues associated with historic placer mining and smelter damage by reducing sediment loads reaching the stream via gully wash, reconnecting the stream to its floodplain, and restoring upland, riparian and wetland areas (Part 2: Middle-Lower Big Hole WRP, pp. 67-69).

Describe how the proposed project is prioritized in the referenced restoration plan.

- Riparian restoration for French creek is listed as the highest riparian restoration priority in the Middle-Lower Big Hole WRP (Part 2: Middle-Lower Big Hole WRP, p.67).
- Wetland Restoration in French Creek is also listed as the highest priority for wetland restoration (Part 2: Middle-Lower Big Hole WRP, p. 69).

1e.3. Evaluation Criterion C— Stakeholder Support

Please describe the level of stakeholder support for the proposed project. Are letters of support from stakeholders provided (see Section D.2.2.8. Letters of Support)? Are any stakeholders providing support for the project through cost-share contributions, or through other types of contributions to the project?

- The level of stakeholder support for the proposed project is high; the project has support from local landowners, other entities responsible for natural resource management in the area, fellow conservation groups (e.g. The Nature Conservancy, Wildlife Conservation Society), BHCW board members, and sportsmen groups.
- BHCW has a standing philosophy that inclusion in project partnerships is a critical part of long-term conservation success. By incorporating critical partners early and often, project work can realize greater success and with less conflict among differing views. The BHCW was built by this concept and we incorporate it into every project we take on, often serving as a coordination or communication hub. Our partners buy in to watershed restoration and work to include water quality improvement into each opportunity. This partnership approach has successfully delivered two large restoration projects recently (California Creek, French Gulch/Moose Creek) and continues to work together to restore over 40 miles of native fishery to this watershed. Our work together up to this point has been smooth and we expect it to continue.
- Letters of Project Support are included as attachments.

Please explain whether the project is supported by a diverse set of stakeholders (appropriate given the types of interested stakeholders within the watershed and the scale, type and complexity of the proposed project). For example, is the project supported by entities representing agricultural, municipal, tribal, environmental, or recreation uses?

- Yes, the project is supported by agricultural entities including ranchers/irrigators, municipal entities such as the Butte-Silver Bow Water Utility Division as well as local conservation districts and counties, environmental groups like The Nature Conservancy and the Wildlife Conservation Society, and recreational users including the Anaconda Sportsman group and many local fly-fishing guides and anglers. There are no tribal entities in or near the project area, or they would have been included in the decision-making and planning process as well.

Is the project supported by entities responsible for the management of land, water, recreation, or forestry within the watershed? Is the project consistent with the policies of those agencies?

- This project is supported by entities responsible for the management of land, water, recreation, and forestry within the watershed. BHCW has a long-standing successful

relationship with Montana Fish, Wildlife and Parks, Montana Department of Environmental Quality, and Anaconda-Deer Lodge County, as well as the Natural Resource Damage Program, all of whom support the proposed work on lower French Creek.

- Montana Fish, Wildlife and Parks identifies resource management goals that match the goals of the Lower French Creek Sediment Reduction Project. They are:
 - Maintain emphasis on aquatic habitat protection and restoration.
 - Restore, maintain, and protect native species and their habitats
 - Continue habitat efforts to keep Arctic grayling off the federal Endangered Species list and continue efforts for delisting of bull trout and pallid and white sturgeon.
 - Maintain emphasis on aquatic habitat protection and restoration
 - Conserve, protect, and enhance fish and wildlife populations, their habitats, and the public's opportunity to enjoy them.

Will the proposed project complement other, ongoing watershed management activities by state, Federal, or local government entities, non-profits or individual landowners within the watershed? Please describe other relevant efforts, including who is undertaking these efforts and whether they support the proposed project. Explain how the proposed project will avoid duplication or complication of other ongoing efforts.

- The project will complement recently completed and planned projects in the Deep Creek and French Creek drainages. These projects were also coordinated/managed by BHWC and completed with a host of project partners. Projects are listed and described below:
- Mount Haggin Uplands Revegetation and Sediment Control Demonstration Project: Completed 2016. \$57,000 project to mitigate sediment delivery from uplands and gullies into waterways and jump-start vegetation restoration on severely eroded upland slopes of the Mount Haggin WMA.
- California Creek: Completed 2017. \$350,000 project to address sediment pathways from source to stream, enhancing the ability of the landscape to both retain sediment on slopes as well as deposit excess sediment on the floodplain.
- French Gulch/Moose Creek: Completed 2017. \$1.3 million stream restoration project that reconnected the stream to its floodplain, restored wetlands, and improved/created fish habitat. Brought together 7 different funding sources and was completed ahead of time and under budget.
- Oregon Creek: In design phase, implementation planned for 2019-2020. Estimated project cost: \$200,000. The overall goal of the placer mine restoration project along Oregon Creek is to restore stream, wetland and riparian function to the mining-impacted reaches of Oregon Creek. *Although they are separate projects, construction for the French Creek and Oregon Creek projects will be put out to bid as one package and completed at the same time to maximize efficiency and save on mobilization, bonding, oversight and other costs.*

- Native Fish Barrier project: This project is being completed by Montana Fish, Wildlife and Parks. Barrier construction has been contracted and construction is scheduled for summer 2019. Native fish introduction will begin in 2021 or 2022. The barrier is necessary to prevent nonnative fish species from accessing French Creek, and BHWC is in full support of this project.

Is the project completely or partially located on Federal land or a Federal facility? If so, explain why the Federal agency is not completing the project, whether the agency supports the project, and whether the agency will contribute toward the project?

- N/A – the project is located on State land owned by Montana Fish, Wildlife and Parks, who supports the proposed project completely.

Is there opposition to the proposed project? If so, describe the opposition and explain how it will be addressed. Opposition will not necessarily result in fewer points.

- N/A – there is no known opposition to the lower French Creek Sediment Reduction project.

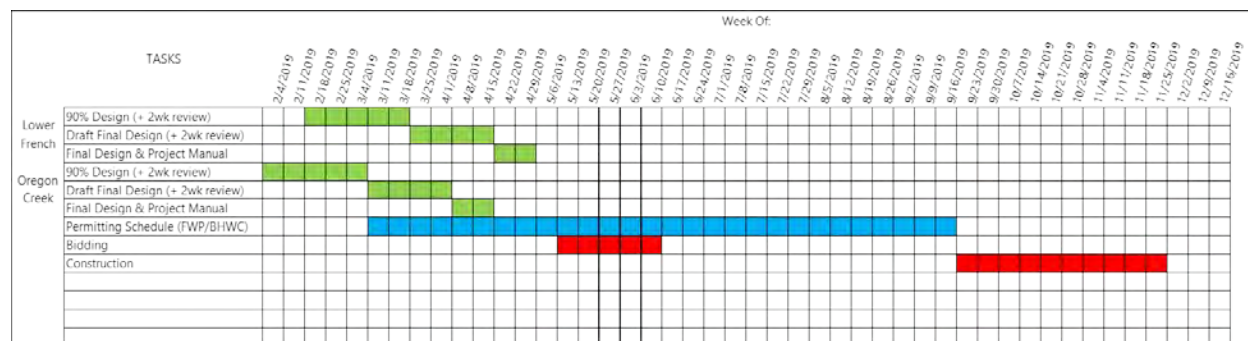
1e.4. Evaluation Criterion D— Readiness to Proceed

Describe the implementation plan for the proposed project. Please include an estimated project schedule that shows the stages and duration of the proposed work, including major tasks, milestones, and dates.

- This project is part of a broad partnership that is piecing together the watershed-scale restoration of over 40 miles of headwaters tributary streams to the Big Hole River. This sediment source was identified by Montana Fish, Wildlife and Parks as the largest and most easily-addressed sediment source along French Creek. Previous historical assessments along French Creek identified the linear gravel piles as mining-related features. Previous 40% design of French Creek project (upstream of project reach) also informed design of this project.
- Preliminary design has been completed for this reach as well as another reach further upstream also impacted by the gravel dike (see attachment). Experience gained from the French Gulch/Moose Creek restoration project has supported accurate engineering and construction estimates.
- Due to collection of restoration efforts, cattle have been removed from the project area for a limited time to support these efforts and decrease need for fencing along project. Preliminary BEHI study has been conducted on the 5 streambanks along project reach, showing an estimated 832 tons/year, which would be eliminated as a result of this project.

Table 2. Project Tasks and Timeline

Below we provide two project schedules. This one was developed by our project engineer and includes the timetable for both this project the Oregon Creek project.



Our internal project schedule has a few items in addition to our engineer's above and is shown below.

Project Task	Winter 2019	Spring 2019	Summer 2019	Fall 2019	Winter 2020	Spring 2020	Summer 2020	Fall 2020
Final Design								
Project Bid and Contracting								
Cultural Resource Inventory								
404 Permitting								
Secure Remaining Funds (FWP, TNC)								
Project Construction								
Project Monitoring								

The project budget outlining costs for specific tasks (required in Section D.2.2.5. Project Budget) should identify costs associated with the tasks in your project schedule, and all contractor costs should be broken out to identify the specific tasks included in those costs.

- Included in Section 2: Project Budget.

Describe any permits and agency approvals that will be required, along with the process and timeframe for obtaining such permits or approvals.

- French Creek Dike Report_2016 (included as attachment in Appendix 3: Required Permits or Approvals). This report documents the mining-related dike but does not specifically address our project area. A site-specific Cultural Resource Inventory will be contracted for Summer, 2019
- Lower French Creek Wetland Delineation_2019 (included as attachment in Appendix 3: Required Permits or Approvals) has been completed. This will be included in US Army Corps of Engineers 404 permit application scheduled for Spring/Summer, 2019 following completion of final design.

- Montana Fish, Wildlife and Parks Environmental Assessment Notice_2016 (included as attachment in Appendix 3: Required Permits or Approvals) has been completed for this area.
- Joint Application State 124 permit will be secured by MFWP Summer, 2019
- Floodplain permit is not expected and conversations are underway with Anaconda Deer Lodge County Floodplain administrator, who supports this project.

Identify and describe any engineering or design work performed specifically in support of the proposed project, or that will be performed as part of the project. Priority will be given to projects that are further along in the design process and ready for implementation.

- Preliminary project designs produced by engineering firm Morrison-Maierle, Inc. included as attachment in Appendix 5: Design Documents.

Does the applicant have access to the land or water source where the project is located? Has the applicant obtained any easements that are required for the project? If so, please provide documentation. If the applicant does not yet have permission to access the project location, please describe the process and timeframe for obtaining such permission.

- Yes, the applicant has access to the land and water source where the project is located. The applicant has not obtained any easements and none are required for the project. The project is located on state land owned by Montana Fish, Wildlife and Parks, with whom BHWCC is working in partnership to complete the proposed project.

Describe the type of environmental and cultural resource you anticipate will be necessary for this project and how the estimated cost of environmental compliance was developed. Provide support for both the type of compliance you anticipate and your estimate. Have the compliance costs been discussed with the local Reclamation office? Environmental compliance must be completed prior to any ground disturbing activity. These costs are considered project costs that must be included in the project budget and will be cost shared accordingly. These costs vary based on project type, location, and potential impacts to the environment and cultural resources. Please consider the questions posed under Section H.1. Environmental and Cultural Resources Compliance Considerations when answering this criterion.

- A preliminary investigation of the dike, which has caused the impairment was completed for an upstream section of French Creek in 2016. A cultural inventory of the area was completed for our upstream French Gulch project. These studies have provided the historical context of mining in the watershed, but do not address the specific project location. FWP is currently seeking estimates to continue this cultural inventory for the immediate project area with the same company that performed the earlier studies. We anticipate this inventory will not cost more than \$3,000.00 and funds are readily available to cover those costs.

1e.5. Evaluation Criterion E— Performance Measures

Please describe the performance measures that will be used to quantify actual project benefits upon completion of the project. Include support for why the specific performance measures were chosen.

- Sediment inputs to the stream are derived from the high erosive terrace along the channel's western flank. A Bank Erosion Hazard Index (BEHI) assessment was performed of this bank following Montana DEQ methodology and presented to MDEQ. The agency agreed with the assessment and has funded \$240,000.00 toward this project, including all design costs. By removing the channel from this terrace, the entire volume of sediment contributed by the slope will be removed from the channel. The stream will then have only low levels of natural bank scour inputs into the stream. An in-stream assessment of bank erosion post-construction will be conducted by Montana DEQ when they assess French Creek for de-listing from its sediment impairments.
- Other quantifiable metrics used will include:
 - monitoring of 3 shallow groundwater wells we installed in the project area in 2018
 - Stream flows and temperatures will be monitored annually from a Tru-Track flow meter that was installed downstream of the construction area in 2018.
 - Impact on fish habitat, native fish and Pearlshell mussel populations will be monitored over the coming 10 years by MFWP as part of their large-scale native fish introduction project.
 - Post-project vegetation monitoring will take place using video drone and UAS survey drone in 2020 and 2021.

1e.6. Evaluation Criterion E— Department of the Interior Priorities

1. *Creating a conservation stewardship legacy second only to Teddy Roosevelt:*

- a. *Utilize science to identify best practices to manage land and water resources and adapt to changes in the environment;*
 - Our use of state-of-the-art UAS technology will allow us to track project results with high resolution topography. These replicable data can be obtained over the long-term by MFWP to monitor project results.
 - Long-term fish population studies will be conducted by MFWP as part of their native fish introduction project.
- b. *Examine land use planning processes and land use designations that govern public use and access;*
 - N/A
- c. *Revise and streamline the environmental and regulatory review process while maintaining environmental standards.*
 - N/A
- d. *Review DOI water storage, transportation, and distribution systems to identify opportunities to resolve conflicts and expand capacity;*
 - N/A

- e. *Foster relationships with conservation organizations advocating for balanced stewardship and use of public lands;*
 - Our partnerships with The Nature Conservancy and The Wildlife Conservation Society will be deepened through this project and pave the way for future partnerships. Our experiences with this project will help inform those organizations, as well as MFWP as to the benefits of restoring the natural resources of our public lands.
- f. *Identify and implement initiatives to expand access to DOI lands for hunting and fishing;*
 - N/A
- g. *Shift the balance towards providing greater public access to public lands over restrictions to access.*
 - The improvement of habitat conditions from this project as well as the parallel native fish restoration project will improve wildlife viewing and angling opportunities in this watershed. Public access is already established and will continue.

2. *Utilizing our natural resources:*

- a. *Ensure American Energy is available to meet our security and economic needs;*
 - N/A
- b. *Ensure access to mineral resources, especially the critical and rare earth minerals needed for scientific, technological, or military applications;*
 - N/A
- c. *Refocus timber programs to embrace the entire 'healthy forests' lifecycle;*
 - N/A
- d. *Manage competition for grazing resources.*
 - N/A

3. *Restoring trust with local communities:*

- a. *Be a better neighbor with those closest to our resources by improving dialogue and relationships with persons and entities bordering our lands;*
 - The success of this project will catalyze conversations between BHWC and downstream neighbors who have been opposed to the fish barrier project. By focusing on the resource benefits of this project, BHWC will play a mediating role between these downstream landowners and MFWP.
- b. *Expand the lines of communication with Governors, state natural resource offices, Fish and Wildlife offices, water authorities, county commissioners, Tribes, and local communities.*
 - By funding this project, BOR would be supporting state lands managed by Montana Fish, Wildlife and Parks as well as BHWC, a local watershed group that represents the needs and wants of local communities.

4. *Striking a regulatory balance*

- a. *Reduce the administrative and regulatory burden imposed on U.S. industry and the public;*
 - N/A
- b. *Ensure that Endangered Species Act decisions are based on strong science and thorough analysis.*
 - N/A

5. *Modernizing our infrastructure*

- a. *Support the White House Public/Private Partnership Initiative to modernize U.S. infrastructure;*
 - N/A
- b. *Remove impediments to infrastructure development and facilitate private sector efforts to construct infrastructure projects serving American needs;*
 - N/A
- c. *Prioritize DOI infrastructure needs to highlight:*
 - 1. *Construction of infrastructure;*
 - N/A
 - 2. *Cyclical maintenance;*
 - N/A
 - 3. *Deferred maintenance.*
 - N/A

2. Project Budget

2a. Funding Plan and Letters of Commitment

The BHWCs 20-year track record of collaborative work for the benefit of our resources, and in particular our recent restoration accomplishments in the watershed have attracted attention of several state and non-profit partners who are eager to contribute to this project. Montana DEQ awarded BHC a 319 grant for \$240,000.00 for project design costs and construction. These are federal funds and not counted toward match for this BOR grant. To date we have paid \$35,574 to Morrison-Maierle, our design engineer for wetland delineation, geomorphic survey, UAS drone survey and project design. We have an additional \$17,426.00 committed to our engineer for producing our bid package for construction and finalizing design. BHC has spent \$1440.00 on project administration from that same DEQ grant. Additionally, Montana Trout Unlimited and the George Grant chapter of Trout Unlimited have each contributed \$5,000 toward our project design costs. These awards have been secured but not yet billed against costs incurred.

We have secured a grant from the Wildlife Conservation Society to demonstrate innovative natural water storage techniques and funds from this project can be applied to the final construction costs of the French Creek project, particularly the creation of new wetlands. We estimate using \$35,000.00 from this grant to cover wetland creation costs.

The Nature Conservancy has committed \$21,000 toward this project and has committed to bringing in another \$26,000 later this summer. Lastly, we have proposed this project to Montana Fish, Wildlife and Parks' Future Fisheries program. In previous funding cycles that program ranked our project 4th out of 11 and it has the enthusiastic support of the funding committee but was awaiting a more final budget estimate before awarding funds. We will be requesting \$65,000 in the next round of program funding in June, 2019 from that committee. We have a high level of certainty that these grant sources (FWP and TNC) will come through. In the absence of those funding sources we have approximately \$68,000 in our WCS grant that could be applied to this project, but we would rather retain those funds for other projects in other areas.

Letters of commitment from all of these funders will be obtained once we have finalized our construction costs, bid the project and secured a contractor. Our construction estimates are conservative. We are also bidding this project for construction with a partner project on Oregon Creek upstream to save on mobilization, bonding, oversight and other costs. We anticipate actual construction costs to be lower than the engineer's estimates. Once we have contracted project construction we will obtain letters of commitment from all project funders with precise funding amounts from each partner entity. All letters of commitment will be provided by July 1, 2019.

2b. Budget Proposal

Table 3. Total Project Cost

SOURCE	AMOUNT
Costs to be reimbursed with the requested Federal funding	\$86,609.51
Costs to be paid by the applicant	\$ 394,554.45
Value of third party in-kind contributions	\$ 0.00
TOTAL PROJECT COST	\$ 481,163.96

Costs to be paid by BHWB include all design, oversight and construction costs for this project. We have contracted an award-winning design engineer, Morrison-Maierle, Inc to design this project for us and we are less than a month away from a completed design. These costs are being paid for from our Montana DEQ 319 grant award, secured in 2018 for this project, which totals \$240,000.00. The same DEQ grant will also pay for an additional \$162,900.00 of project construction costs and covers all of BHWB's costs to manage, coordinate and report on the outcomes of this project. These DEQ funds are federal sources and not applied to the match requirements for this grant.

Non-federal matching grant sources for this grant will include the following sources:

Table 4: Matching Contributions

Non-Federal Funding Source	Amount	Status
Wildlife Conservation Society	\$35,000.00	Secured- in hand

Montana FWP- Future Fisheries Grant Program	\$65,000.00	Proposal in June, 2019. High confidence of award
TNC- Confirmed	\$21,000.00	Committed
TNC- Additional	\$26,000.00	Projected- July, 2019
Total non-federal funding sources	\$147,000.00	

Our partner for this grant is Montana Fish, Wildlife and Parks, particularly the fish biologist for the region, Jim Olsen. He is expected to provide significant support for this project as a third party but those costs are not included in total project costs or in-kind contribution. Due to his involvement in the downstream fish barrier project which will be installed in 2019 and native fish being introduced over the following 5 years, those in-kind contributions are near impossible to calculate and will not be included in the overall cost estimates for this project.

Table 5: Budget Proposal

WORK ITEMS (ITEMIZE BY CATEGORY)	ESTIMATED QUANTITY	UNIT DESCRIPTION	COST/UNIT	TOTAL COST
Contractual/Construction: Morrison-Maierle, Inc. (Contracted)				
Survey	1	LS	\$7,000.00	\$7,000.00
Design Drawings and Project Manual	1	LS	\$29,200.00	\$29,200.00
Geomorphic Site Reconnaissance	1	LS	\$4,800.00	\$4,800.00
Wetland Delineation	1	LS	\$10,500.00	\$10,500.00
Joint Application for Riparian Permits	1	LS	\$1,500.00	\$1,500.00
Oversight* (<i>not yet under contract</i>)	1	LS	\$10,000.00	\$10,000.00
			Sub-Total	\$63,000.00
Contractual/Construction: Contractor B				
Taxes, Bonds, and Insurance	1	LS	\$20,000.00	\$20,000.00
General Requirements	1	LS	\$20,000.00	\$20,000.00
Mobilization/Demobilization	1	LS	\$15,000.00	\$15,000.00
Water & Erosion Control	1	LS	\$12,000.00	\$12,000.00
Earthwork - Floodplain Shaping	20000	CY	\$4.00	\$80,000.00
Stream Channel Restoration	4030	LF	\$15.00	\$60,450.00
Willow Streambanks	1000	LF	\$15.00	\$15,000.00
Woody Debris Structure - Habitat Wood Structures	20	EA	\$150.00	\$3,000.00
Abandoned Channel Plug	3	EA	\$1,500.00	\$4,500.00
Abandoned Channel Wetland Creation	2000	LF	\$10.00	\$20,000.00
Topsoil/ Organics/Sod Mat Salvaging Separation & Stockpiling	6.5	AC	\$3,000.00	\$19,500.00
Seeding	6.5	AC	\$1,500.00	\$9,750.00
Mature Willow Transplants	1	LS	\$5,000.00	\$5,000.00
Optional - Streambed Material Sorting/Transport from French Gulch	3000	CY	\$20.00	\$60,000.00
			Sub-Total	\$344,200.00
Contingency (12%)				\$41,304.00
			Sub-Total	\$385,504.00
Salaries and Wages: BHWC Personnel				
Hours: Project Manager- Pedro Marques	352	\$/Hour	\$30.00	\$10,560.00
Hours: Project Coordinator- Ben LaPorte	500	\$/Hour	\$21.00	\$10,500.00
Fringe Benefits- Pedro Marques		Fringe Rate-%	16%	\$1,689.60
Fringe benefits- Ben LaPorte		Fringe Rate-%	16%	\$1,680.00
Personnel Sub-Total				\$24,429.60
Indirect Costs: 10%				\$2,442.96
Travel Costs				
Travel-Mileage	6530	\$0.58/Mile	\$3,787.40	\$3,787.40
Travel-Nightly Lodging Costs	25	\$80/Night	\$2,000.00	\$2,000.00
			Sub-Total	\$5,787.40
TOTAL				\$481,163.96

2c. Budget Narrative

Salaries and Wages

Project Manager Pedro Marques and Project Coordinator Ben LaPorte, staff members of the BHWC, will be our team leads for the implementation of this project. Their estimated hours dedicated to this project are provided in the budget table above. Their staff hours will be allocated to all aspects of the project not covered by the services contracted for the execution of this project- namely the engineering, oversight and construction of the project. Our role will be to hold all contracts with our funders and contract all construction. Our staff will write the federal 404 permit applications, provide supplementary oversight of the project's execution when the engineer is not on site, all monitoring and documentation of the project, and provide all reporting to our funders.

Fringe Benefits

Our organization's standard fringe rate is 16% of all staff costs.

Travel

Our staff will be required to drive from Missoula to our project site numerous times to meet with project partners, conduct project walk-through for potential contractors, and oversee project execution. Staff will be required to stay overnight on numerous occasions. Local hotel costs have been estimated for these stays. Updated state mileage rates have been included in project costs and an estimated number of miles to drive to and from (200 miles) to the project site for each visit. As this project will be executed concurrently with another project upstream, these costs are difficult to estimate accurately and we have some flexibility in which project to charge our travel.

Equipment

We do not anticipate purchasing any equipment for this project.

Materials and Supplies

All materials and supplies needed for this project are estimated under our estimates for construction contractor. Those estimates have been provided by our design engineer. We are currently at a 75% design and should be closer to 95% design within a month. Construction estimates are not expected to change much from the current estimates provided by our engineer.

Contractual

We have already contracted a design engineer and those costs are provided. Oversight costs for our engineer have not yet been contracted as those costs will be split between this project and our Oregon Creek project. Both these projects will be overseen together and we are awaiting final construction estimates on that project before we contract project oversight. Both this project and our Oregon Creek project will be bid together. We will follow State of

Montana procurement guidelines to publicly bid this project and select a qualified low-bid contractor to execute the project.

We anticipate that by bidding this project together with our Oregon Creek project, we will see substantial cost savings from our budget estimates and therefore consider all contractual cost estimates to be conservative.

Third-Party In-Kind Contributions

While we anticipate Montana Fish, Wildlife and Parks will provide significant contributions to this project, their efforts will be part and parcel of a much larger initiative outside the scope of this project. Those cost estimates are not included in budget estimates for this project as they will be nearly impossible to determine.

Environmental and Regulatory Compliance Costs

This project will improve habitat for fish and wildlife along French Creek and is part of the larger native fish restoration project being implemented by Montana Fish, Wildlife and Parks described above. We previously completed projects in California Creek and French Gulch, tributaries of French Creek. All of this work and the improvements along French Creek proposed here were included in FWPs NEPA document attached to this application. Montana Fish, Wildlife and Parks is prepared to provide any additional documentation requested by BOR to support this particular project. As stated above, those costs are not included in our estimates.

State of Montana and Federal permitting requirements for this work are included in several line item costs that have already been contracted under separate arrangements. Specifically, our grant award from the Montana DEQ provided for contracting a design engineer to provide wetland delineation (\$10,500.00) and federal permit review support (\$1,600.00). This contracted agreement can be provided upon request. The wetland delineation report has been attached to our application. BHWC will write the 404 permit application under the staff hours estimated in our budget. We have not received indication from BOR as to their cost estimates for reviewing compliance with these requirements. We will be happy to incorporate those costs into our budget estimates and we have a good amount of budget cushion from our non-profit and state grant sources to cover those costs that could arise.

Indirect Costs

BHWC will use the *de minimus* indirect rate of 10% for our administrative/management role in this project. These costs, which include some of our DEQ 319 grant contractual obligations for education/outreach and monitoring, as well as contracting and contractor payments, total \$24,429.60. Our indirect costs of \$2,442.26 will cover operation and maintenance costs, our legal and accounting fees that cover payroll and if needed, time for our associate director to contribute to this project.

3. Environmental and Cultural Resources Considerations

Will the proposed project impact the surrounding environment (e.g., soil [dust], air, water [quality and quantity], animal habitat)? Please briefly describe all earth-disturbing work and any work that will affect the air, water, or animal habitat in the project area. Please also explain the impacts of such work on the surrounding environment and any steps that could be taken to minimize the impacts.

- The construction of a new stream channel will cause temporary decrease in water quality due to sedimentation and turbidity from loosened earth. This temporary turbidity is covered under a 318 permit that will be issued by Montana, Fish, Wildlife and Parks. The selected construction contractor will be required to submit a stormwater pollution and prevention plan prior to beginning of construction. We will minimize these impacts to the existing stream channel by constructing the project from downstream to upstream and only tying the new channel to the old once the new channel is completely constructed.
- We will be constructing this project during base-flow conditions and late in the fall to minimize impacts on fish habitat and to decrease the amount of surface waters affected by construction.
- Effects from construction activities are expected to cease within 1 week of the new channel having flowing water in it.

Are you aware of any species listed or proposed to be listed as a Federal threatened or endangered species, or designated critical habitat in the project area? If so, would they be affected by any activities associated with the proposed project?

- The Upper Big Hole was the last location in the lower 48 states to host a naturally producing population of Arctic grayling in a river. Grayling historically occupied much of the Upper Missouri Basin to Great Falls, Montana. Changes in habitat resulting from development, large dams, and mining beginning in the late 1880's caused the grayling population to decline dramatically. In the Big Hole, their decline was exacerbated by drought in the 1980's, causing the fish to drop to dangerously low populations. In 1991, the Arctic grayling was designated as a Candidate for Endangered Species Act listing. In 2009, Montana Fish, Wildlife and Parks, in partnership with United States Fish and Wildlife Service (USFWS), Montana Department of Natural Resources and Conservation (DNRC), and the Natural Resources Conservation Service (NRCS) put into place the Candidate Conservation Agreement with Assurances (CCAA) program in the Upper Big Hole to promote grayling recovery. Citing the extensive efforts and improvements for conservation specifically targeting the Arctic grayling as well as increasing populations, the USFWS determined in 2014 that the Arctic grayling was not warranted for Endangered Species Act listing. In 2015, a lawsuit was filed suing the USFWS, disagreeing with their decision to not list the fish on the Endangered Species Act. The outcome of that lawsuit has not yet been resolved, but agency partners continue to work to promote grayling recovery in the Upper Big Hole watershed.

Are there wetlands or other surface waters inside the project boundaries that potentially fall under CWA jurisdiction as “Waters of the United States?” If so, please describe and estimate any impacts the proposed project may have.

- Yes, a large portion of the project area has been delineated as wetland. Our construction plan minimizes the amount of this wetland that will be impacted by construction—namely the width of the channel itself. Total wetlands impacted by our project is 2 acres, while we anticipate creating a minimum of 5 acres of new wetland. French Creek is a WOTUS but will not be impacted by construction other than the temporary flush of fresh sediments from channel construction during the hours following flows accessing the new channel.

When was the water delivery system constructed?

- This question is not applicable as there are no water delivery systems in the proposed project area.

Will the proposed project result in any modification of or effects to individual features of an irrigation system (e.g., headgates, canals, or flumes)? If so, state when those features were constructed and describe the nature and timing of any extensive alterations or modifications to those features completed previously.

- The proposed project will not result in any modifications of or effects to individual features of an irrigation system.

Are any buildings, structures, or features in the irrigation district listed or eligible for listing on the National Register of Historic Places? A cultural resources specialist at your local Reclamation office or the State Historic Preservation Office can assist in answering this question.

- No buildings, structures, or features in the project area are eligible for listing on the National Register of Historic Places.

Are there any known archeological sites in the proposed project area?

- There are no known archeological sites in the proposed project area.

Will the proposed project have a disproportionately high and adverse effect on low income or minority populations?

- The proposed project will not have a disproportionately high and adverse effect on low income or minority populations. The project is on state-owned land and does not host a resident population. Public recreation opportunities will be enhanced and are available to anyone.

Will the proposed project limit access to and ceremonial use of Indian sacred sites or result in other impacts on tribal lands?

- The proposed project will not limit access to or ceremonial use of Indian sacred sites or result in other impacts to tribal lands. The project area does not encompass any tribal lands or known sites of historic or sacred indigenous use.

Will the proposed project contribute to the introduction, continued existence, or spread of noxious weeds or non-native invasive species known to occur in the area?

- The proposed project will not contribute to the introduction, continued existence, or spread of noxious weeds or non-native invasive species known to occur in the area.
- There are no weeds in the project area currently. Construction contractor will be obligated to maintain equipment free of weeds throughout construction.

4. Appendices

4a. Appendix 1—Mandatory Federal Forms

- SF424_1-V2.1_Application for Federal Assistance
- SF424C_2.0-V20_Budget Information_Construction Programs
- SF424D-V1.1_Assurances_Construction Programs

4b. Appendix 2—Required Permits or Approvals

- French Creek Dike Report_2016
- Lower French Creek Wetland Delineation_2019
- Montana Fish, Wildlife and Parks Environmental Assessment Notice_2016

4c. Appendix 3—Documentation in Support of Applicant Eligibility

- Self-certification that group meets the definition of a “Watershed Group”
- Articles of Incorporation
- Bylaws
- Mission Statement
- Self-Certification of Regular Meetings
- Watershed Restoration Plan
 - Middle-Lower Big Hole Watershed Restoration Plan

4d. Appendix 4—Design Documents

- Morrison-Maierle, Inc. Preliminary Project Designs

4e. Appendix 5—Letters of Project Support

- LOS from 2017 Department of Environmental Quality 319 grant application for Lower French Creek Sediment Reduction project

4f. Appendix 6—Official Resolution

A SUPPLEMENTAL REPORT

For the

PROPOSED FRENCH GULCH STREAMBED REHABILITATION PROJECT

On the

MOUNT HAGGIN WILDLIFE MANAGEMENT AREA

DEER LODGE COUNTY, MONTANA

Prepared for:

Big Hole Watershed Committee

And

Montana Department of Fish, Wildlife and Parks

P. O. Box 200701

Helena, Montana 59620-0701

By

David Ferguson
GCM Services, Inc.
Butte, Mt 59701

May 13, 2016

INTRODUCTION

The Big Hole Watershed Committee and Montana Department of Fish, Wildlife and Parks (FWP), Butte, Montana contracted with GCM Services, of Butte, Montana to supply additional, supplemental historic information on linear gravel pile features within the area of a proposed streambed rehabilitation project on French Gulch in Deer Lodge County. The purpose of the project is to restore the creek channel and create trout habitat. French Gulch is a tributary of the Big Hole River.

The subject of the research is a pair of linear gravel piles along the French Creek floodplain in Sections 1 and 2, T2N R12W. The linear gravel piles more or less parallel the recently replaced roadbed and the drainage channel. There has been extensive, well-documented placer mining activity, including dredging operations, on French Creek above this point. The features lie in the drainage bottom, an extensive riparian environment with rushes, willows and dogwood growing amid the flowing French Creek Channel, bogs, and beaver impoundments.

Figure 1 shows the location of historic selected cultural properties on the Deer Lodge National Forest 1:126,720-scale Forest Visitor Map and the USGS 7.5-minute topographic quadrangle, *Lincoln Gulch*, Montana (1962). Figure 2 is an aerial view of the area of investigation showing the linear dike features provided by Montana FWP. Figure 3 is an enlargement of a portion of the 1907 Plat of the Allen Gold Company's placer claims on French Creek. Figure 4 is a portion of the 1872 Master Title Plat for Township 2 North, Range 12 West showing the subject area. Figures 4-6 are photos of the linear gravel piles along the French Creek floodplain taken in 2014 and 2016.

The following sources were examined in an effort to identify the origin of the two linear structures: The Bureau of Land Management (BLM) mineral survey plat files in the Butte Field Office; the BLM's General Land Office survey plat archives, found on the internet at: (<https://www.glorerecords.blm.gov/default.aspx>); the William R. Allen Papers at the Montana Historical Society Archives; Montana Bureau of Mines and Geology vertical files, the library of Montana Tech, W.R. Allen's 1949 autobiography, *The Chequamegon*, as well as general mining references such as mining industry journals, state records of mine production and overviews of Montana mining camps, and, past reports by Newell (1980) and Ferguson (2008; 2013) on the local history of the French Creek area.

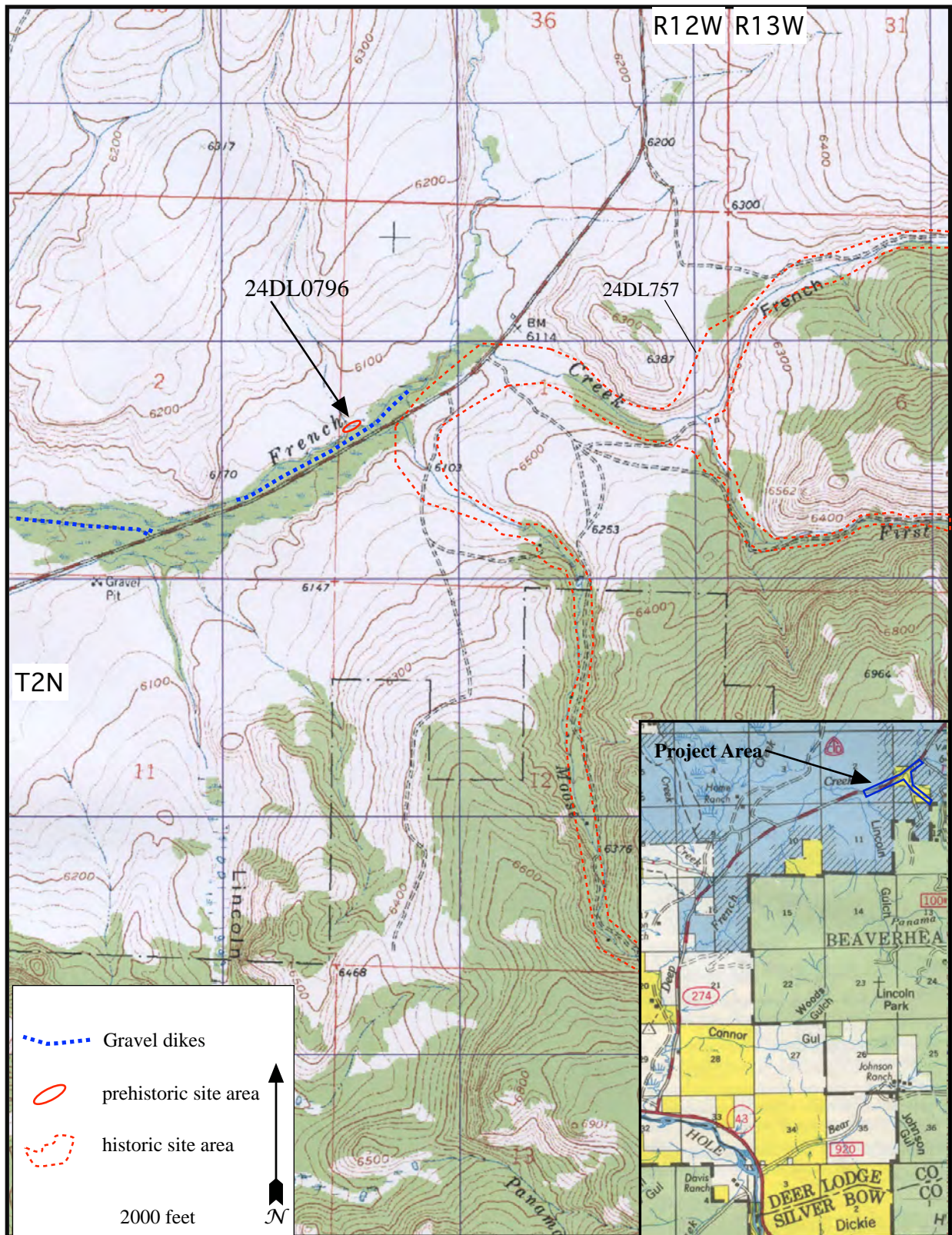


Figure 1. The location of historic selected cultural properties on the Deer Lodge National Forest 1:126,720-scale Forest Visitor Map and the USGS 7.5-minute topographic quadrangle, *Lincoln Gulch*, Montana (1962).



Figure 2. Aerial view of the area of investigation showing the linear dike features.

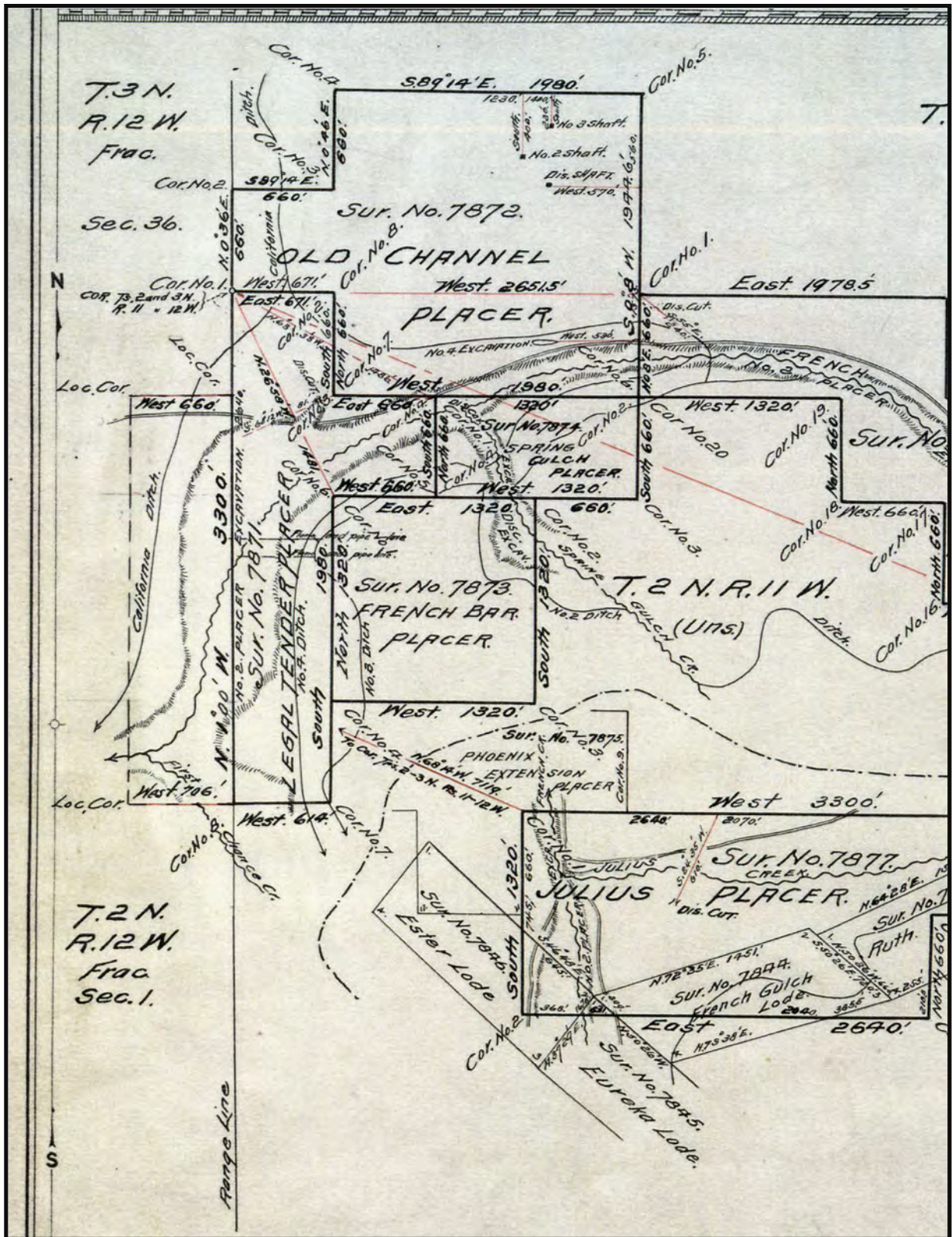


Figure 3. The 1907 plat of the Allen Gold Company's placer claims on French Creek.



Figure 4. The east bank of French Creek, which is comprised of washed gravels (NW SW Section 1, T2N R12E, Ferguson 2014 photo)



Figure 5. Washed placer gravels (NW SW Section 1, T2N R12E, Jim Olsen 2016 photo)



Figure 6. Washed placer gravels along French Creek viewing southwest, Jim Olsen 2016 photo)

French Gulch Mining District History

Two Frenchmen are credited with making the first placer gold discoveries in the area in 1863. French Gulch, as with many of the placer mining districts in Montana Territory, soon attracted a variety of itinerant prospectors. American, Spanish, German and Chinese, miners entered the Mount Haggin Area during these early years. The names given to creeks in the Area reflect this diverse ethnic influence--German Gulch, French Creek, American Creek.

The French Gulch Mining District included some of the more important mining properties in southwestern Montana. The district encompassed French Creek, California Creek, American Creek, Oregon Creek, and their minor tributaries. In the first four years since its discovery, the district yielded between \$1,000,000 and \$5,000,000 in gold nuggets and dust (WPA 1941).

In 1864, French Gulch held a roaring gold mining camp, similar to hundred of others throughout the West. Twenty placer mining claims were filed on French Creek in its first year. The “town” of Mountaineer City (a/k/a French Gulch) was located at the confluence of French Creek and First Change Creek (Section 1, T2N R12W). In 1865, it is reported to have consisted of 20 to 30 homes, two or three shops, two blacksmith shops and a shoemaker’s shop, as well as saloons, a Faro bank and a hurdy gurdy house. The town served as the supply source for the miners and settlers in the area. A road from the Deer Lodge Valley to French Gulch connected the town to the rest of the territory. Another pioneer trail bisected the Mount Haggin Area and connected the gulch with the Big Hole Valley.

W. R. Allen, a future lieutenant governor of Montana, was born in the town of French Gulch in 1871. Allen's father had arrived in French Gulch six years earlier and had located one of the earliest placers at Allen's Bar. In his later published reminiscences, the younger Allen recalled what it was like to live in the isolated community of French Gulch.

Supplies had to be freighted in from either Salt Lake City over the Corrine Road or from Fort Benton over the Mullan Road. During the months November to May, snow, usually three to six feet deep, prohibited the delivery of large quantities of supplies. The only goods to reach the isolated community were those that were carried by men on snowshoes from the lower valleys. Mail that arrived from Warm Springs once a week during the winter was transported in this way. After spending the winters of 1871-1873 at French Gulch, the Allen family moved to a ranch in the Deer Lodge Valley. Thereafter, the elder Allen worked his placer claims in French Gulch only during the summer months.

Placer mining in the French Gulch Mining District, as in other mining districts, was a temporary phenomenon. The readily available nuggets from gravel bars and exposed crevices soon dissipated. By 1877, it was no longer profitable to recover gold with only a pan, rocker and sluice box. Many miners left the area at this time. Others, who had sufficient determination and capital, invested in the abandoned placer claims and began hydraulic mining in the gulch.

Hydraulic mining consisted of directing a concentrated stream of water at a potential gold-containing gravel area. The hundreds of cubic yards of material that would be dislodged in the process were channeled through sluice boxes to a screen, which would remove the sediment from the gold. This operation was essentially a more elaborate, and destructive, means of placer mining. It required the diversion of large amounts of water to the site of the hydraulic activity. The origin of many ditches along Oregon, California and American Creeks can be traced to this period of mining history of French Gulch.

The Allen family took advantage of the decline in placer mining at French Gulch by purchasing a number of the original diggings. Soon, the senior Allen had acquired most of the French Gulch camp. Other less ambitious prospectors also entered the district. Many of these new arrivals were Chinese. As in other mining districts throughout the west, Chinese succeeded Anglo miners at the old tailings. Leasing the placer claims from their owners, the Chinese methodically worked the mined-over gravel bars and beds. They often established small log dwellings near a claim or assumed residency in an abandoned cabin or even a mine tunnel. The Chinese probably left the French Gulch area during the mid-1890s. (Lyden 1948; Wolle 1963; *Mining World* 1904; WPA 1941; Dingman 1932).

In 1898, William R. Allen, who had been working for the Anaconda Company, left that firm's employ and assumed control of his father's mining properties at French Gulch. In conjunction with his acquisition of timber interests in the area, Allen soon consolidated more of the mining placer and lode claims in the district. They encompassed more than 800 acres of land. The Spain and McKinley mines were the cornerstones of what became

the Allen Gold Mining Company (Sections 4, 5, 6, 7, 8, 9, T2N R11W; Section 1 T2N R12W; Sections 27, 29, 30, 31, T3N T11W).

The McKinley and Spain were subsurface mines. The McKinley mine had a shaft of 100 feet, while the larger Spain mine reached 200 feet below the surface. More than 30 men worked either above or below ground at the mines. In addition to the Spain and McKinley lodes, Allen worked a number of placer claims by hydraulic methods. The elevator had a capacity to carry between 500 and 1,000 yards of dirt and was used in areas where the stream gradient was too low to carry the sediments.

In 1900, Allen installed a dredge in the French Gulch District. The "Mildred" was a boat dredge that had buckets for digging stream gravel and conveying it to a screen that separated the gold from the tailings. It was one of the first large dredges to be established in Montana (Newell 1980).

Site 24DL757 is a National Register Eligible (Criterion A; possibly Criteria B and D) historic mining property (Wilmoth 2013) consisting of the placer and dredge tailings as well as a cabin, tent platforms, ditch remnants and other placer mining associated features along French Creek. Highway 43 bisects the site from north to south. Placer mining tails are found in both Moose Creek and French Creek as well as on the adjacent benches. Smaller linear rock piles and excavations observed within the site area and are attributed to the pre-dredge placering operations. The earliest placer mining operations occurred from 1863-1873. Bench placers were removed with hydraulic mining in the later 1870s-1880s. Hydraulic elevators were used in the upper reaches of French Creek to reach bedrock. A floating dredge was used in the early 1900s. Dredge tailings begin at the mouth of Moose creek and run approximately 900 m north to the mouth of French Gulch and surround the other historic features. Exploratory diggings are found on adjacent benches, and in surrounding drainages. Prospecting occurred at least intermittently in French Gulch into the 1930s and even later exploration was conducted. The subject features are considered to be outlying features of the French Gulch Placer Mining Site, 24DL757.

CONCLUSIONS

No definitive historical reference regarding these specific linear gravel features was found. Clearly the washed gravels are associated with placer mining and as such should be considered outlying features of site 24DL757, the French Creek Placers. It is not likely that the subject features are associated with dredging operation, rather they are probably associated with later mechanical excavators, perhaps steam shovel or later mechanized exploration. The linear gravel piles appear to represent exploratory mining for placer gold deposits below the main developed area of the French Creek Placers.

As these features lack specific temporal context and historical association and lie outside of the productive placer claims, these are recommended as non-contributing to the National Register of Historic Places (NRHP) eligibility of site 24DL757. They have been impacted by the construction of the original Secondary State Highway 569 (aka Secondary 274, aka Mill Creek Road). No further work is recommended.

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LOWER FRENCH CREEK WETLAND DELINEATION REPORT

Deer Lodge County, Montana

February 2019

Prepared for:

Pedro Marques

Big Hole Watershed Committee

Prepared by:

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1.0 INTRODUCTION

Morrison-Maierle, Inc. (MMI) was contracted by the Big Hole Watershed Committee (BHWC) to delineate wetlands associated with stream restoration design plans for Lower French Creek in Deer Lodge County, Montana.

Lower French Creek is located in the Mount Haggin Wildlife Management Area (WMA) administered by Montana Fish, Wildlife & Parks (MFWP). French Creek is a perennial tributary to Deep Creek, a tributary to the Big Hole River.

The stream restoration site is located on the Lincoln Gulch, MT 7.5 minute U.S. Geological Survey (USGS) topographic quadrangle. The French Creek restoration area is located in Sections 2, 3, and 10 of Township 2 North, Range 12 West in Deer Lodge County, Montana (Figures 1 & 2).

The stream and wetlands in both the French Creek drainage has been manipulated by past placer mining activities that created large linear cobble/rock piles throughout the floodplains. The placer mine rock piles and past mining activities have influenced regional hydrology.

The BHWC received a 319 grant through the Montana Department of Environmental Quality to partially fund the proposed restoration project. The over-all objectives of the Lower French Creek restoration project include the following:

- Reconstruction of stream channel, floodplain, and valley function;
- Reduce fine sediment delivery to French Creek by relocating a section of stream channel away from an eroding hillslope;
- Creation of wetland depressions within the restoration areas and abandoned Lower French Creek channel;
- Localized stream habitat augmentation at specified locations;
- Smoothing and removal of specified existing mine waste piles to blend with existing topography which will restore floodplain connectivity;
- Design revegetation specifications and a weed control plan for the project.

MMI has prepared design drawings, construction specifications, and revegetation plans for the restoration project. This wetland delineation report supports the stream restoration design as part of the permitting requirement for the Montana Joint Permit Application process.

This report provides a summary of wetland characteristics observed during the September 2018 field investigation at the Lower French Creek investigation area.

2.0 METHODS

A wetland delineation was performed on September 24 and 25, 2018 within the Lower French Creek restoration area. The wetland determination and delineation followed the methods identified in the 1987 Corps of Engineers Wetland Delineation Manual, as well as, the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains,

Valleys, and Coast Region (Version 2.0) (Environmental Laboratory 1987, USACE 2010, respectively).

Upland and wetland data points were established during the field visit. For wetlands and non-wetlands identified, wetland and upland plot data for vegetation, hydrology, and soils were recorded in the field onto Wetland Determination Forms, and are provided in Appendix B. Delineated wetland areas were designated as WL-1-18 during the field efforts. Waterways were similarly mapped, utilizing the existing nomenclature. Sample points were labeled with an S indicating the feature is a sample point rather than a wetland, followed by the feature number the point was associated with (e.g. noted here in bold (S-1-18) correspond to the sample points for that location). The number 18 indicates that this sample point was observed in 2018. Photographs of sample points and wetlands are provided in Appendix B.

The wetland boundaries were mapped using a Trimble resource-grade hand held GPS unit with sub-meter accuracy. Locations were then converted to shapefiles and uploaded into ArcMap 10.5.1. for display on Figures. The wetland delineation mapping was overlaid on aerial photography obtained by drone flight and is included as Figures 3.

2.1 Vegetation

Vegetation at upland and wetland data points was classified based on wetland indicator status. The indicator status of vegetation was derived from the 2016 National Wetland Plant List (Lichvar et al. 2016).

2.2 Hydrology

Primary and secondary hydrologic indicators were assessed at each wetland and upland data point; one primary indicator or two secondary indicators are required to qualify the area as containing wetland hydrology. Examples of primary hydrology indicators are saturation within 12 inches of the ground surface, surface water, and water table within 12 inches of the ground surface. Examples of secondary hydrology indicators are FAC-neutral test and geomorphic position on the landscape.

Primary wetland hydrology indicators were observed throughout all areas identified as wetlands at Lower French Creek during the September 2018 fieldwork. Primary indicators of hydrology included surface water, high water table, saturation, and inundation visible on aerial imagery. Secondary indicators observed included drainage patterns, saturation visible on aerial imagery, and geomorphic position.

Wetland determination data forms were completed for both the wetland and upland paired sampling points and are included as Appendix A.

2.3 Soils

Soil types within the project area were obtained from the Web Soil Survey (NRCS 2018a) and analyzed in the field for texture and color using the Munsell Soil Color Charts (Munsell 2009). Wetlands must meet the qualifications of at least one hydric soil indicator, or meet the definition

of a hydric soil (a soil that formed under conditions of saturation, flooding or ponding long enough during the growing season to develop anaerobic conditions in the upper part [NRCS 2018b]). The NRCS mapped soil type within the project area is Mooseflat-Foxgulf, 0 to 4 percent slopes (414A) (NRCS 2018a) (Appendix D).

2.4 National Wetland Inventory

The U.S. Fish & Wildlife Service's (USFWS) maintains the National Wetland Inventory (NWI), which serves as a publicly available resource that provides detailed information on the abundance, characteristics, and distribution of wetlands. According to the NWI database, a Palustrine Forested/Shrub Seasonally Flooded wetland (PFOC) exists throughout the entire investigation area. Additionally, French Creek and Panama Creek were identified within or near the investigation area (Appendix C).

2.5 Topography

The project is located within the Lincoln Gulch, Montana (date), U.S. Geological Survey (USGS) 7.5 minute Topographic Map. The entire project area is identified as wetlands with French Creek depicted flowing adjacent to a cliff.

3.0 RESULTS

A total of 23.9 acres of wetlands were mapped within the Lower French Creek investigation area during the September 2018 delineation effort. The investigation area of Lower French Creek is primarily dominated by wetland habitat of palustrine scrub-shrub (PSS), with minor inclusions of palustrine emergent (PEM).

3.1 Wetlands

Palustrine scrub-shrub wetland (W-1-18)

One palustrine scrub-shrub wetland was delineated within the investigation area totaling 18.25 acres. The dominant vegetation observed within this area of wetland included Geyer willow (*Salix geyeriana*), Kentucky bluegrass (*Poa pratensis*), Nebraska sedge (*Carex nebrascensis*), and field timothy (*Phleum pratensis*). The dominant Cowardin Classification for this site is scrub-shrub (Cowardin et al. 1979). The hydrophytic vegetation indicators included a positive dominance test and prevalence index within the range indicating the presence of hydrophytic vegetation. The hydric soil indicator is based on observations of a 10YR 3/1 soils layer from 0 to 4 inches and observed redox concentrations (2.5YR4/6) from 4 to 8 inches. The soil was saturated to the surface. The upland/wetland boundary primarily follows topographic changes. The upland pit did not indicate redox concentrations nor was hydrology present.

Palustrine emergent wetland (W-2-18)

One palustrine emergent wetland was delineated within the investigation area totaling 5.65 acres. The dominant vegetation appeared to be a mono-culture of Nebraska sedge (though identification was difficult due to lack of seed head). The dominant Cowardin classification for

this site is emergent (Cowardin et al. 1979). The hydrophytic vegetation indicators include a positive dominance test and prevalence index within the range indicating the presence of hydrophytic vegetation. The soil was saturated to the surface and there was often standing water on the surface. A pit was not dug for the wetland point because it was obviously wet during the dry season (late September). The upland/wetland boundary primarily follows topographic and vegetative changes. The upland inclusions within the larger wetland boundary was identified by a change of vegetation, primarily the presence of common yarrow (*Achillea millefolium*). Additionally, the upland inclusions were primarily 1 to 2 feet higher in elevation than the areas with standing water

Table 1. Delineated Wetlands within the Investigation Area

Wetland name	Acres	HGM Class	Cowardin Class
W-1-18	18.25	Riverine	Palustrine Scrub-shrub
W-2-18	5.65	Riverine	Palustrine Emergent

3.2 Waterways

Approximately 6,635 linear feet of Lower French Creek was delineated within the project area.

Table 2. Delineated Waterways within the Investigation Area

Waterway name	Length	HGM Glass	Hydrology
Lower French Creek	6,635	Riverine	Perennial

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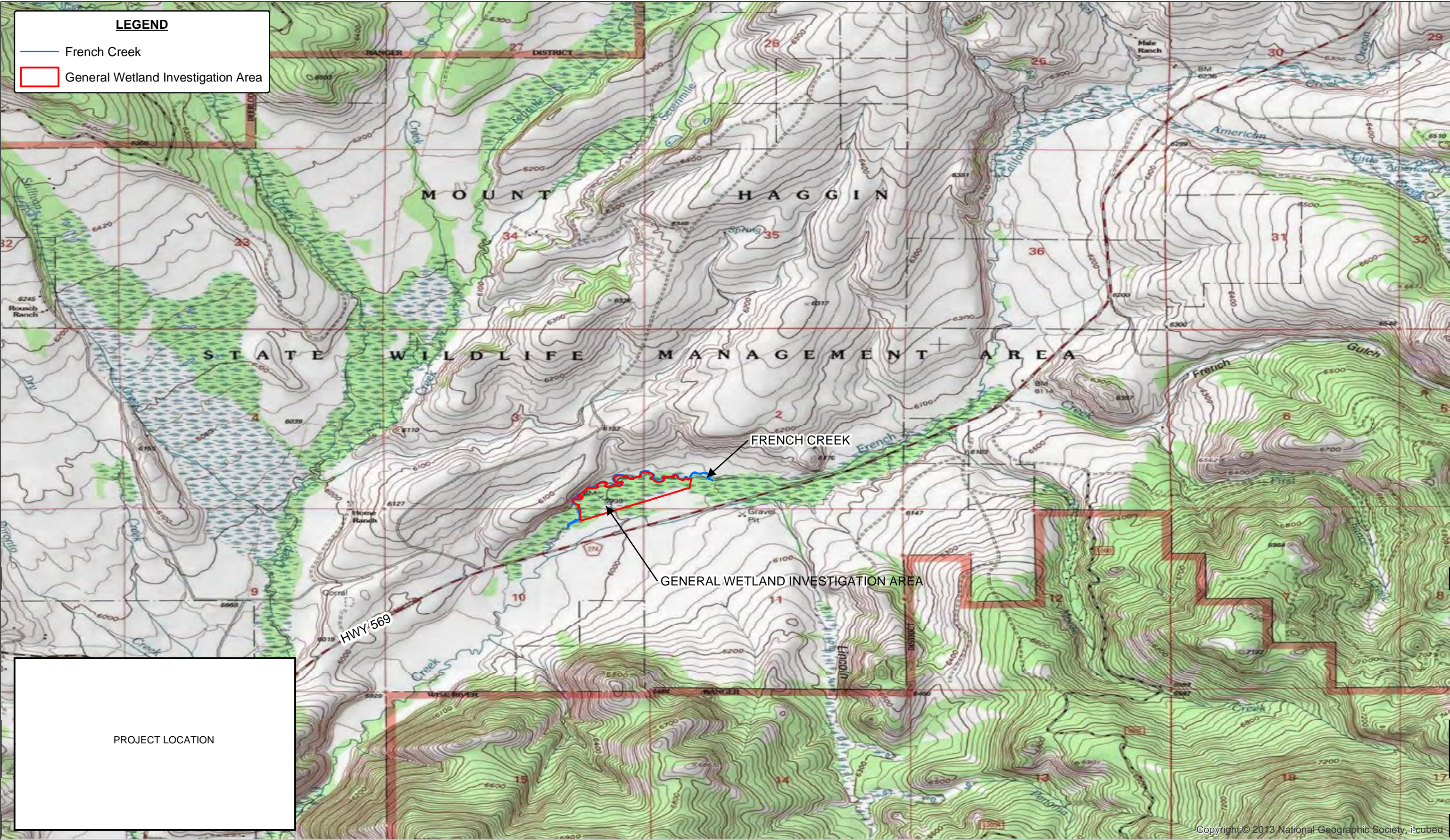
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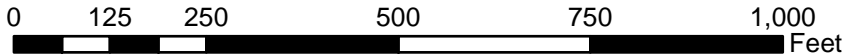
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CHK'D BY: _CAP_
APPR. BY: _CAP_
DATE: 01/24/19

UPPER BIG HOLE	LOWER FRENCH CREEK	MONTANA	PROJECT NUMBER 5406.00401
	VICINITY MAP		FIGURE NUMBER 1

LEGEND

French Creek - Edge of Water

General Wetland Investigation Area



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UPPER BIG HOLE	LOWER FRENCH CREEK	MONTANA
AERIAL MAP		

PROJECT NUMBER 5406.00401
FIGURE NUMBER 2

Appendix A Wetland Determination Data Forms

Morrison-Maierle, Inc.

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

Project Site:	Lower French Creek	City/County:	Deer Lodge	Sampling Date:	9/24/2018
Applicant/Owner:	MFWP	State:	Montana	Sampling Point:	S-1-18(W)
Investigator(s):	Wainright/Pearcy	Section/Range:	Section 2, Township 2 N, Range 12 W	Slope (%):	0 - 2
Landform (hillslope, terrace, etc.):	wet meadow	Local relief (concave, convex, none):	concave	Datum:	NAD83 SP MT
Subregion (LRR or MLRA):	Northern Rocky Mtn Valleys	Lat:	45.94713	Long:	-113.104651
Soil Map Unit Name:	Mooseflat-Foxgulch complex, 0 to 4 percent slopes	NWI classification:	PFOC		
Are climatic/hydrologic conditions on the site typical for this time of year?		Yes	X	No	(If no, explain in Remarks)
Are Vegetation	Soil	Hydrology	x	significantly disturbed?	
Are Vegetation	Soil	Hydrology		naturally problematic? (If needed, explain any answers in Remarks)	
Are "Normal Circumstances" present?		Yes	No	x	

SUMMARY OF FINDINGS- Attach site map showing sampling point locations, transects, important features, ect.

Hydrophytic Vegetation Present?	Yes	x	No		Is the Sample Area within a Wetland?	Yes	x
Hydric Soils Present?	Yes	x	No			No	
Wetland Hydrology Present?	Yes	x	No				
Remarks: Area experienced historic placer mining. Placer piles have influenced hydrology.							

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required: check all that apply)		Secondary Indicators (minimum of two required)	
Surface Water (A1)	Water-Stained Leaves (B9) (except	Water-Stained Leaves (B9) (MLRA 1, 2,	
High Water Table (A2)	MLRA 1, 2, 4A, an d4B)	4A, an d4B)	
x Saturation (A3)	Salt Crust (B11)	Drainage Patterns (B10)	
Water Marks (B1)	Aquatic Invertebrates (B13)	Dry-Season Water Table (C2)	
Sediment Deposits (B2)	Hydrogen Sulfide Odor (C1)	Saturation Visible on Aerial Imagery (C9)	
Drift Deposits (B3)	Oxidized Rhizospheres along Living Roots (C3)	Geomorphic Position (D2)	
Algal Mat or Crust (B4)	Presence of Reduced Iron (C4)	Shallow Aquitard (D3)	
Iron Deposits (B5)	Recent Iron Reduction in Tilled Soils (C6)	FAC-Neutral Test (D5)	
Surface Soil Cracks (B6)	Stunted or Stressed Plants (D1) (LRR A)	Raised Ant Mounds (D6) (LRR A)	
x Inundation Visible on Aerial Imagery (B7)	Other (Explain in Remarks)	Frost-Heave Hummocks (D7) (LRR F)	
Sparsely Vegetated Concave Surface (B8)			

Field Observations:

Surface Water Present?	Yes	x	No	Depth (inches)	0	Wetland Hydrology Present?	Yes	X
Water Table Present?	Yes	x	No	Depth (inches)	4		No	
Saturation Present?	Yes	x	No	Depth (inches)	0			
(includes cappillary fringe)								

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

Remarks:

Tree Stratum (Plot Sizes: 30')		Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test Worksheet:			
1					Number of Dominant Species		3 (A)	
2					That Are OBL, FACW, or FAC:			
3								
4					Total Number of Dominant		3 (B)	
5					Species Across All Strata:			
6								
7					Percent of Dominant Species		100% (A/B)	
		Total Cover	0		That Are OBL, FACW, or FAC:			
Sapling Stratum (30')		Absolute % Cover	Dominant Species?	Indicator Status	Prevalance Index Worksheet:			
1					Total % Cover of:		Multiply by:	
2					OBL species	50	x 1 = 50	
3					FACW species	40	x 2 = 80	
4					FAC species	25	x 3 = 75	
5					FACU species	0	x 4 = 0	
6					UPL species	0	x 5 = 0	
7					Column Totals:	115	(A) (B) 205	
		Total Cover	0		Prevalence Index = B/A = 2			
Shrub Stratum (30')		Absolute % Cover	Dominant Species?	Indicator Status	Hydrophytic Vegetation Indicators:			
1	salix geyeriana	40	YES	FACW	Rapid Test for Hydrophytic Vegetation			
2					X	Dominance Test is >50%		
3					X	Prevalence Index ≤ 3.0 ¹		
4						Morphological Adaptation ¹ (Provide supporting data)		
5						Wetland Non-Vascular Plants ¹		
6						Problematic Hydrophytic Vegetation ¹ (Explain)		
7					¹ Indicators of hydric soil and wetland hydrology must be present.			
		Total Cover	40		Definitions for Four Vegetation Strata:			
Herb Stratum (30')		Absolute % Cover	Dominant Species?	Indicator Status	Tree - Woody plants, excluding vines, 3 inches or more in diameter at breast height (DBH), regardless of height			
1	Poa pratensis	15	YES	FAC				
2	Phleum pratense	10	NO	FAC				
3	carex nebrascensis	50	YES	OBL	Sapling/Shrub - Woody plants, excluding vines less than 3 inch DBH and greater than 1 meter tall.			
4								
5								
6					Herb - All herbaceous (non-woody) plants, regardless of size, and wood plants less than 1 meter tall.			
7								
8								
9								
10					Woody vine - All woody vines greater than 1 meter in height.			
11								
12								
		Total Cover	75					
Woody Vine Stratum (30')		Absolute % Cover	Dominant Species?	Indicator Status	Hydrophytic Vegetation Present?			
1								
2								
3								
4								
5								
		Total Cover	0					

Remarks: Delineation occurred in late September and seed heads were not present on sedges. Best guess of sedge in list.

SOIL

Depth (inches)	Matrix		Redox Fetures		Type ¹	Loc ²	Texture	Remarks
	Color (moist)	%	Color (moist)	%				
0-4	10YR3/1	100					silt loam	
4-8	Glau2.5/10Y	80	2.5YR4/5	20	rm	M	clayey sand	
8+	2.5/10Y	100					sand	

¹Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

²Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

Histosol (A1)

Histic Epipedon (A2)

Black Histic (A3)

Hydrogen Sulfide (A4)

X

Depleted Below Dark Surface (A11)

Thick Dark Surface (A12)

Sandy Mucky Mineral (S1) (LRR O, S)

Sandy Gleyed Matrix (S4)

Sandy Redox (S5)

Stripped Matrix (S6)

Loamy Mucky Mineral (F1) (except MLRA 1)

Loamy Gleyed Matrix (F2)

Depleted Matrix (F3)

Redox Dark Surface (F6)

Depleted Dark Surface (F7)

Redox Depressions (F8)

2 cm Muck (A10)

Red Parent Material (TF2)

Very Shallow Dark Surface (TF12)

Other (Explain in Remarks)

³Indicators of hydrolophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if observed):

Type:

Depth (inches):

Hydric Soil Present?

Yes

X

No

Remarks:

Morrison-Maierle, Inc.

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

Project Site: Lower French Creek City/County: Deer Lodge Sampling Date: 9/24/2018
Applicant/Owner: MFWP State: Montana Sampling Point: S-1-18(U)
Investigator(s): Wainright/Pearcy Section/Range: Section 2, Township 2 N, Range 12 W Slope (%): 0 - 2
Landform (hillslope, terrace, etc.): meadow Local relief (concave, convex, none): convex Datum: NAD83 SP MT
Subregion (LRR or MLRA): Northern Rocky Mtn Valleys Lat: 45.94722 Long: -113.062484
Soil Map Unit Name: Mooseflat-Foxgulch complex, 0 to 4 percent slopes NWI classification: PFOC

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

Are Vegetation Soil Hydrology x significantly disturbed?

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

Are "Normal Circumstances" present? Yes No x

SUMMARY OF FINDINGS- Attach site map showing sampling point locations, transects, important features, ect.

Hydrophytic Vegetation Present?	Yes <u> x </u>	No <u> </u>	Is the Sample Area within a Wetland?	Yes <u> </u>
Hydric Soils Present?	Yes <u> </u>	No <u> x </u>		No <u> </u>
Wetland Hydrology Present?	Yes <u> </u>	No <u> x </u>		No <u> x </u>
Remarks: Area experienced historic placer mining. Placer piles have influenced hydrology.				

HYDROLOGY

Wetland Hydrology Indicators:

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

Secondary Indicators (minimum of two required)

<u> </u> Surface Water (A1)	<u> </u> Water-Stained Leaves (B9) (except	<u> </u> Water-Stained Leaves (B9) (MLRA 1, 2,
<u> </u> High Water Table (A2)	<u> </u> MLRA 1, 2, 4A, and d4B)	<u> </u> 4A, and d4B)
<u> </u> Saturation (A3)	<u> </u> Salt Crust (B11)	<u> </u> Drainage Patterns (B10)
<u> </u> Water Marks (B1)	<u> </u> Aquatic Invertebrates (B13)	<u> </u> Dry-Season Water Table (C2)
<u> </u> Sediment Deposits (B2)	<u> </u> Hydrogen Sulfide Odor (C1)	<u> </u> Saturation Visible on Aerial Imagery (C9)
<u> </u> Drift Deposits (B3)	<u> </u> Oxidized Rhizospheres along Living Roots (C3)	<u> </u> Geomorphic Position (D2)
<u> </u> Algal Mat or Crust (B4)	<u> </u> Presence of Reduced Iron (C4)	<u> </u> Shallow Aquitard (D3)
<u> </u> Iron Deposits (B5)	<u> </u> Recent Iron Reduction in Tilled Soils (C6)	<u> </u> FAC-Neutral Test (D5)
<u> </u> Surface Soil Cracks (B6)	<u> </u> Stunted or Stressed Plants (D1) (LRR A)	<u> </u> Raised Ant Mounds (D6) (LRR A)
<u> </u> Inundation Visible on Aerial Imagery (B7)	<u> </u> Other (Explain in Remarks)	<u> </u> Frost-Heave Hummocks (D7) (LRR F)
<u> </u> Sparsely Vegetated Concave Surface (B8)		

Field Observations:

Surface Water Present?	Yes <u> </u>	No <u>x</u>	Depth (inches) <u> </u>	Wetland Hydrology Present?
Water Table Present?	Yes <u> </u>	No <u>x</u>	Depth (inches) <u> </u>	
Saturation Present?	Yes <u> </u>	No <u>x</u>	Depth (inches) <u> </u>	
(includes cappillary fringe)				Yes <u> </u>
				No <u>X</u>

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

Remarks: sample point on what appears to be an old roadbed

Vegetation- Use scientific names of plants

Montana S-1-18(U)

Tree Stratum (Plot Sizes: 30')		Absolute % Cover	Dominant Species?	Indicator Status				
1					Dominance Test Worksheet: Number of Dominant Species 3 (A) That Are OBL, FACW, or FAC: Total Number of Dominant Species Across All Strata: 3 (B) Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)			
2								
3								
4								
5								
6								
7								
Total Cover		0						
Sapling Stratum (30')		Absolute % Cover	Dominant Species?	Indicator Status				
1					Prevalance Index Worksheet: Total % Cover of: OBL species 40 x 1 = 40 FACW species 0 x 2 = 0 FAC species 60 x 3 = 180 FACU species 0 x 4 = 0 UPL species 0 x 5 = 0 Column Totals: 100 (A) (B) 220 Prevalence Index = B/A = 2			
2								
3								
4								
5								
6								
7								
Total Cover		0						
Shrub Stratum (30')		Absolute % Cover	Dominant Species?	Indicator Status				
1					Hydrophytic Vegetation Indicators: Rapid Test for Hydrophytic Vegetation Dominance Test is >50% X Prevalence Index $\leq 3.0^1$ Morphological Adaptation ¹ (Provide supporting data) Wetland Non-Vascular Plants ¹ Problematic Hydrophytic Vegetation ¹ (Explain) Indicators of hydric soil and wetland hydrology must be present.			
2								
3								
4								
5								
6								
7								
Total Cover		0						
Herb Stratum (30')		Absolute % Cover	Dominant Species?	Indicator Status				
1	Poa pratensis	40	YES	FAC	Definitions for Four Vegetation Strata: Tree - Woody plants, excluding vines, 3 inches or more in diameter at breast height (DBH), regardless of height Sapling/Shrub - Woody plants, excluding vines less than 3 inch DBH and greater than 1 meter tall. Herb - All herbaceous (non-woody) plants, regardless of size, and wood plants less than 1 meter tall. Woody vine - All woody vines greater than 1 meter in height.			
2	Phleum pratense	20	YES	FAC				
3	carex nebrascensis	40	YES	OBL				
4								
5								
6								
7								
8								
9								
10								
11								
12								
Total Cover		100						
Woody Vine Stratum (30')		Absolute % Cover	Dominant Species?	Indicator Status				
1					<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 5px; text-align: center;">X YES</div> <div style="border: 1px solid black; padding: 5px; text-align: center;">NO</div> </div>			
2								
3								
4								
5								
Total Cover		0						

Remarks: Delineation occurred in late September and seed heads were not present on sedges. Best guess of sedge in list.

SOIL

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

Montana S-1-18(U)

Depth (inches)	Matrix		Redox Fetures		Type ¹	Loc ²	Texture	Remarks
	Color (moist)	%	Color (moist)	%				
0-3	10 YR 4/2	100					silt loam	
3+							packed gravel	road bed/placer pile?

¹Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

²Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

Indicators for Problematic Hydric Soils³:

<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> 2 cm Muck (A10)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> Red Parent Material (TF2)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Loamy Mucky Mineral (F1) (except MLRA 1)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Matrix (F3)	
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Dark Surface (F6)	
<input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR O, S)	<input type="checkbox"/> Depleted Dark Surface (F7)	
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Redox Depressions (F8)	

³Indicators of hydrolophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if observed):

Type:
Depth (inches):

Hydric Soil Present?

Yes ☐ No ☒

Remarks: Hydric soil indicators were not observed at this location.

Morrison-Maierle, Inc.

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

Project Site: Lower French Creek City/County: Deer Lodge Sampling Date: 9/24/2018
Applicant/Owner: MFWP State: Montana Sampling Point: S-2-18(U)
Investigator(s): Wainright/Pearcy Section/Range: Section 2, Township 2 N, Range 12 W Slope (%): 0 - 2
Landform (hillslope, terrace, etc.): meadow Local relief (concave, convex, none): convex Datum: NAD83 SP MT
Subregion (LRR or MLRA): Northern Rocky Mtn Valleys Lat: 45.946 Long: -113.065484
Soil Map Unit Name: Mooseflat-Foxgulf complex, 0 to 4 percent slopes NWI classification: PFOC

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

Are Vegetation Soil Hydrology x significantly disturbed?

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

Are "Normal Circumstances" present? Yes No x

SUMMARY OF FINDINGS- Attach site map showing sampling point locations, transects, important features, ect.

Hydrophytic Vegetation Present?	Yes <u>x</u>	No <u> </u>	Is the Sample Area within a Wetland?	Yes <u> </u>
Hydric Soils Present?	Yes <u> </u>	No <u>x</u>		No <u> </u>
Wetland Hydrology Present?	Yes <u> </u>	No <u>x</u>		No <u>x</u>

Remarks: Area experienced historic placer mining. Placer piles have influenced hydrology.

HYDROLOGY

Wetland Hydrology Indicators:

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

Secondary Indicators (minimum of two required)

<u> </u> Surface Water (A1)	<u> </u> Water-Stained Leaves (B9) (except	<u> </u> Water-Stained Leaves (B9) (MLRA 1, 2,
<u> </u> High Water Table (A2)	<u> </u> MLRA 1, 2, 4A, an d4B)	<u> </u> 4A, an d4B)
<u> </u> Saturation (A3)	<u> </u> Salt Crust (B11)	<u> </u> Drainage Patterns (B10)
<u> </u> Water Marks (B1)	<u> </u> Aquatic Invertebrates (B13)	<u> </u> Dry-Season Water Table (C2)
<u> </u> Sediment Deposits (B2)	<u> </u> Hydrogen Sulfide Odor (C1)	<u> </u> Saturation Visible on Aerial Imagery (C9)
<u> </u> Drift Deposits (B3)	<u> </u> Oxidized Rhizospheres along Living Roots (C3)	<u> </u> Geomorphic Position (D2)
<u> </u> Algal Mat or Crust (B4)	<u> </u> Presence of Reduced Iron (C4)	<u> </u> Shallow Aquitard (D3)
<u> </u> Iron Deposits (B5)	<u> </u> Recent Iron Reduction in Tilled Soils (C6)	<u> </u> FAC-Neutral Test (D5)
<u> </u> Surface Soil Cracks (B6)	<u> </u> Stunted or Stressed Plants (D1) (LRR A)	<u> </u> Raised Ant Mounds (D6) (LRR A)
<u> </u> Inundation Visible on Aerial Imagery (B7)	<u> </u> Other (Explain in Remarks)	<u> </u> Frost-Heave Hummocks (D7) (LRR F)
<u> </u> Sparsely Vegetated Concave Surface (B8)		

Field Observations:

Surface Water Present?	Yes <u> </u>	No <u>x</u>	Depth (inches) <u> </u>	Wetland Hydrology Present?
Water Table Present?	Yes <u> </u>	No <u>x</u>	Depth (inches) <u> </u>	
Saturation Present?	Yes <u> </u>	No <u>x</u>	Depth (inches) <u> </u>	
(includes cappillary fringe)				Yes <u> </u>
				No <u>X</u>

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

Remarks: area appears to be an upland inclusion amidst a larger wet-meadow. The upland inclusion mapped here is approximately 1 to 2 feet higher than surrounding topography. Also noted, a change in vegetation.

Vegetation- Use scientific names of plants

Montana S-2-18(U)

Tree Stratum (Plot Sizes: 30')		Absolute % Cover	Dominant Species?	Indicator Status				
1					Dominance Test Worksheet: Number of Dominant Species 2 (A) That Are OBL, FACW, or FAC: Total Number of Dominant Species Across All Strata: 3 (B) Percent of Dominant Species That Are OBL, FACW, or FAC: 67% (A/B)			
2								
3								
4								
5								
6								
7								
Total Cover		0						
Sapling Stratum (30')		Absolute % Cover	Dominant Species?	Indicator Status				
1					Prevalance Index Worksheet: Total % Cover of: OBL species 0 x 1 = 0 FACW species 50 x 2 = 100 FAC species 20 x 3 = 60 FACU species 30 x 4 = 120 UPL species 0 x 5 = 0 Column Totals: 100 (A) (B) 280 Prevalence Index = B/A = 3			
2								
3								
4								
5								
6								
7								
Total Cover		0						
Shrub Stratum (30')		Absolute % Cover	Dominant Species?	Indicator Status				
1					Hydrophytic Vegetation Indicators: Rapid Test for Hydrophytic Vegetation Dominance Test is >50% X Prevalence Index $\leq 3.0^1$ Morphological Adaptation ¹ (Provide supporting data) Wetland Non-Vascular Plants ¹ Problematic Hydrophytic Vegetation ¹ (Explain) Indicators of hydric soil and wetland hydrology must be present.			
2								
3								
4								
5								
6								
7								
Total Cover		0						
Herb Stratum (30')		Absolute % Cover	Dominant Species?	Indicator Status				
1	Achillea millefolium	30	YES	FACU	Definitions for Four Vegetation Strata: Tree - Woody plants, excluding vines, 3 inches or more in diameter at breast height (DBH), regardless of height Sapling/Shrub - Woody plants, excluding vines less than 3 inch DBH and greater than 1 meter tall. Herb - All herbaceous (non-woody) plants, regardless of size, and wood plants less than 1 meter tall. Woody vine - All woody vines greater than 1 meter in height.			
2	Elymus trachycaulus	20	YES	FAC				
3	juncus balticus	50	YES	FACW				
4								
5								
6								
7								
8								
9								
10								
11								
12								
Total Cover		100						
Woody Vine Stratum (30')		Absolute % Cover	Dominant Species?	Indicator Status				
1					Hydrophytic Vegetation Present? <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 5px; text-align: center;">X YES</div> <div style="border: 1px solid black; padding: 5px; text-align: center;">NO</div> </div>			
2								
3								
4								
5								
Total Cover		0						

Remarks: Delineation occurred in late September and seed heads were not present on sedges and grasses.

SOIL

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

Montana S-2-18(U)

Depth (inches)	Matrix		Redox Fetures		Type ¹	Loc ²	Texture	Remarks
	Color (moist)	%	Color (moist)	%				
0-14	10 YR 2/1	100					loam	
14+	10 YR 2/1	80	10YR5/2	20				

¹Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

²Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

Indicators for Problematic Hydric Soils³:

<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> 2 cm Muck (A10)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> Red Parent Material (TF2)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Loamy Mucky Mineral (F1) (except MLRA 1)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Matrix (F3)	
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Dark Surface (F6)	
<input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR O, S)	<input type="checkbox"/> Depleted Dark Surface (F7)	
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Redox Depressions (F8)	

³Indicators of hydrolophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if observed):

Type:
Depth (inches):

Hydric Soil Present?

Yes ☐ No ☒

Remarks: Hydric soil indicators were not observed at this location.

Appendix B Photographs

Lower French Creek Delineation
Photo dates: September 24 and 25, 2018



Photo 1: View of varied landscapes and proximity of wetland/upland boundary



Photo 2: View of surrounding cliffs eroding into French Creek

Lower French Creek Delineation
Photo dates: September 24 and 25, 2018



Photo 3: Wetland W-1-18 sample pit



Photo 4: Wetland W-1-18 soils

Lower French Creek Delineation
Photo dates: September 24 and 25, 2018



Photo 5: Upland S-1-18 (believed to be historic roadbed)



Photo 6: Upland S-2-18. An upland inclusion in an otherwise large emergent wetland.

Lower French Creek Delineation
Photo dates: September 24 and 25, 2018



Photo 7: Wetland, sage brush, then willow riparian area along French Creek. Varied habitat in close proximity.

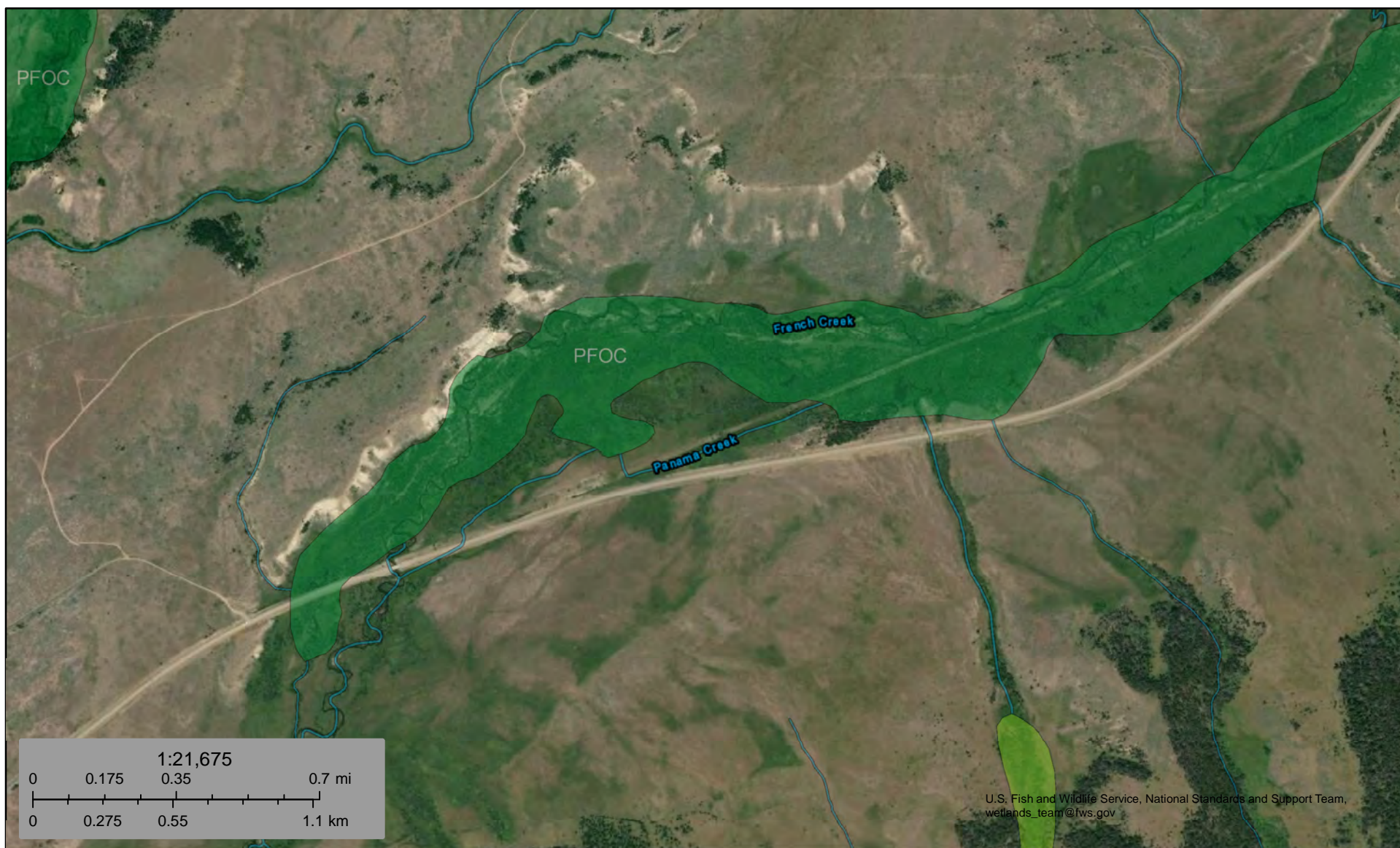
Appendix C National Wetland Inventory Map



U.S. Fish and Wildlife Service

National Wetlands Inventory

Lower French Creek



January 17, 2019

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland

- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond

- Lake
- Other
- Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

Appendix D Soil Survey Map



United States
Department of
Agriculture

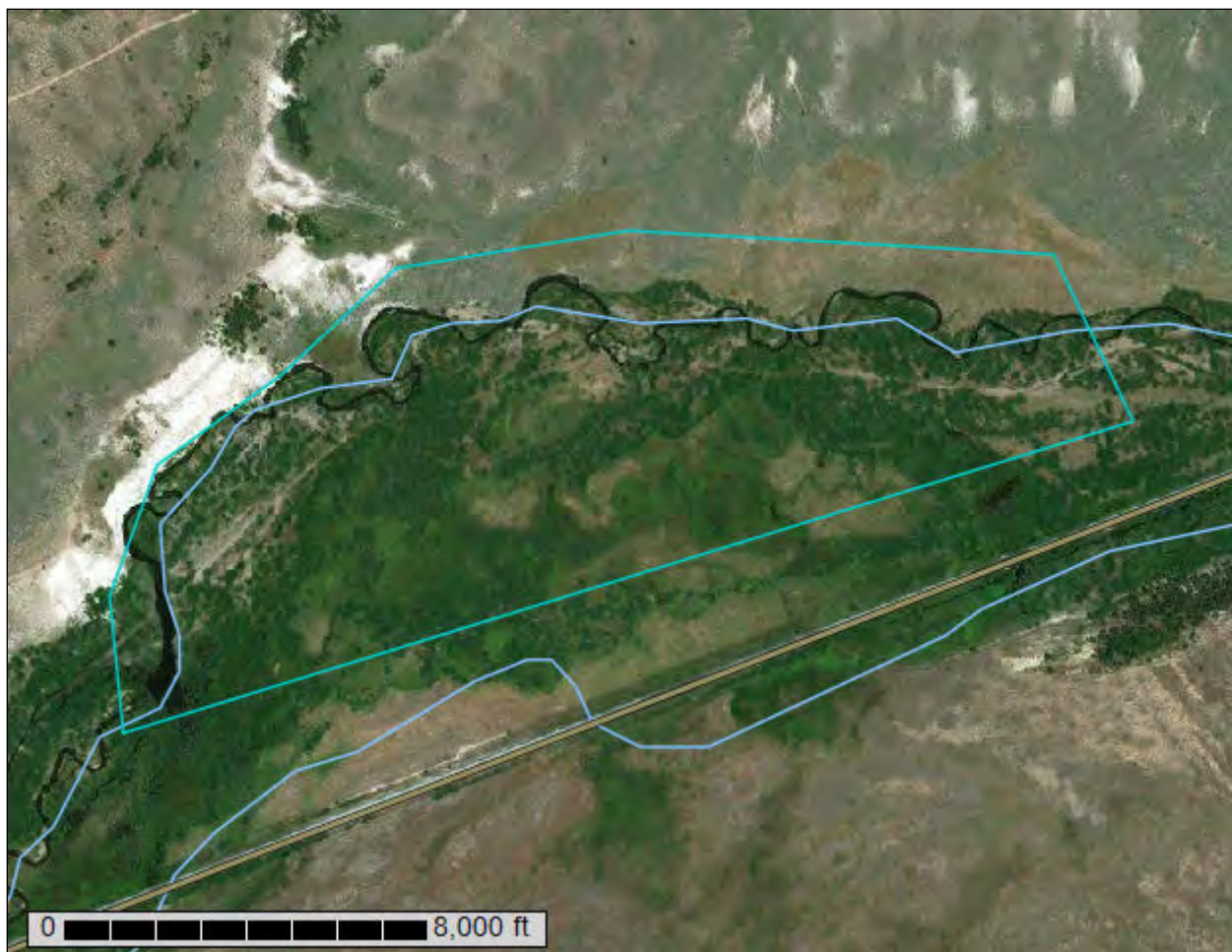
NRCS

Natural
Resources
Conservation
Service

A product of the National
Cooperative Soil Survey,
a joint effort of the United
States Department of
Agriculture and other
Federal agencies, State
agencies including the
Agricultural Experiment
Stations, and local
participants

Custom Soil Resource Report for **Deer Lodge County Area, Montana**

Lower French Creek Restoration Area



January 17, 2019

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<https://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

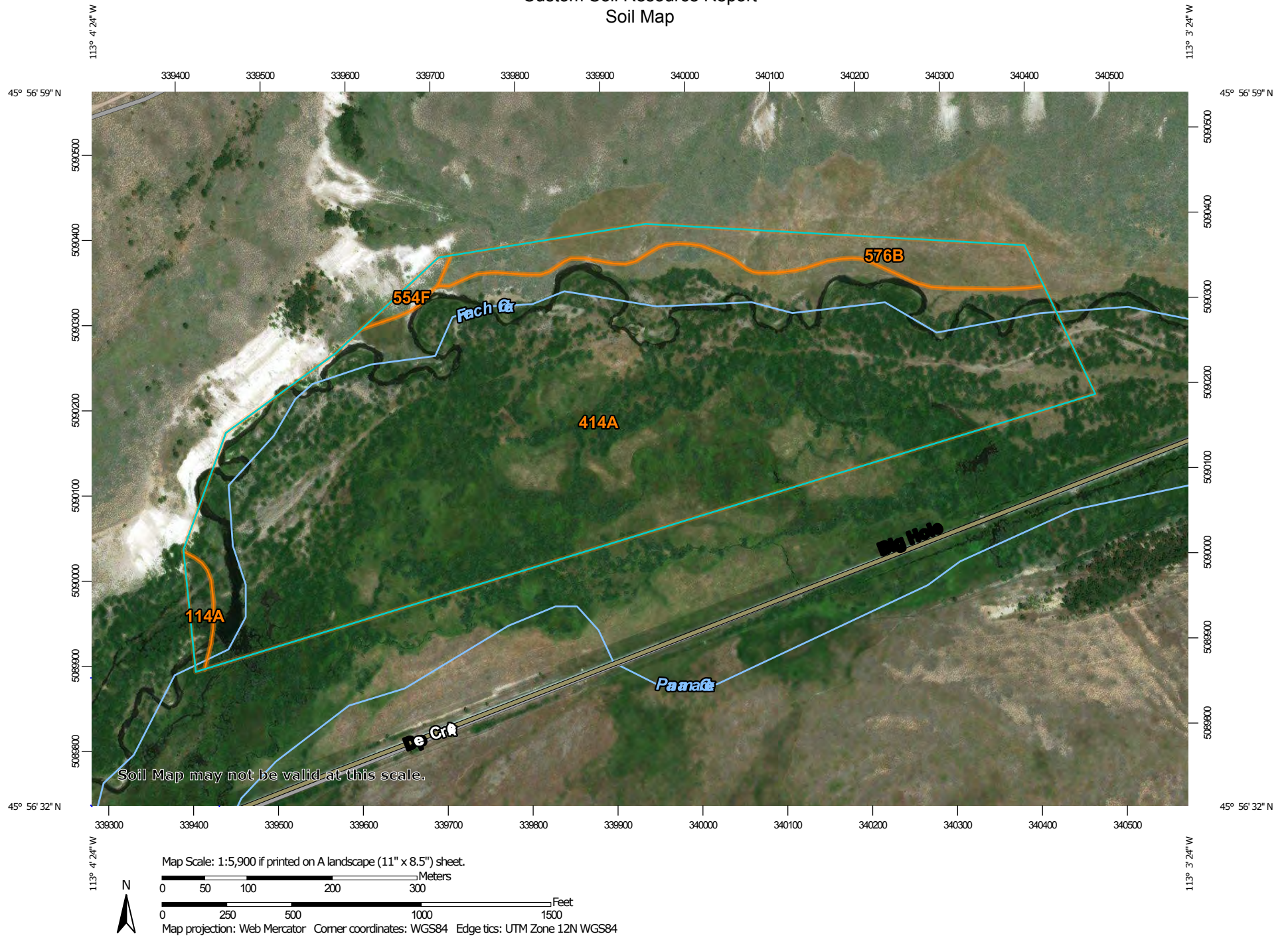
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identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report Soil Map




MAP LEGEND


Area of Interest (AOI)

 Area of Interest (AOI)

Soils


 Soil Map Unit Polygons


 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features

 Blowout

 Borrow Pit


 Clay Spot

 Closed Depression

 Gravel Pit

 Gravelly Spot


 Landfill

 Lava Flow

 Marsh or swamp

 Mine or Quarry

 Miscellaneous Water


 Perennial Water

 Rock Outcrop

 Saline Spot

 Sandy Spot

 Severely Eroded Spot


 Sinkhole


 Slide or Slip

 Sodic Spot

 Spoil Area

 Stony Spot

 Very Stony Spot

 Wet Spot

 Other

 Special Line Features

Water Features

 Streams and Canals


Transportation

 Rails


 Interstate Highways

 US Routes

 Major Roads

 Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Deer Lodge County Area, Montana
Survey Area Data: Version 16, Sep 5, 2018

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 24, 2013—Sep 25, 2016

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
114A	Mooseflat loam, 0 to 2 percent slopes	0.8	1.0%
414A	Mooseflat-Foxgulch complex, 0 to 4 percent slopes	71.0	89.9%
554F	Redchief-Macabre-Libeg complex, 35 to 60 percent slopes	0.6	0.7%
576B	Finn gravelly loam, dry, 0 to 4 percent slopes	6.6	8.4%
Totals for Area of Interest		79.0	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

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The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Deer Lodge County Area, Montana

114A—Mooseflat loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 55tp
Elevation: 5,700 to 6,260 feet
Mean annual precipitation: 15 to 22 inches
Mean annual air temperature: 34 to 39 degrees F
Frost-free period: 30 to 70 days
Farmland classification: Not prime farmland

Map Unit Composition

Mooseflat, rarely flooded, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Mooseflat, Rarely Flooded

Setting

Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy alluvium over sandy and gravelly alluvium

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 11 inches: loam
Bw - 11 to 23 inches: loam
2C - 23 to 60 inches: very cobbly sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: Rare
Frequency of ponding: None
Available water storage in profile: Low (about 4.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: B/D
Ecological site: Wet Meadow (WM) LRU 43B-Y (R043BY181MT), Bottomland (R043BP801MT)
Hydric soil rating: Yes

Minor Components

Foolhen, occasionally ponded

Percent of map unit: 5 percent
Landform: Flood plains
Down-slope shape: Linear

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Across-slope shape: Linear
Ecological site: Wet Meadow (WM) LRU 43B-Y (R043BY181MT)
Hydric soil rating: Yes

Dunkleber, rarely flooded

Percent of map unit: 5 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Wet Meadow (WM) LRU 43B-Y (R043BY181MT)
Hydric soil rating: Yes

Mooseflat

Percent of map unit: 5 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Wet Meadow (WM) LRU 43B-Y (R043BY181MT)
Hydric soil rating: Yes

414A—Mooseflat-Foxgulch complex, 0 to 4 percent slopes

Map Unit Setting

National map unit symbol: 1tzdc
Elevation: 5,580 to 6,920 feet
Mean annual precipitation: 14 to 19 inches
Mean annual air temperature: 35 to 40 degrees F
Frost-free period: 30 to 70 days
Farmland classification: Not prime farmland

Map Unit Composition

Mooseflat, rarely flooded, and similar soils: 60 percent
Foxgulch and similar soils: 25 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Mooseflat, Rarely Flooded

Setting

Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material
A - 2 to 12 inches: loam
Bg - 12 to 18 inches: sandy loam
BCg - 18 to 26 inches: very gravelly loamy sand
2Cg - 26 to 60 inches: very cobbly loamy coarse sand

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Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: Rare
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline (0.0 to 1.0 mmhos/cm)
Available water storage in profile: Low (about 4.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: B/D
Ecological site: Wet Meadow (WM) LRU 44B-Y (R044BY181MT), Bottomland (R043BP801MT)
Hydric soil rating: Yes

Description of Foxgulch

Setting

Landform: Flood-plain steps
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
A - 1 to 12 inches: loam
Bw - 12 to 30 inches: loam
BC - 30 to 46 inches: sandy clay loam
2C - 46 to 60 inches: very gravelly coarse sand

Properties and qualities

Slope: 1 to 4 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: About 24 to 40 inches
Frequency of flooding: Very rare
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline (0.0 to 1.0 mmhos/cm)
Available water storage in profile: Moderate (about 8.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6w
Hydrologic Soil Group: C
Ecological site: Subirrigated (Sb) LRU 44B-Y (R044BY150MT), Subirrigated Grassland (R043BP815MT)
Hydric soil rating: Yes

Minor Components

Kilgore, rarely flooded

Percent of map unit: 10 percent

Landform: Flood plains

Down-slope shape: Linear

Across-slope shape: Concave

Ecological site: Riparian Meadow (RM) LRU 44B-Y (R044BY080MT)

Hydric soil rating: Yes

Water

Percent of map unit: 5 percent

554F—Redchief-Macabre-Libeg complex, 35 to 60 percent slopes

Map Unit Setting

National map unit symbol: 566t

Elevation: 5,900 to 6,300 feet

Mean annual precipitation: 15 to 22 inches

Mean annual air temperature: 34 to 43 degrees F

Frost-free period: 30 to 90 days

Farmland classification: Not prime farmland

Map Unit Composition

Macabre and similar soils: 30 percent

Redchief and similar soils: 30 percent

Libeg and similar soils: 25 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Redchief

Setting

Landform: Mountains, hills

Landform position (two-dimensional): Footslope, backslope

Landform position (three-dimensional): Mountainbase

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Gravelly clayey colluvium derived from igneous rock

Typical profile

A - 0 to 6 inches: cobbly loam

Bt - 6 to 10 inches: very gravelly clay

C - 10 to 60 inches: very gravelly clay

Properties and qualities

Slope: 35 to 60 percent

Depth to restrictive feature: More than 80 inches

Natural drainage class: Well drained

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Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water storage in profile: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7e

Hydrologic Soil Group: C

Ecological site: Silty (Si) 20"+ p.z. (R043XW152MT), Upland Sagebrush

Shrubland (R043BP819MT)

Hydric soil rating: No

Description of Macabre

Setting

Landform: Hills, mountains, ridges

Landform position (three-dimensional): Mountaintop, nose slope

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Gravelly colluvium and/or residuum weathered from rhyolite and/or welded tuff

Typical profile

A - 0 to 7 inches: gravelly ashy loam

Bt - 7 to 17 inches: very gravelly ashy sandy clay loam

BC - 17 to 27 inches: very gravelly ashy sandy clay loam

Cr - 27 to 41 inches: weathered bedrock

R - 41 to 60 inches: unweathered bedrock

Properties and qualities

Slope: 35 to 60 percent

Depth to restrictive feature: 20 to 60 inches to lithic bedrock

Natural drainage class: Well drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 1.98 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water storage in profile: Very low (about 2.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7e

Hydrologic Soil Group: B

Ecological site: Silty (Si) 20"+ p.z. (R043XW152MT), Upland Sagebrush

Shrubland (R043BP819MT)

Hydric soil rating: No

Description of Libeg

Setting

Landform: Alluvial fans, hills, terraces

Landform position (three-dimensional): Side slope, riser

Down-slope shape: Linear

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Across-slope shape: Linear
Parent material: Gravelly colluvium

Typical profile

A - 0 to 14 inches: cobbly loam
Bt - 14 to 60 inches: very channery clay loam

Properties and qualities

Slope: 35 to 60 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 5.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B
Ecological site: Silty (Si) 20"+ p.z. (R043XW152MT), Upland Sagebrush Shrubland (R043BP819MT)
Hydric soil rating: No

Minor Components

Mollet

Percent of map unit: 8 percent
Landform: Terraces, fans, mountains
Landform position (three-dimensional): Mountainbase
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Silty (Si) 20"+ p.z. (R043XW152MT)
Hydric soil rating: No

Monad

Percent of map unit: 7 percent
Landform: Stream terraces
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Silty (Si) 20"+ p.z. (R043XW152MT)
Hydric soil rating: No

576B—Finn gravelly loam, dry, 0 to 4 percent slopes

Map Unit Setting

National map unit symbol: 5671

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Elevation: 6,300 to 6,400 feet
Mean annual precipitation: 15 to 22 inches
Mean annual air temperature: 34 to 45 degrees F
Frost-free period: 30 to 70 days
Farmland classification: Not prime farmland

Map Unit Composition

Finn and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Finn

Setting

Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Gravelly alluvium

Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material
A - 2 to 12 inches: gravelly loam
Bw1 - 12 to 18 inches: very gravelly loam
2Bw2 - 18 to 24 inches: very gravelly sandy clay loam
2C - 24 to 60 inches: very gravelly sandy clay loam

Properties and qualities

Slope: 0 to 4 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 1.98 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: Occasional
Calcium carbonate, maximum in profile: 5 percent
Available water storage in profile: Low (about 6.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: B/D
Ecological site: Wet Meadow (WM) 15-19" p.z. (R043XW283MT), Subirrigated Sagebrush Shrubland (R043BP816MT)
Hydric soil rating: Yes

Minor Components

Adel

Percent of map unit: 5 percent
Landform: Drainageways on alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Silty (Si) 15-19" p.z. (R043XW277MT)
Hydric soil rating: No

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Monad

Percent of map unit: 5 percent

Landform: Stream terraces

Down-slope shape: Linear

Across-slope shape: Linear

Ecological site: Silty (Si) 15-19" p.z. (R043XW277MT)

Hydric soil rating: No

Mooseflat

Percent of map unit: 5 percent

Landform: Flood plains

Down-slope shape: Linear

Across-slope shape: Linear

Ecological site: Wet Meadow (WM) 15-19" p.z. (R043XW283MT)

Hydric soil rating: Yes

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Montana Fish, Wildlife & Parks

*Region Three
1400 South 19th
Bozeman, MT 59718*

June 13, 2016

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Environmental Quality Council, State Capitol, Room 106, P.O. Box 201704, Helena, MT 59620-1704
Dept. of Environmental Quality, Metcalf Building, P.O. Box 200901, Helena, MT 59620-0901
Dept. of Natural Resources & Conservation, P.O. Box 201601, Helena, MT 59620-1601
Montana Fish, Wildlife & Parks:

Director's Office	Parks Division	Lands Section	FWP Commissioners
Fisheries Division	Legal Unit	Wildlife Division	Design & Construction

MT Historical Society, State Historic Preservation Office, P.O. Box 201202, Helena, MT 59620-1202
MT State Parks Association, P.O. Box 699, Billings, MT 59103
MT State Library, 1515 E. Sixth Ave., P.O. Box 201800, Helena, MT 59620
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Janet Ellis, Montana Audubon Council, P.O. Box 595, Helena, MT 59624
George Ochenski, P.O. Box 689, Helena, MT 59624
Jerry DiMarco, P.O. Box 1571, Bozeman, MT 59771
Montana Wildlife Federation, P.O. Box 1175, Helena, MT 59624
Wayne Hurst, P.O. Box 728, Libby, MT 59923
Jack Jones, 3014 Irene St., Butte, MT 59701
Jack Atcheson, 2309 Hancock Avenue, Butte MT 59701
U.S. Army Corp of Engineers, Helena
U.S. Fish and Wildlife Service, Helena
U.S. Fish and Wildlife Service, 420 Barrett Street, Dillon, MT 59725
Big Hole Watershed Committee, P.O. Box 931, Butte, MT 59703
Montana Trout Unlimited, P.O. Box 7186, Missoula, MT 59807
Dan Vermillion, FWP Commissioner, Livingston MT
Earnest and Colleen Bacon, 2215 Fishtrap Creek Road, Wisdom, MT 59761
Dept. of Natural Resources and Conservation, 730 N. Montana Street, Dillon, MT 59725-9424
George Grant Chapter of Trout Unlimited, P.O. Box 563, Butte, MT 59703
Skyline Sportsmen, P.O. Box 173, Butte, MT 59703
Anaconda Sportsmen, 2 Cherry, Anaconda, MT 59711
E.T. Bud Moran, Chairman CSKT, PO Box 278, Pablo, MT 59855
Al Lubeck, 2710 Amherst, Ave, Butte, MT 59701
Adam Rissien, ORV Coordinator, Wildands CPR, PO Box 7516, Missoula, MT 59807
Josiah Pinkham, Tribal Arch., Nez Perce Tribe, PO Box 365, Lapwai, ID 83540
John and Sandy Gordon, Juniper Acres Rd, Butte, MT, 59750
Phil Ralston, 54289 MT Highway 43, Wise River, MT 59762
Martin White, 3308 46th Ave. SE, Mandan ND, 58554-4730
Jerry Lussie, 305 Main Street, Anaconda, MT 59711
Jim Schmeller, Montana Living Trust, 4935 Everett Rd, Akron, OH 44333
Kieth and Jean Rankin, P.O. Box 28, Anaconda, MT 59711
Richard Seddon, 2017 Harrison Ave# 237, Butte, MT 59701
Haddox Ventures LLC, 9141 Briar Forest Dr., Huston, TX 77024

Ladies and Gentlemen:

Montana Fish Wildlife & Parks (FWP) is proposing to restore habitat and native aquatic species to the French Creek watershed in the Big Hole River drainage. The habitat restoration component of the project would consist of reclaiming areas in the upper watershed impacted by atmospheric deposition of harmful substances from the Anaconda Smelter.

This restoration work would focus on establishing vegetation on unvegetated slopes of Sugarloaf Mountain and the creation of sediment retaining structures to reduce copper and arsenic laden sediments from reaching California Creek. Habitat would also be restored in placer mined reaches of French Creek, French Gulch Oregon Creek and Moose Creek. The goal of this restoration would be to restore stream function, a floodplain and fish passage in mined reaches of the streams. Pasture fences and water development would be created to improve grazing management.

Native fish species restoration is being proposed as part of the overall watershed restoration. Native fish restoration would consist of the construction of a fish migration barrier on French Creek near the downstream boundary of the Mount Haggin Wildlife Management Area (WMA). This fish barrier would consist of an earthen dam with a concrete spillway that forms a small waterfall and precludes upstream fish passage. Upstream of the fish barrier there are more than 40 miles of stream that currently contain fish. Once the fish barrier is in place non-native trout (brook trout and rainbow trout) would be removed from the stream using the piscicide rotenone in the formulation of CFT Legumine (5% rotenone). Once non-native fish are removed, native westslope cutthroat trout (WCT) and Arctic grayling would be stocked into the stream.

A total of 2 written comments were received.

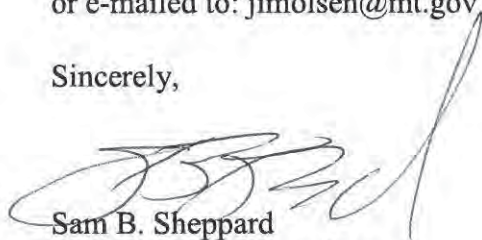
It is my decision to proceed with the proposed restoration actions in the French Creek watershed.

Questions regarding these Decision Notices should be mailed to:

Montana Fish, Wildlife & Parks
French Creek Restoration
Attn: Jim Olsen
1820 Meadowlark Ln.
Butte, MT 59701

or e-mailed to: jimolsen@mt.gov

Sincerely,



Sam B. Sheppard
Region Three Supervisor

c: Travis Horton

Environmental Assessment for Watershed Restoration in French Creek, Big Hole River Drainage

ENVIRONMENTAL ASSESSMENT DECISION NOTICE

**Montana Fish, Wildlife & Parks
Region Three, Bozeman
June 14, 2016**

Proposed Action

Montana Fish, Wildlife & Parks is proposing to restore habitat and native aquatic species to the French Creek watershed in the Big Hole River drainage. The habitat restoration component of the project would consist of reclaiming areas in the upper watershed impacted by atmospheric deposition of harmful substances from the Anaconda Smelter. This restoration work would focus on establishing vegetation on unvegetated slopes of Sugarloaf Mountain and the creation of sediment retaining structures to reduce copper and arsenic laden sediments from reaching California Creek. Habitat would also be restored in placer mined reaches of French Creek, French Gulch, Oregon Creek and Moose Creek. The goal of this restoration would be to restore stream function, a floodplain and fish passage in mined reaches of the streams. Pasture fences would be relocated to reduce livestock impacts to the riparian area and stream channel. Native fish species restoration is being proposed as part of the overall watershed restoration. Native fish restoration would consist of the construction of a fish migration barrier on French Creek near the downstream boundary of the Mount Haggin Wildlife Management Area (WMA). This fish barrier would consist of an earthen dam with a concrete spillway that forms a small waterfall and precludes upstream fish passage. Upstream of the fish barrier there are more than 40 miles of stream that currently contain fish. Once the fish barrier is in place non-native trout (brook trout and rainbow trout) would be removed from the stream using the piscicide rotenone in the formulation of CFT Legumine (5% rotenone). Once non-native fish are removed, native westslope cutthroat trout (WCT) and Arctic grayling would be stocked into the stream.

Montana Fish, Wildlife & Parks is required by the Montana Environmental Policy Act (MEPA) to assess significant potential impacts of a proposed action to the human and physical environment. In compliance with MEPA, an Environmental Assessment (EA) was completed for the proposed project by FWP and released for public comment on April 29th, 2016.

Public comments on the proposed project were taken for 30 days (through May 29th, 2016). The EA notice was mailed to 31 individuals and groups; legal notice was printed in the Montana Standard (Butte) newspaper and the Dillon Tribune. A draft EA was posted on the FWP webpage: <http://fwp.mt.gov/publicnotices/>. Two written comments were received.

Comment 1. *I am in favor of this project. I am in favor of the reintroduction of WCT and Arctic grayling.*

Response: No response necessary.

Comment 2. *Comment on Environmental Assessment for Watershed Restoration in French Creek, Big Hole River drainage. Reference I made to page 7 of the document as follows:*

*F. Narrative Summary of the Proposed Action and Purpose of the Proposed Action.
1. Placer Mining.*

"The Mount Haggin Wildlife Management Area (WMA, Figure 1) was acquired by Montana Fish, Wildlife & Parks (FWP) in 1976 from the Mount Haggin Livestock Company through the Nature Conservancy. Prior to state ownership the land was used for multiple purposes. Gold was first discovered 1864 in French Gulch and a sizable mining camp was established in that drainage with year-round occupants. The French Gulch area including First Chance Creek, Moose Creek, and parts of French Creek were mined on and off through the early 1900's. Two hard rock mines were also present at the headwaters of French Gulch at French Town."

The last sentence above is incorrect. The two hard rock mines referred to are the Spain Mine. French Town is located about 2 miles to the northwest near the confluence of First Chance and French Creek. The Spain is located in Township 2 North; Range 11 West; Section 8 while the French Town on the USGS Topo and USGS map is incorrect. Original government surveys of the area to establish the Township boundaries are dated 1868 and 1878. The survey plats show the location of the "Town of French Gulch". Those Original Surveys can be viewed on the General Land Office Website (website given). I am unable to print or copy the survey plats but I have printed and attached pages 204-206 of the 1868 field notes that place French Gulch Town at the "confluence of First Chance and French Gulches" and describes "the town of French Gulch through which the line passes as a village containing about twenty houses strung along the main street...". I have also attached a copy of page 271 of the 1878 field notes for T2N R 12W that states: "French Gulch which is situated on the eastern boundary of Sec 1 is a thriving little mining town..."

Supporting documentation can be found in William R. Allen's book the "Chequamegon" published in 1949. On page 23 he describes a tribe of Indians approaching when he, as a child, was playing on a hillside above the family cabin. Read that and try to visualize the scene where you have place French Town. Can't be done. Now try it near the confluence of First Chance and French Creek. Additionally, if you will view the 19—Mineral Survey plat made when Allen Mining Co. patented the mining claims, including the Spain, the stream you refer to as the headwaters of French Gulch is labeled Fenian Creek". W. R. Allen pg 19, credits the name to an Irishmen who operated there.

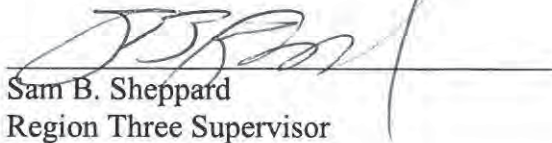
From the detail given in the subject document I can't tell if the project will impact the old town of French Gulch, aka French Town. I do think you need to be aware of where the town site actually is.

Response: The survey maps referenced above were obtained and reviewed and the comments above were found to be accurate and the information in the EA incorrect. The town of French Gulch was located at the confluence of First Chance Gulch and French Gulch and not at the headwaters of French Creek. This decision notice will stand as the correction to the error in the EA.

The project will not affect the French Town site. All construction activities in the vicinity of French town or any other building sites or other historical features (with the exception of the gravel piles themselves) will take place in the stream bottom and not in the uplands where these features are located.

Decision

Based on the Environmental Assessment and the public comments received, and benefits and risks associated with this project, it is my decision to go forward with the Proposed Action as outlined in the Draft Environmental Assessment. I find there to be no significant impacts on the human and physical environments associated with this project. Therefore, I conclude that the Environmental Assessment is the appropriate level of analysis, and that an Environmental Impact Statement is not required.



Sam B. Sheppard
Region Three Supervisor

Self-Certification of Watershed Group Status

The Big Hole Watershed Committee (BHWC) is a grassroots, non-regulatory entity that addresses water availability and quality issues within the Big Hole River watershed, represents a diverse group of stakeholders, and is capable of promoting the sustainable use of water resources in the watershed.

BHWC is composed of a Governing Board that represents diverse interests including: ranching, utilities, local government, sportsmen, conservationists, tourism, and outfitters. Representatives from local, state, and federal agencies participate as technical advisers.

Committee Members

- Staff
 - Pedro Marques, Executive Director
 - Tana Nulph, Associate Director
 - Ben LaPorte, Program Manager
- Board Members
 - Randy Smith – Ranching, Middle Big Hole River (Chairman)
 - Jim Hagenbarth – Ranching, Middle Big Hole River (Vice-Chairman)
 - Steve Luebeck – Sportsmen (Treasurer)
 - Roy Morris – George Grant Trout Unlimited (Secretary)
 - Dean Peterson – Ranching, Upper Big Hole River
 - Ray Weaver – Ranching, Upper Big Hole River
 - Peter Frick – Resident
 - Hans Humbert – Ranching, Upper Big Hole River
 - Jim Berkey – The Nature Conservancy
 - Liz Jones – Ranching, Middle Big Hole River
 - John Reinhardt – Ranching, Middle Big Hole River
 - Phil Ralston – Ranching, Middle Big Hole River
 - Jim Dennehy – Butte-Silver Bow County Water Utility Division
 - Mark Kambich – Ranching, Middle Big Hole River
 - Erik Kalsta – Ranching, Middle Big Hole River
 - Eric Thorson – Guiding & Outfitting (Angling)
 - Cindy Ashcraft – Ranching, Lower Big Hole River
 - Paul Cleary – Resident
 - Bill Kempf – Guiding & Outfitting (Angling)
 - Mark Raffety – Ranching, Lower Big Hole River
 - John Jackson – Beaverhead County Commission
 - Andy Suenram – Resident

**Restated Articles of Incorporation
of
Big Hole Watershed Committee
A Non-Profit Corporation**

Pursuant to Montana Code Annotated Section 35-2-226, the Big Hole Watershed Committee adopts these Restated Articles of Incorporation.

Article 1

The name of this corporation is the BIG HOLE WATERSHED COMMITTEE.

Article 2

The organization is a public benefit corporation.

Article 3

The name and address of the registered agent and registered office of this corporation is Randy Smith, #1 Hartwig Lane, Glen, MT 59732 with a mailing address at P.O. Box 21, Divide, MT 59727.

Article 4

Said organization is organized exclusively for charitable, educational, and scientific purposes, including for such purposes the making of distributions to organizations that qualify as exempt organizations under section 501 (c) (3) of the Internal Revenue Code, or corresponding section of any future federal tax code.

No part of the net earnings of the organization shall inure to the benefit of, or be distributable to its members, trustees, officers, or other private persons, except that the organization shall be authorized and empowered to pay reasonable compensation for services rendered and to make payments and distributions in furtherance of the purposes set forth in the purpose clause hereof. No substantial part of the activities of the organization shall be the carrying on of propaganda, or otherwise attempting to influence legislation, and the organization shall not participate in, or intervene in (including the publishing or distribution of statements) any political campaign on behalf of any candidate for public office. Notwithstanding any other provision of this document, the organization shall not carry on any other activities not permitted to be carried on (a) by any organization exempt from federal income tax under section 501 (c) (3) of the Internal Revenue Code, corresponding section of any future federal tax code, or (b) by any organization, contributions to which are deductible under section 170 (c) (2) of the Internal Tax Code, or corresponding section of any future federal tax code.

Upon the dissolution of the organization, assets shall be distributed for one or more exempt purposes within the meaning of section 501 (c) (3) of the Internal Revenue Code, or corresponding section of any future federal tax code, or shall be distributed to the federal government, or to a state or local government, for the public purpose. Any such assets not disposed of shall be disposed of by the Court of Common Pleas of the county in which the principal office of the organization is then located, exclusively for the

purposes or to such organization or organizations, as said court shall determine, which are organized and operated exclusively for such purposes.

Article 5

The period of duration of this corporation is perpetual.

Article 6

The corporation shall have no members.

Article 7

The directors of the corporation shall not be liable to the corporation or its members for monetary damages for breach of a directors' duties to the corporation or its members, except for (a) breaches of the directors' duty of loyalty to the corporation or its members, (b) acts or omissions not in good faith or that involve intentional conduct or a knowing violation of the law, (c) transactions from which a director derived an improper economic benefit, or (d) conflict of interest transactions, loans to or guaranteed for directors and officers or unlawful distributions.

Article 8

The corporation may amend these articles in a manner authorized by law at the time of the amendment.

Article 9

These Restated Articles of Incorporation supersede the original Articles of Incorporation and all amendments thereto.

DATED: _____

BY: _____

Board Officer Signature, Title

Printed Name

Amended Bylaws of the BIG HOLE WATERSHED COMMITTEE

Bylaw 1. Name and Designation

The name of this organization shall be the Big Hole Watershed Committee, incorporated under the laws of Montana for public benefit. The area of geographical concern for the Big Hole Watershed shall include the entire Big Hole River Watershed in portions of Beaverhead, Deerlodge, Madison, and Silver Bow counties.

1.1 Registered Office and Registered Agent

Any change in the corporation's registered agent or registered office must be authorized by resolution of the Board of Directors and shall be effective upon the filing of such notices as may be required by law with the Montana Secretary of State.

Bylaw 2. Purposes

2.1 IRC Section 501(c)(3) Purposes

This corporation is organized exclusively for one or more of the purposes as specified in Section 501(c)(3) of the Internal Revenue Code, including, for such purposes, the making of distributions to organizations that qualify as exempt organizations under Section 501(c)(3) of the Internal Revenue Code.

2.2 Specific Objectives and Purposes

The specific objectives and purposes of this corporation shall be for public benefit.

2.3 Mission Statement of the Big Hole Watershed Committee

The purpose of the Big Hole Watershed Committee is to seek understanding of the river and agreement among individuals and groups with diverse viewpoints on water use and management in the Big Hole watershed.

The Big Hole Watershed Committee should include all interests that may be affected by water use and management in the Big Hole Watershed, and are willing to seek practical solutions that benefit all interests.

The Big Hole Watershed Committee is committed to:

- Involving all interests that are willing to seek practical solutions that benefit all interests;
- Promoting a common understanding among individuals and groups with diverse viewpoints;
- Fostering the ability of local individuals and groups to create effective solutions to local problems, and;
- Seeking long-term solutions based on sound information.

To accomplish its mission, the Big Hole Watershed Committee has developed the following goals:

- Seek to sustain the rural quality of life in the Big Hole Watershed;
- Promote economic activities that are compatible with the environmental amenities of the watershed;
- Protect and/or enhance the natural resources in the watershed;
- Protect and respect existing water rights;
- Involve all interests that are willing to seek practical solutions that benefit all interests;
- Promote a common understanding among individuals and groups with diverse viewpoints;
- Foster the ability of local individuals and groups to create effective solutions to local problems;
- Seek long-term solutions based on sound information;
- Provide for the exchange and distribution of technical and topical information;
- Serve as a responsible planning entity for developing a coordinated resource plan for the Watershed;
- Seek financial and technical assistance to implement resource planning efforts agreed upon by the committee.

Bylaw 3. Members

The corporation shall have no members.

Bylaw 4. Board of Directors (a.k.a Governing Board)

4.1 Number, Term, and Election

The Board of Directors shall consist of at least 16 directors and no more than 26 directors represented by the interests defined in Bylaw 4.5. Directors to fill expiring terms shall be appointed by consensus, as stated in Bylaw 4.10, for three year terms at the annual meeting. Each director holds office until his or her term expires and successor is appointed. A director may be appointed for successive terms.

This Paragraph Applies to Initial Adoption of Amended Bylaws in Year 2016 Only:

Upon adoption of these amended Bylaws, each individual who is a member (i.e., Governing Body member) immediately prior to the start of the meeting will become a director, unless he/she declines to serve on the Board of Directors. Following adoption of these amended Bylaws, in order to stagger the terms, the Board of Directors shall set the term of each director by resolution according to the formula below, or a similar formula to have approximately one-third of the Board of Directors elected at each annual meeting.

Three-year terms: 8 directors

Two-year terms: 7 directors

One-year terms: 7 directors

4.2 Resignation

A director may resign at any time by delivering written notice to the Board of Directors, the Chair, or the Secretary of the corporation. A resignation shall be effective when the notice is delivered unless the notice specifies a later effective date.

4.3 Removal

A director may be removed without cause by the vote of two-thirds of the directors then in office, provided that each director receives at least seven days' written notice that removal will be voted upon at the meeting.

4.4 Vacancies

A vacancy may be filled by the Board of Directors for the remainder of the unexpired term, provided that at each director receives at least seven days' written notice that a vacancy will be filled by appointment by consensus, as stated in Bylaw 4.10, at the meeting.

4.5 Board Composition

The Board of Directors shall represent diverse views and interests and shall actively seek the input, advice, and participation of individuals, groups, or communities (hereinafter referred to as stakeholders) that are affected by the decisions and actions of the Big Hole Watershed Committee.

(1) Representation on the Board of Directors shall include, but is not limited to the following stakeholders:

- Agriculture/Ranching– These directors shall manage land within the watershed as a working agricultural operation that generates the majority of the individual's income. Agriculture/Ranching shall hold at least fifty percent of the director seats.

The remaining directors shall represent the following stakeholders:

- Conservation
- Fisheries/Wildlife
- Organized Sportsmen
- Outfitters/Guides
- Small Business/Tourism
- Local Government– including County Commissioners, County Planning Boards, and Conservation Districts.
- Utilities – including municipal water users and power companies.
- Other stakeholders as may be identified from time to time by the Board of Directors

For the purposes of this bylaw, the Conservation, Fisheries/Wildlife, and Organized Sportsman shall each be considered to hold a conservation interest. Each Conservation interest must represent an organized stakeholder group or groups.

(2) Stakeholder groups may recommend an individual to the Board of Directors for appointment as a director prior to the annual meeting or a meeting to fill a vacancy.

4.6 Duties and Responsibilities of Directors

In addition to each director's duties pursuant to law, including the duty to act in good faith, with reasonable care, and in a manner the director reasonably believes to be in the best interest of the Big Hole Watershed Committee, directors also have the following responsibilities:

(1) The Board of Directors shall make a commitment to seek consensus. For purposes of the Big Hole Watershed Committee, consensus is defined as agreement among all directors present at any Board of Directors meeting.

(2) Directors responsibilities are defined as follows:

- to fully and consistently participate in the process unless they withdraw.
- to fully explore and understand all issues before reaching conclusions.
- to search for creative opportunities to address the interests and concerns of all stakeholders.
- commitment to seeking consensus. Consensus is reached when directors present at a meeting agree on a package of provisions that address the range of issues being discussed. Directors may not agree with all aspects of an agreement; but they do not disagree enough to warrant their opposition to the overall package.

Directors:

- May disagree with any proposal, but must explain why they disagree and/or present an alternative proposal that constructively responds to the needs and interests of other directors;
- Are committed to implementing agreements that are reached; and
- Will maintain their stakeholders' values and interests.

(3) Responsibility to other directors is as follows: Each director agrees:

- to candidly identify and share their interests.
- to listen carefully and respectfully to other directors and to avoid interrupting.
- to offer suggestions with respect and care.
- to share relevant information regarding the issues under consideration.
- to communicate with each other directly, rather than through the news media, and to challenge ideas, not people.
- to respect the decision of any director to withdraw from the process at any time and for any reason.
- to explain to the other directors the reason for withdrawal from the process.

- (4) Responsibility to stakeholders is as follows: Each director agrees:
- to identify the interests of the stakeholder they represent.
 - to seek the advice of their stakeholder throughout the process.
 - to make every effort to represent and speak for their stakeholder.
 - to objectively explain and interpret the process and its proposed outcomes to their stakeholder.
 - to keep their stakeholder informed of the activities and ideas emerging from the process.

4.7 Board Authority

Subject to the laws of this state, all corporate powers are exercised by or under the authority of the Board of Directors, and the affairs of the corporation managed under the direction of its Board of Directors by reaching consensus at Board of Directors meetings.

4.8 Meetings

(1) The annual meeting of the Board of Directors will be held on the third Wednesday in January of each year, or as otherwise determined by the Board of Directors, and at a place and time as may be determined by the Board of Directors. No less than ten days' notice of the annual meeting of the Board of Directors shall be given to all directors.

(2) Regular meetings of the Board of Directors shall be held on the third Wednesday of every month, except January when the annual meeting occurs, and at such place and time as shall from time to time be set by the Board of Directors or its designee. No notice of regular meetings of the Board of Directors shall be necessary, unless required by law, the articles, or these Bylaws. One week prior to each regular meeting, the record of the last meeting, the up-coming agenda, specific location and time, Executive Committee meeting minutes, and other appropriate documents shall be distributed to directors. Each regular meeting shall be held as scheduled and shall begin and end on time, unless the directors agree to extend the time of a particular meeting.

(3) Special meetings may be called at any time and place upon the call of the president, secretary, or any two directors. Notice of the time and place of each special meeting shall be given by the Secretary, or the persons calling the meeting, by mail, e-mail or facsimile transmission at least ten days in advance of the time of the meeting. The purpose of the meeting need not be given in the notice, unless required by law, the articles, or these Bylaws. Notice of any special meeting may be waived in writing (either before or after such meeting) by any director.

(4) The Secretary shall document the results of each meeting in an appropriate format, including tasks to be undertaken by individuals or organizations and emerging areas of agreement. Directors may make recommendations for agenda items for upcoming meetings.

4.9 Quorum

Not less than one-third of the directors in office immediately before a meeting begins shall constitute a quorum for the transaction of business at a meeting. No action shall be taken unless a quorum is present, except that a majority of the directors present may vote to adjourn any meeting to another time and place even if the number of directors present or voting does not constitute a quorum. If the meeting is adjourned for more than forty-eight hours, the Secretary shall give notice of the time and place of the adjourned meeting to the directors who were not present at the time the meeting was adjourned.

4.10 Manner of Acting

Unless otherwise required by law, the Articles, or the Bylaws, the act of a consensus of directors present at a Board of Directors meeting at which a quorum is present shall be the act of the Board of Directors. Consensus is defined in Bylaw 4.6.

4.11 Proxy Voting Prohibited

Proxies and proxy voting shall not be allowed on behalf of any director.

4.12 Compensation of Directors

Directors shall serve without compensation except that they shall be allowed reasonable advancement or reimbursement of expenses incurred in the performance of their duties.

4.13 Committees

(1) Board Committees

The Board of Directors may create one or more committees of the board and appoint directors to serve on them by the vote of not less than a majority of the directors then in office. Each committee of the board must have two or more directors who serve at the pleasure of the Board of Directors. The sections of these Bylaws that govern meetings, actions without meetings, notice, waiver of notice, quorum and voting requirements, and meetings by conference telephone of the Board of Directors apply to committees of the board and their members. Committees of the board must keep minutes of their meetings and report them to the Board of Directors.

Committees may exercise the Board of Directors' authority as designated in the resolution creating the committee; however, a committee of the board may not: (1) authorize distributions; (2) approve dissolution, merger, or the sale, pledge, or transfer of all or substantially of the corporation's assets; (3) elect, appoint, or remove directors or fill vacancies on the Board of Directors or on any of its committees, or (4) adopt amend, or repeal the Articles or Bylaws.

(2) Steering Committee

The Big Hole Watershed Committee shall have a Steering Committee consisting of the four Officers set forth in Article 5. The Steering Committee shall conduct the day-to-day business activities of the Big Hole Watershed Committee, to include fundraising, personnel matters, making recommendations on proposed projects, grants and other strategic issues, and other business matters concerning the corporation. It shall report to report back to the Board of Directors at regular monthly meetings with recommendations, updates, and minutes of the Steering Committee meetings and quarterly Treasurer's reports. A quorum of the Steering Committee shall consist of a majority of the Officers.

(3) Other Committees

The Board of Directors may create such other committees, appoint members to the committees, and select committee chairs as may be deemed necessary to carry out certain designated duties and responsibilities for the Big Hole Watershed Committee. These committees may consist of any persons with required skills, knowledge and interest and shall act in an advisory capacity to the Big Hole Watershed Committee. Committees shall meet at the discretion of the designated committee chairperson.

Bylaw 5. Officers

5.1 Officers

The corporation shall have four officers; the Chair, the Vice-Chair, the Treasurer, and the Secretary. These officers compose the Steering Committee described, above, in Bylaw 4.13(2). The officers shall include of 50% ranch interests and at least one conservation interest. No officer may hold more than one office simultaneously. Such other officers and assistant officers as may be deemed necessary may be appointed by the Board of Directors.

5.2 Qualification

Each officer must be a member of the Board of Directors. Only those directors who have served for at least one year on the Board of Directors are eligible to become an officer.

5.4 Appointment and Terms of Office

Officers terms shall be for one year. Each officer holds office until his or her term expires and successor is appointed. An officer may be appointed or successive terms. Officers to fill expiring terms shall be appointed by the Board of Directors by consensus at the annual meeting.

5.5 Duties Of Officers

(2) The duties of the officers shall be as follows:

The Chair shall participate in meetings of the Board of Directors. The Chair shall delegate such duties and responsibilities as may be necessary to conduct the normal business and activities of the Big Hole Watershed Committee. The Chair shall serve as spokesman for the Big Hole Watershed Committee and perform such other duties as may be prescribed by the Board of Directors. The Chair may designate another person to serve as the spokesperson on his behalf.

The Vice-Chair shall perform all the duties of the Chair in the absence of the Chair, or in the event of the Chair's inability or refusal to act. The Vice Chair shall have other powers and perform such other duties as may be prescribed by the Board of Directors.

The Secretary shall: (1) keep the minutes of the Board of Directors' meetings; (2) see that all notices are duly given in accordance with the provisions of these Bylaws or as required by law; (3) be custodian of and authenticate records of the corporation; (4) keep a list of the post office address of each director which shall be furnished to the Secretary by such director; and (5) in general perform all duties incident to the office of Secretary and such other duties as from time to time may be assigned to him or her.

The Treasurer shall maintain the financial records of the Big Hole Watershed Committee, make periodic financial reports, and present an annual financial report to the Board of Directors. The Treasurer shall perform such other duties as may be prescribed by the Board of Directors.

5.6 Resignation or Removal

An officer may resign at any time by delivering written notice to the Board of Directors. A resignation shall be effective when the notice is delivered, unless the notice specifies a future effective date. The Board of Directors, by consensus, may remove any officer at any regular meeting with or without cause.

5.7 Vacancies

A vacancy may be filled by the Board of Directors for the remainder of the unexpired term, provided that at each director receives at least seven days' written notice that filling a vacancy will be voted upon at the meeting

Bylaw 6. Participants and Technical Advisors

6.1 Advisory Role

Anyone with an interest in the activities of the Big Hole Watershed Committee may be considered a participant. Local, State and Federal agencies shall further participate with the Big Hole Watershed Committee as Technical Advisors. Participants and Technical Advisors shall be considered ex-officio, non-voting partners and may participate in meetings, discussions, and serve on advisory committees by invitation of the Board of Directors of the Big Hole Watershed Committee.

6.2 Participant Responsibilities

Responsibility to other participants is as follows:

- Each participant agrees to candidly identify and share their interests.
- Each participant agrees to listen carefully and respectfully to other participants and to avoid interrupting.
- Each participant agrees to offer suggestions with respect and care.
- Each participant agrees to share relevant information regarding the issues under consideration.
- Each participant agrees to communicate with each other directly, rather than through the news media.
- Each participant agrees to challenge ideas, not people.
- Each participant may disagree with any proposal, but must explain why they disagree and/or present an alternative proposal that constructively responds to the needs and interests of other participants.

Bylaw 7. Nonliability and Indemnification of Directors, Officers, Employees, and Agents

Directors, Officers, Employees, and Agents shall not be individually liable for any action or omission, debt, liability, or other obligation of the corporation made in the course and scope of their official capacity on behalf of the nonprofit corporation, and shall be indemnified by the corporation to the fullest extent permissible under the laws of this state.

Bylaw 8. Conflict of Interest Policy

The Board of Directors shall adopt, periodically review, and implement a conflict of interest policy to protect the corporation's interest when it is contemplating any transaction or arrangement which may benefit a director, officer, employee, or member of committee of the board with board-delegated powers.

Bylaw 9. Execution of Instruments, Deposits and Funds

9.1 Authorization

The Big Hole Watershed Committee, except as otherwise provided in these Bylaws, may by resolution authorize any officer or agent of the corporation to enter into any contract or execute and deliver any instrument in the name of and on behalf of the corporation, and such authority may be general or confined to specific instances. Unless so authorized, no officer, agent or employee shall have any power or authority to bind the corporation by any contract or engagement or to pledge its credit or to render it liable monetarily for any purpose or in any amount.

9.2 Checks and Notes

Except as otherwise specifically determined by resolution of the Board of Directors, or as otherwise required by law, checks, drafts, promissory notes, orders for the payment of

money and other evidence of indebtedness of the corporation shall be signed by at least one Officer or party designated by the Board of Directors.

Bylaw 10. Corporate Records, Reports and Seal

10.1 Maintenance of Corporate Records

The corporation shall keep at its principal office:

- a. Minutes of all Big Hole Watershed Committee and committees of the Board meetings indicating the time and place of holding such meetings, whether regular or special, how called, the notice given and the names of those present and the proceedings;
- b. Adequate and correct books and records of account, including accounts of its properties and business transactions and accounts of its assets, liabilities, receipts, disbursements, gains and losses;
- c. A copy of the corporation's Articles of Incorporation and Bylaws as amended to date.

10.2 Periodic Report

The Big Hole Watershed Committee shall cause any annual or periodic report required under law to be prepared and delivered to an office of this state to be so prepared and delivered within the time limits set by law.

Bylaw 11. IRC 501(c)(3) Tax Exemption Provisions

11.1 Limitations on Activities

No substantial part of the activities of this corporation shall be the carrying on of propaganda, or otherwise attempting to influence legislation (except as otherwise provided by Section 501(h) of the Internal Revenue Code), and this corporation shall not participate in, or intervene in (including the publishing or distribution of statements), any political campaign on behalf of, or in opposition to, any candidate for public office.

Notwithstanding any other provisions of these Bylaws, this corporation shall not carry on any activities not permitted to be carried on (a) by a corporation exempt from federal income tax under Section 501(c)(3) of the Internal Revenue Code, or (b) by a corporation, contributions to which are deductible under Section 170(c)(2) of the Internal Revenue Code.

11.2 Prohibition against Private Inurement

No part of the net earnings of this corporation shall inure to the benefit of, or be distributable to, its members, directors, officers or other private persons, except that the corporation shall be authorized and empowered to pay reasonable compensation for services rendered and to make payments and distributions in furtherance of the purposes of this corporation

11.3 Distribution of Assets

Upon the dissolution of the organization, assets shall be distributed for one or more exempt purposes within the meaning of section 501 (c) (3) of the Internal Revenue Code, or corresponding section of any future federal tax code, or shall be distributed to the federal government, or to a state or local government, for the public purpose. Any such assets not disposed of shall be disposed of by the Court of Common Pleas of the area of geographical concern for which the organization is dedicated, exclusively for the purposes or to such organization or organizations, as said court shall determine which are organized and operated exclusively for such purposes.

Bylaw 12 Amendment of Bylaws

These Bylaws may be altered, amended or repealed by the vote of not less than a majority of directors then in office.

Date Adopted: January 20, 2016

Watershed Group Resolution

The Big Hole Watershed Committee Steering Committee provides leadership for the Big Hole Watershed Committee. The Steering Committee approves of the content and the commitments described in the Big Hole Watershed Committee's Bureau of Reclamation WaterSMART (Phase II) application for funding.

Our Executive Director, Pedro Marques, has the legal authority to enter into an agreement with the WaterSMART program on behalf of the Big Hole Watershed Committee.

The Big Hole Watershed Committee has the experience, infrastructure, and capability to manage funds awarded from the WaterSMART program, provide the required matching funds, and implement the project as described in the application.

The Steering Committee agrees that the Big Hole Watershed Committee will work with the Bureau of Reclamation to meet established deadlines for entering into a financial assistance agreement.

February 10, 2019




Randy Smith, Chairman



Jim Hagenbarth, Vice Chairman



Roy Morris, Secretary



Steve Luebeck, Treasurer

Representative:


Pedro Marques, Executive Director

Mission Statement

The mission of the Big Hole Watershed Committee is to seek understanding and agreement among groups and individuals with diverse viewpoints on water use and management in the Big Hole River watershed of Southwest Montana.

Self-Certification of Regular Meetings

The Big Hole Watershed Committee holds 8-9 public board meetings per year as well as one annual business meeting that is attended by staff and board members only. We meet on the third Wednesday of each month, excluding July and December. Meetings are occasionally, though infrequently, cancelled due to weather or conflicting schedules.

Big Hole River, Montana Watershed Restoration Plan

Part II: Middle & Lower Big Hole Watershed



Produced by:
Big Hole Watershed Committee

Final
August 29, 2013

Big Hole Watershed Committee

PO Box 21

Divide, Montana 59727

e-mail: info@bhwc.org

website: bhwc.org

Produced with Funds and Support from:

Montana Department of Environmental Quality 319 Program

Helena, Montana

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Acronyms

BDNF	Beaverhead-Deerlodge National Forest
BHWC	Big Hole Watershed Committee
BHRF	Big Hole River Foundation
BLM	Bureau of Land Management
CCAA	Candidate Conservation Agreement with Assurances
DEQ	Montana Department of Environmental Quality
EPA	Environmental Protection Agency
ESA	Endangered Species Act
MFWP	Montana Fish, Wildlife and Parks
NRDP	Natural Resources Damages Program
TMDL	Total Maximum Daily Load
USFS	United States Forest Service
USFWS	US Fish & Wildlife Service

A Note on Spelling:

It is common for creeks or locations to have several spellings for the same location. A single spelling is used in this document when applicable:

Case 1: Pintlar versus Pintler: Pintlar Creek is the spelling used in the TMDL document from which this plan is based, and therefore used in this document. Pintler Creek is the spelling used on maps and other resources. Since the Anaconda-Pintler Wilderness is a title, “Pintler” is retained. Where “Pintler” is used in text from the USFS plan, Pintler is retained since this is a direct quote from the Forest Plan.

Case 2: Pattengail versus Pettengill: Pattengail Creek is the spelling used in the TMDL; therefore, “Pattengail” is used widely in this document. MFWP and USFS used Pettengill; therefore, “Pettengill” is retained where their information is a direct quote.

Project Area

The Big Hole River watershed is located in southwest Montana ([Figure 1](#)). The colored areas within the watershed represent public lands and the white areas represent private lands. The Big Hole River headwaters begin in the south-west corner of the watershed and flow north, then east, to its confluence with the Beaverhead River near Twin Bridges. There are two watershed restoration plans at work in the Big Hole River watershed. The black line shows the division between two watershed restoration plans:

Part I: Upper & North Fork Big Hole River Watershed Restoration Plan (separate document)

Part II: Middle & Lower Big Hole River Watershed Restoration Plan (this document)

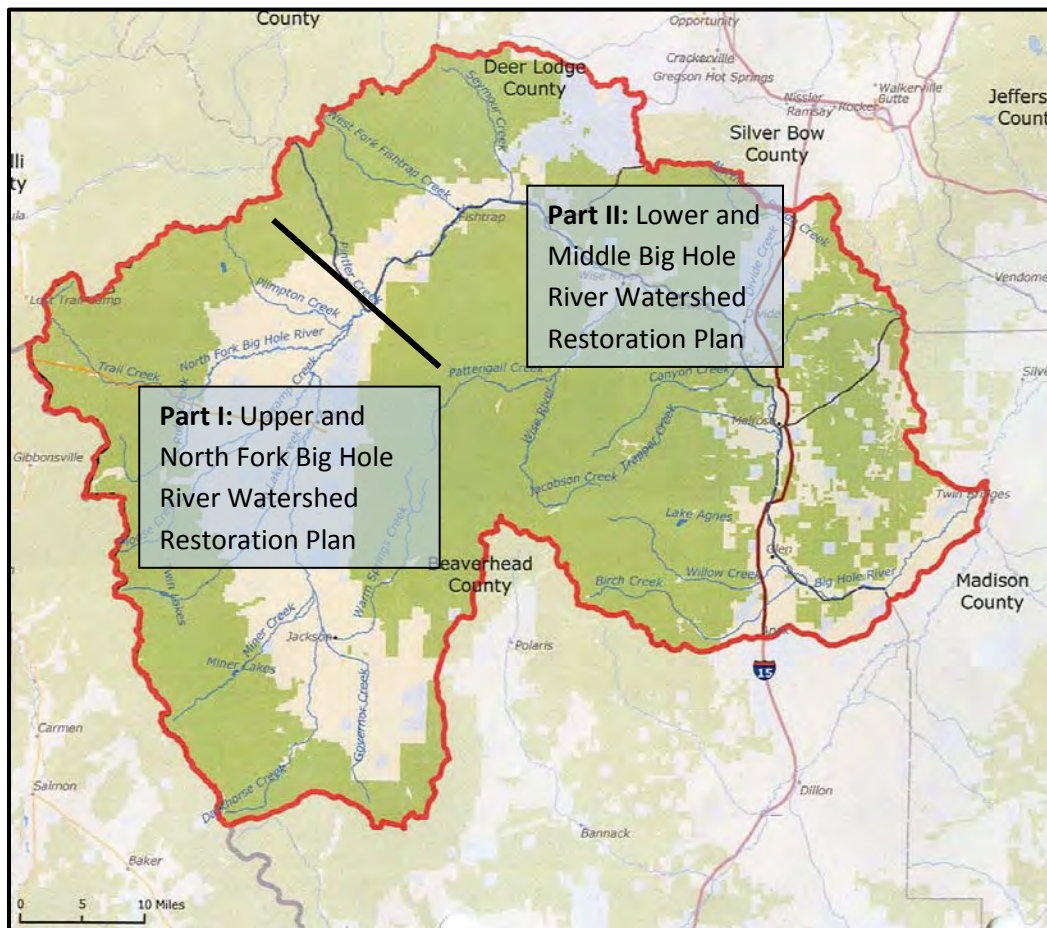


Figure 1: Big Hole River Watershed, Montana

Executive Summary



The Watershed Restoration Plan is a coordinated document that outlines restoration in terms of impacts, goals, objectives, and measures of improvement. The plan serves to coordinate restoration efforts among stakeholders.

There are four active watershed restoration plans in place in the Middle-Lower Big Hole watershed beyond this watershed restoration plan. The four plans are the US Forest Service (USFS) Beaverhead Deerlodge Forest Plan, Bureau of Land Management's (BLM) Watershed Assessments and Land Health Evaluations, Upper Big Hole Candidate Conservation Agreement with Assurances (CCAA) program, and the Montana Fish, Wildlife and Parks Statewide Fisheries Management Plan (see [Figure 2](#)).

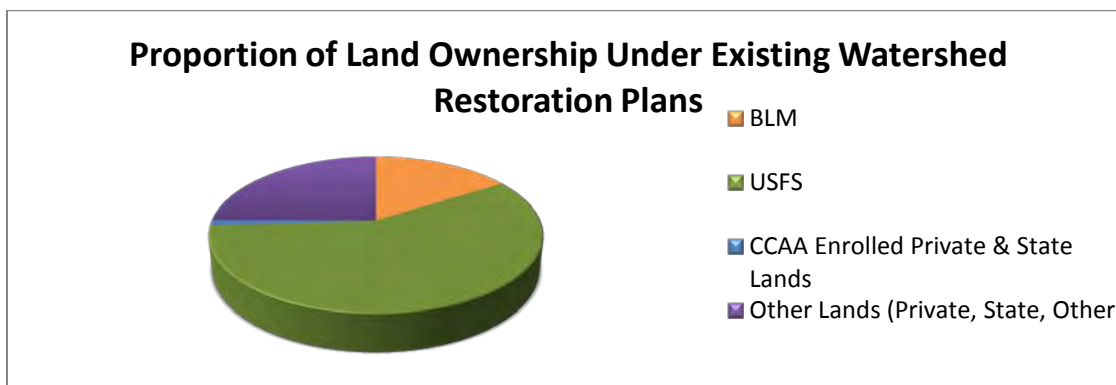


Figure 2: Proportion of land ownership in the Middle-Lower Big Hole watershed managed under existing watershed restoration plans.

The primary water quality issues of concern in the Middle-Lower Big Hole watershed are high water temperature, often attributed to low flows due to drought and irrigation withdrawals and the lack of riparian vegetation, and high sediment loads resulting from channel and bank erosion changes that occur as a result of riparian vegetation loss. Improvement in water temperature and sediment issues are often difficult to track given that changes occur over years or decades and varies with natural changes in precipitation and air temperature. In some cases high nutrients and high metals may also be a water quality issue, but typically on a local scale.

The Middle & Lower Big Hole Planning Area TMDL was completed in 2009 (Montana DEQ, September 2009). Significant effort towards watershed restoration has occurred since the information for the TMDL was collected in 2005.

It is important to focus on land managers interested in making water quality improvements and to continue to implement projects that will decrease water temperature and increase stream flows. This occurs through riparian vegetation, grazing management, irrigation infrastructure upgrades, and wetlands restoration.



Purpose

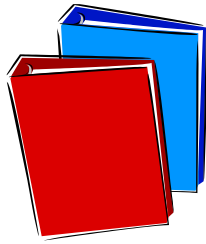


This Watershed Restoration Plan was compiled by the Big Hole Watershed Committee (BHWC). The BHWC serves as a coordination hub and communication group between interests in the Big Hole Valley, including private land owners, residents, agencies, conservation groups, sportsman, and guides/outfitters.

The goal of this plan is to provide a coordinated approach to restoration in the Big Hole. The Middle-Lower Big Hole Valley is unique in that there are several active restoration plans already in place. These existing plans have varied goals, such as to improve the fishery, forest health, or range production. However, many of the activities used to achieve these goals also have a positive effect on water quality. Identifying plan goals and activities that include water quality benefits can be a cost effective way to improve water quality in the Middle-Lower Big Hole. The BHWC determined the best approach to accomplish watershed restoration in the Middle-Lower Big Hole was to

1. Compile the existing efforts into one concise resource (this plan)
2. Coordinate efforts among interests and encourage communication.
3. Support planned activity, either with in-kind, implementation, financial, or other support
4. Advocate including water quality benefits in planned projects.

Watershed Restoration Planning



A Watershed Restoration Plan is a guiding document that outlines watershed restoration goals and needs to address non-point source pollution. The plan describes actions to occur over a 3-5 year period. It is designed to be a working document that is reviewed and updated as needed. The goals and needs outlined will help watershed groups and stakeholders clearly meet objectives and coordinate efforts between stakeholders.

The Big Hole River watershed is divided into two sections - the Upper & North Fork Big Hole River and Middle & Lower Big Hole River. There is a watershed restoration plan for each section. The plans were developed with support from Montana Department of Environmental Quality 319 program.

The Environmental Protection Agency (EPA) developed a protocol for Watershed Restoration Plan development. Each Watershed Restoration Plan should contain the following 9 minimum elements:

1. Identification of causes of impairment (Section I)
2. An estimate of the load reductions expected from management measures (Section III)
3. A description of the nonpoint source management measures that will need to be implemented to achieve load reductions (Section III)
4. Estimate of the amounts of technical and financial assistance needed, associated costs, and/or the sources and authorities that will be relied upon to implement this plan (Section IV)
5. An information and education component to enhance public understanding of the project and encourage their early and continued participation in selecting, designing, and implementing the nonpoint source management measures that will be implemented (Section IV)
6. Schedule for implementing the nonpoint source management measures identified in this plan that is reasonably expeditious (Section IV)
7. A description of interim measurable milestones for determining whether nonpoint source management measures or other control actions are being implemented (Section V)
8. A set of criteria that can be used to determine whether loading reductions are being achieved over time and substantial progress is being made toward attaining water quality standards (Section V)
9. A monitoring component to evaluate the effectiveness of the implementation efforts over time, measured against the criteria established (Section VI)

The Big Hole Watershed Committee

Big Hole



Watershed Committee

The Big Hole Watershed Committee (BHWC), established 1995, seeks common ground among diverse viewpoints for watershed restoration and preservation in the Big Hole River watershed.

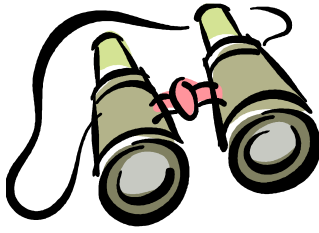
Mission: "To seek understanding of the Big Hole River and agreement among individuals and groups with diverse viewpoints on water use and management in the Big Hole watershed."

The BHWC operates within four focus areas, each with a priority initiative:

1. Land Use Planning: Climate resiliency, specifically riparian protection standards and incentives for landowners to preserve riparian systems.
2. Wildlife: Reduce predator-human conflict with non-lethal deterrence
3. Water Quality & Quantity: Gain climate resiliency, specifically in water scarcity & high water temperature. Actions are through management plans, monitoring, research, and restoration activities. This includes the use of wetlands as a tool to improve or maintain water quality.
4. Invasive Species: Reduce and prevent invasive species infestation, particularly noxious weeds.

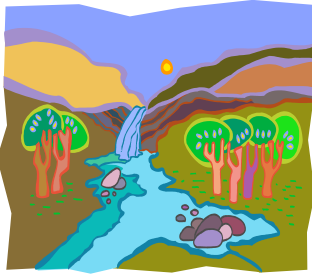
More information is available on our website: bhwc.org

Vision



The Big Hole watershed hosts fully functioning aquatic ecosystems and supports and sustains a viable ranching economy. Biological populations and water quality are monitored closely. The watershed is resilient to drought and other climate pattern changes. Plans are in place to adjust human activities during drought to sustain aquatic systems. Its residents are invested in watershed health. Provisions are in place to protect sensitive areas of the watershed in perpetuity. Efforts to improve or protect the watershed are coordinated among interest groups.

Watershed Characterization



The Middle-Lower Big Hole River watershed is a high elevation valley. The landscape is rural. The valley bottom is primarily private lands used for cattle ranching and hay production sustained by flood irrigation. The uplands are primarily public lands managed by USFS, BLM, or State of Montana. Public lands are often leased by ranches for cattle grazing. The Anaconda-Pintler Wilderness is located at the most upstream portion of the Middle-Lower Big Hole watershed. Population is sparse. Several small towns dot the river bottom, including Wise River, Dewey, Divide, Melrose, and Glen. The confluence of the Big Hole River with the Jefferson River is near the town of Twin Bridges. The Big Hole River is a headwater tributary to the Missouri River. It begins near the town of Jackson at the Continental Divide. The Middle-Lower Watershed begins at the confluence of Pintlar Creek with the Big Hole River and ends at the rivers confluence with the Jefferson River. See [Table 1](#) for watershed details. Attention has been directed towards this watershed as it is home to the Arctic grayling, a fish that faced significant decline in the 1970-1980's and a candidate for endangered species listing. Significant focus has been placed on actions and plans to recover the species over the last two decades.

Table 1: Watershed Characterization *(note: The spellings of "Pintler Creek" and "Pintlar Creek" are synonymous and refer to the same creek.)*

Description	Pintlar Creek to Confluence with Beaverhead River
Miles of river in Middle-Lower Big Hole River <ul style="list-style-type: none"> Middle Big Hole River (Pintlar Creek to Divide Creek) Lower Big Hole River (Divide Creek to Beaverhead River) 	95.2 miles <ul style="list-style-type: none"> 43.8 miles 51.4 miles
Watershed Area	1,021,021 acres; 1596 square miles
Counties	Beaverhead, Anaconda-Deer Lodge, Madison, Butte-Silver Bow
Land Ownership	USFS: 58% Private: 20% BLM: 16% State: 6%
Fish Species of Special Concern	Westslope Cutthroat Trout Yellowstone Cutthroat Trout Arctic Grayling
High Priority Abandoned Hard Rock Mine Sites (14 mines) (See Table Page 33 of TMDL (Montana DEQ, September 2009))	4 located in Silver Bow County, located in Moose Creek, Camp Creek, Soap Gulch and Maiden Rock. 3 located in Madison County, located in Rochester Creek and Nez Perce Creek. 7 located in Beaverhead County, located in Trapper Creek, Lost Creek, Birch Creek and Wise River.

Sensitive Species



provided in [Table 2](#).

There are 32 Montana Fish, Wildlife and Parks Animal Species of Concern in the Middle-Lower Big Hole watershed. The most prominent aquatic species sensitive to water quality are described below. A full Animal Species of Concern list is

The Fluvial Arctic Grayling and the CCAA Program



Montana FWP: Species of Special Concern

USFWS: Candidate for Endangered Species Listing

USFS: Sensitive Species

BLM: Sensitive Species

The Fluvial Arctic grayling (*Thymallus arcticus*) is a member of the trout family. The Big Hole River is the last remaining native population in the lower 48 states. They spawn in the spring and their diet is largely made up of aquatic insects. While the grayling can be found throughout the Big Hole River drainage, the majority of the population resides in the Upper Big Hole and the upper portion of the Middle Big Hole. Therefore, much of the restoration effort and future needs are driven by the habitat needs of the Arctic grayling. The grayling require cold and clear waters. They are typically a small fish with an identifiable large, iridescent dorsal fin. (Montana Field Guide)

Candidate Conservation Agreement with Assurances (CCAA) Program: In the Upper and Middle-Lower Big Hole, the BHWC is a partner in an ambitious conservation and restoration initiative known as the Candidate Conservation Agreement with Assurances or CCAA. The Big Hole CCAA is the largest of its kind in the United States. Bringing together local, state, and federal agencies, private landowners, non-profit organizations and many other parties, the CCAA develops restoration projects targeted to the last remaining population of fluvial Arctic grayling in the lower 48 states. Montana Fish, Wildlife & Parks (MFWP) and US Fish & Wildlife Service (USFWS) determined that the most immediate human-influenced threats to fluvial Arctic grayling in the Big Hole River are habitat loss, degradation, and fragmentation. *The CCAA proposes to remediate those threats by addressing the following four issues: reduced streamflows; degraded and non-functioning riparian habitats; barriers to fish migration; and entrainment in ditches.* The agencies “have developed a phased implementation schedule to provide immediate and long-term benefits to grayling, facilitate maximum landowner participation, and enable development of meaningful site-specific plans that are tailored to (each) property,” including a monitoring plan. (Montana Fish, Wildlife and Parks and the U.S. Fish and Wildlife Service, 2006)

Legal Status of Fluvial Arctic Grayling: On April 24, 2007 the USFWS determined that the grayling population in the upper Missouri River basin was no longer warranted for listing under the ESA. This determination removed grayling from the Candidate Species List. Grayling remain a “Species of Special Concern” in Montana. On November 15, 2007 a lawsuit was filed by the Center for Biological Diversity, the Grayling Restoration Alliance, the Federation of Flyfishers and the Western Watersheds Project to overturn the USFWS decision not to list the grayling population in the upper Missouri River basin as

either Threatened or Endangered. In the settlement agreement, the Service agreed to publish a new status review finding on or before August 30, 2010. As part of the settlement, the Service agreed to consider the appropriateness of a Distinct Population Segment (DPS) designation for Arctic grayling populations in the upper Missouri River basin. Since the 2007 finding, additional research has been conducted and new information on the genetics of Arctic grayling has become available. As a result, on September 8, 2010, the Service determined that listing the upper Missouri River basin as a DPS of Arctic grayling, as threatened or endangered under the Endangered Species Act is warranted, but that listing the fish is precluded at this time by the need to complete other listing actions of a higher priority. In 2011, the Center for Biological Diversity reached an agreement with the USFWS to move forward on listing decisions on 757 species, including the Arctic grayling. Under the settlement, a final listing proposal is due in 2014. (Montana Fish, Wildlife and Parks, 2012)

Westslope Cutthroat Trout



Montana Fish, Wildlife and Parks: Species of Special Concern

USFWS: NA

USFS: Sensitive

BLM: Sensitive

The Westslope Cutthroat Trout (*Oncorhynchus clarkii lewisi*) is one of two cutthroat trout species in Montana. The cutthroat is the Montana state fish. The fish is identified by red throat slashes and black spots on the body. The cutthroat population is significantly reduced, now occupying less than 3% of its original range. The decline is attributed to hybridization and competition from non-native trout and from habitat degradation. The cutthroat trout requires cool waters with little sediment. They spawn in the spring leaving their eggs in redds made in the gravels. Westslope cutthroat trout restoration is active in the Big Hole watershed. (Montana Field Guide)

Western Toad



Montana Fish, Wildlife and Parks: Species of Concern

USFWS: N/A

USFS: Sensitive

BLM: Sensitive

The Western Toad (*Bufo boreas*) is, with one rare exception, the only toad species in western Montana. The Western Toad may occupy a wide range of habitat types including wetlands, dry conifer forest and aspen stands, streams, and wet meadows. The toad reproduces in the spring. Their eggs and larvae require shallow, still water for survival through the summer. The toad eats live insects. Specialists recommend the following actions to benefit toads in their known breeding sites: Reduce grazing and avoid pesticide use in and near, avoid stocking predatory game fish if not already present, and remove toads prior to use lethal stream treatments on the fishery. (Montana Field Guide)

Western Pearlshell Mussel



Montana Fish, Wildlife and Parks: Species of Concern

USFWS: N/A

USFS: Sensitive

BLM: N/A

The Western Pearlshell (*Margaritifera falcata*) is the only mussel to live in Montana's coldwater streams in habitats that typically also house westslope cutthroat trout. Their typical size range is between 50-80mm long. Threats to this species include impoundments, siltation and eutrophication (resulting from high nutrients). (Montana Field Guide)

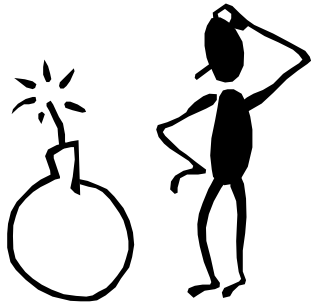
Table 2: Montana animal Species of Concern located in the Middle –Middle Lower Big Hole watershed (Montana Natural Heritage)

Species <i>Latin Name</i> Common Name	Habitat
Mammals	Sagebrush
<i>Gulo gulo</i> Wolverine	Boreal Forest and Alpine Habitats
<i>Martes pennanti</i> Fisher	Mixed conifer forests
<i>Lasiurus cinereus</i> Hoary Bat	Riparian and forest
<i>Myotis thysanodes</i> Fringed Myotis (Bat)	Riparian and dry mixed conifer forests
<i>Brachylagus idahoensis</i> Pygmy Rabbit	Sagebrush
<i>Corynorhinus townsendii</i> Townsend's Big-eared Bat	Caves in forested habitats
Birds	
<i>Ardea herodias</i> Great Blue Heron	Riparian forest
<i>Strix nebulosa</i> Great Gray Owl	Conifer forest
<i>Accipiter gentilis</i> Northern Goshawk	Mixed conifer forests
<i>Catharus fuscescens</i> Veery	Riparian forest
<i>Haemorhous cassinii</i> Cassin's Finch	Drier conifer forest
<i>Leucosticte atrata</i> Black Rosy-Finch	Alpine
<i>Nucifraga columbiana</i> Clark's Nutcracker	Conifer forest
<i>Numenius americanus</i>	Grasslands

Long-billed Curlew	
<i>Spizella breweri</i> Brewer's Sparrow	Sagebrush
<i>Falco peregrinus</i> Peregrine Falcon	Cliffs / canyons
<i>Certhia americana</i> Brown Creeper	Moist conifer forests
<i>Otus flammeolus</i> Flammulated Owl	Dry conifer forest
<i>Dryocopus pileatus</i> Pileated Woodpecker	Moist conifer forests
<i>Centrocercus urophasianus</i> Greater Sage-Grouse	Sagebrush
<i>Buteo regalis</i> Ferruginous Hawk	Sagebrush grassland
<i>Artemisiospiza belli</i> Sage Sparrow	Sagebrush
<i>Oreoscoptes montanus</i> Sage Thrasher	Sagebrush
<i>Athene cunicularia</i> Burrowing Owl	Grasslands
<i>Rhynchophanes mccownii</i> McCown's Longspur	Grasslands
<i>Dolichonyx oryzivorus</i> Bobolink	Moist grasslands
Fish	
<i>Oncorhynchus clarkii lewisi</i> Westslope Cutthroat Trout	Mountain streams, rivers, lakes
<i>Thymallus arcticus</i> Arctic Grayling	Mountain rivers, lakes
<i>Oncorhynchus clarkii bouvieri</i> Yellowstone Cutthroat Trout	Mountain streams, rivers, lakes
Amphibians	
<i>Anaxyrus boreas</i> Western Toad	Wetlands, floodplain pools
Invertebrates	
<i>Euphydryas gillettii</i> Gillette's Checkerspot (Butterfly)	Wet meadows
<i>Margaritifera falcata</i> Western Pearlshell (Mussel)	Mountain streams, rivers
<i>Leucorrhinia borealis</i> Boreal Whiteface (Dragonfly)	Forested Wetlands

- For More Information: [Montana Natural Heritage - Animals of Concern](#)

Section I: What is the Problem? Causes of Impairment in the Middle-Lower Big Hole Watershed



Non-point source impairments to water quality in the Middle-Lower Big Hole watershed include high water temperature, sediment, nutrients and metals ([Table 3](#)). Factors that contribute to water quality impairments are largely human caused due to agriculture (grazing and hay production), historic mining, development, and forest land practices (roads and timber harvest); however weather patterns and natural causes also are contributing factors. Impairments in the Middle-Lower Big Hole River can largely be attributed to a loss of riparian vegetation resulting in channel changes. Other water

quality issues include dewatering, nutrient influx, abandoned mines and unpaved roads. As a result, streams may be listed on Montana DEQ's list of impaired waters. Listed streams in the Middle-Lower Big Hole are presented in [Table 4](#) and [Figure 3](#).

Table 3: Water quality impairments, causes, and remedies in the Big Hole River watershed. See for detailed impairments by sub watershed and stream. Source: (Montana DEQ, September 2009)

Water Quality Impairment	Cause of Impairment	Remedy
Temperature	Lack of riparian vegetation for shade Low summer time stream flows Widened channels	Restore Riparian Vegetation to: 1. Provide shade 2. Reduce width-to-depth ratios 3. Absorb nutrients 4. Reduce bank erosion 5. Prevent additional sediment inputs 6. To catch sediment before reaching the stream Improve Irrigation Efficiency Prevent sediment from washing into streams from roads. Use wetlands as a means to attain water quality
Nutrients	Natural sources Upland grazing runoff Streambank erosion Fertilizer use Animal feeding operations	
Sediment	Streambank erosion Upland erosion Erosion off unpaved roads Historic mining	
Metals	Abandoned mines Natural sources	
Other Watershed Issues	Cause of Issue	Remedy
Arctic grayling	High water temperature Low stream flows Entrainment in ditches	Riparian vegetation restoration to decrease water temperature Improve irrigation efficiency Provide fish passage or exclusion

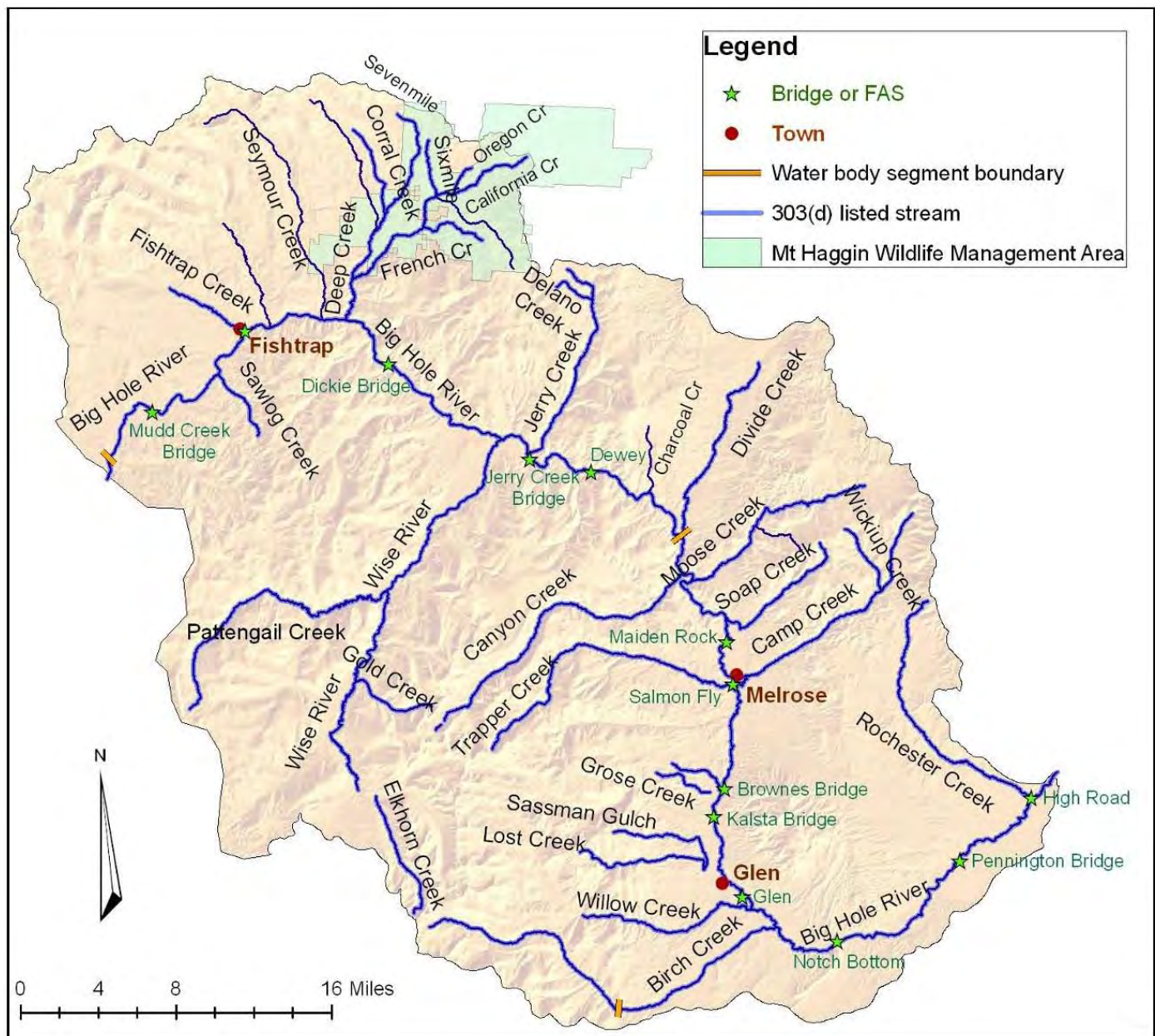
Table 4: Sub-watersheds, 2012 listed streams, and their impairment sources (4 pages). See Table 16 and Table 17 for details. See Figure 3 for map. See page 84 for sub-watershed summaries.

	Water body & Stream Description	Probable Cause of Impairment
Big Hole River Mainstem	Big Hole River –Middle Segment Pintlar Creek to Divide Creek	Copper Lead Temperature Alteration in stream-side or littoral vegetative cover Low flow alterations Physical substrate habitat alterations Sedimentation/ Siltation
	Big Hole River –Lower Segment Divide Creek to the mouth at Jefferson River	Cadmium Copper Lead Zinc Temperature Low flow alterations Physical substrate habitat alterations
Big Hole River - Fishtrap Creek	Fishtrap Creek Confluence of West & Middle Forks to mouth (Big Hole River)	Alteration in stream-side or littoral vegetative cover Low flow alterations Phosphorus (Total) Sedimentation/ Siltation
	Sawlog Creek Tributary to Big Hole River	Alteration in stream-side or littoral vegetative cover Arsenic Phosphorus (Total) Sedimentation/ Siltation

	Water body & Stream Description	Probable Cause of Impairment
Deep Creek	Corral Creek Headwaters to mouth (Deep Creek)	Alteration in stream-side or littoral vegetative cover Physical substrate habitat alterations Sedimentation/ Siltation
	Deep Creek Headwaters to mouth (Big Hole River)	Alteration in stream-side or littoral vegetative cover Low flow alterations Sedimentation/ Siltation
	California Creek Headwaters to mouth (French Cr-Deep Creek)	Arsenic Iron Copper Dewatering Bank erosion Sedimentation/ Siltation Riparian degradation Turbidity Fish habitat degradation
	French Creek Headwaters to mouth (Deep Creek)	Arsenic Copper Sedimentation/ Siltation
	Oregon Creek Headwaters to mouth (California Creek - French Creek - Deep Creek)	Alteration in stream-side or littoral vegetative cover Arsenic Copper Lead Other anthropogenic substrate alterations Physical substrate habitat alterations Sedimentation/ Siltation
	Twelvemile Creek Headwaters to mouth (Deep Creek)	Sedimentation/ Siltation
	Sevenmile Creek Headwaters to mouth (Deep Creek)	Alteration in stream-side or littoral vegetative cover Sedimentation/ Siltation
	Sixmile Creek Headwaters to mouth (California Creek)	Physical substrate habitat alterations Sedimentation/ Siltation
Wise River	Elkhorn Creek Headwaters to mouth (Jacobson Creek-Wise River)	Arsenic Cadmium Copper Lead Zinc Sedimentation/ Siltation
	Gold Creek Headwaters to mouth (Wise River)	Alteration in stream-side or littoral vegetative cover Phosphorus (Total) Sedimentation/ Siltation
	Grose Creek Headwaters to mouth (Big Hole River)	Alteration in stream-side or littoral vegetative cover Other flow regime alterations Phosphorus (Total) Sedimentation/ Siltation
	Pattengail Creek Headwaters to mouth (Wise River)	Alteration in stream-side or littoral vegetative cover Physical substrate habitat alterations Sedimentation/ Siltation
	Wise River Headwaters to mouth (Big Hole River)	Alteration in stream-side or littoral vegetative cover Low flow alterations Physical substrate habitat alterations Sedimentation/ Siltation Copper, Lead, Cadmium

	Water body & Stream Description	Probable Cause of Impairment
Big Hole River - Divide	Charcoal Creek Tributary of the Big Hole River	Nitrogen (Total) Phosphorus (Total) Sedimentation/ Siltation
	Jerry Creek Headwaters to mouth (Big Hole River)	Alteration in stream-side or littoral vegetative cover Copper Excess algal growth Lead Low flow alterations Physical substrate habitat alterations Sedimentation/ Siltation
	Delano Creek Headwaters to mouth	Alteration in stream-side or littoral vegetative cover Sedimentation/ Siltation
Divide Creek	Divide Creek Headwaters to mouth (Big Hole River)	Alteration in stream-side or littoral vegetative cover Low flow alterations Phosphorus (Total) Sedimentation/ Siltation Temperature Total Kjeldahl Nitrogen (TKN)
Big Hole River - Melrose	Moose Creek headwaters to mouth (Big Hole River)	Low flow alterations Sedimentation/ Siltation
	Camp Creek headwaters to mouth (Big Hole River)	Alteration in stream-side or littoral vegetative cover Arsenic Low flow alterations Phosphorus (Total) Sedimentation/ Siltation Solids (suspended/bedload)
	Trapper Creek Headwaters to mouth (Big Hole River)	Alteration in stream-side or littoral vegetative cover Copper Lead Zinc Arsenic Cadmium Low flow alterations Physical substrate habitat alterations Sedimentation/ Siltation
	Lost Creek	Alteration in stream-side or littoral vegetative cover Arsenic Nitrogen (Total) Phosphorus (Total) Sedimentation/ Siltation
	Wickiup Creek Tributary to Camp Creek (Big Hole River)	Alteration in stream-side or littoral vegetative cover Bottom deposits Copper Lead Mercury Phosphorus (Total)
	Canyon Creek Headwaters to mouth (Big Hole River)	Low flow alterations Sedimentation/ Siltation
	Soap Creek Headwaters to mouth (Big Hole River)	Alteration in stream-side or littoral vegetative cover Nitrogen (Total) Phosphorus (Total) Sedimentation/ Siltation
	Sassman Gulch Headwaters to mouth (Big Hole River)	Arsenic

	Water body & Stream Description	Probable Cause of Impairment
Lower Big Hole River	Birch Creek Headwaters to the USFS Boundary	Sedimentation/ Siltation Alteration in stream-side or littoral vegetative cover Low flow alterations Physical substrate habitat alterations
	Birch Creek USFS Boundary to mouth (Big Hole River)	Physical substrate habitat alterations Low flow alterations Other anthropogenic substrate alterations Alteration in stream-side or littoral vegetative cover Sedimentation/ Siltation
	Rochester Creek Headwaters to mouth (Big Hole River)	Arsenic Copper Lead Mercury Physical substrate habitat alterations Sedimentation/ Siltation
	Willow Creek Headwaters to mouth (Big Hole River)	Low flow alterations Sedimentation/ Siltation



Section II. Who Addresses Water Quality Issues?



This section identifies key players in the Big Hole River watershed that work under plans that ultimately improve water quality:

- Montana Department of Environmental Quality (DEQ)
- US Forest Service: Beaverhead Deerlodge National Forest (USFS)
- Bureau of Land Management (BLM)
- CCAA/US Fish and Wildlife Service (CCAA)
- Montana Fish, Wildlife and Parks (MFWP)
- Big Hole Watershed Committee (BHWC)

Each plan has unique goals, work areas, and action plans. This section provides a summary of each plan and reference to each plan. This watershed restoration plan incorporated the goals and actions identified in the other plans in order to create a coordinated approach to watershed restoration.

Water Quality: Montana Department of Environmental Quality

The TMDL & Impaired Waters List:

The Middle & Lower Big Hole River Planning Area TMDLs (Total Maximum Daily Loads) and Framework was finalized in 2009 (Montana DEQ, September 2009). The TMDL summarized non-point source water quality impairments, targets for restoration, and guidelines for restoration for the mainstem Big Hole River and several tributaries. A non-point source pollutant cannot be tied to a single source as the source is widespread. In contrast, a point source pollutant can be tied to single location or source. A summary of the impairments listed in the TMDL are provided in [Table 4](#).

Every two years, DEQ publishes a Water Quality Integrated Report that includes a list of impaired waters (Appendix A) (Montana DEQ, March 2012). Streams found on this list are not meeting one or more beneficial uses for water quality. There are four beneficial uses: 1. Drinking Water, 2. Aquatic Life, 3. Agriculture, 4. Recreation. The intention of this list is to provide a list of impaired waters in which TMDLs have been developed or need to be developed (303(d) list). A list of impaired waters and 303(d) listed streams in the Middle-Lower Big Hole watershed is provided in [Table 4](#), [Table 16](#) and [Table 17](#). Links to these resources are also provided:

- [Montana 2012 Water Quality Integrated Report](#)
- [Montana Impaired Waters List Summary \(Appendix A of Integrated Report\)](#)
- [303d lists on CWAIC](#)
- [Middle-Lower Big Hole River Planning area TMDL and Framework](#)

The TMDL produced for the Middle-Lower Big Hole developed targets that can be used to assess progress towards meeting water quality goals. The targets are described in detail in the TMDL document in Tables 5-2, 6-2, 7-4 and 8-1 (Montana DEQ, September 2009). Four impairments and the measures used in the targets are described in [Table 5](#).

Table 5: TMDL Target Summary

Impairment	Target Measures
Temperature	Maximum Allowable Temperature Over Naturally Occurring Temperatures, or Riparian Shade Channel Width-Depth Ratio Irrigation Water Management Inflows to Stream
Sediment	Percent Fine Sediment Channel Width-Depth Ratio Pool Frequency Fish Population BEHI (Bank Erosion Hazard Index) Rating Eroding Banks Riparian Shrub Cover Along Green Line Macroinvertebrate Assessment Periphyton Human Caused Sources
Nutrients	Total Nitrogen NO ₃ +NO ₂ as N Total Phosphorous Chlorophyll a Human Caused Sources Riparian Shrub Cover Along Green Line Percent Bare Ground Along Green Line
Metals: Cadmium, Copper, Mercury, Zinc and Lead	Montana's Numeric Water Quality Standards Supplemental Indicators Periphyton Sediment Metal Concentrations Human Caused Sources

USFS Beaverhead - Deerlodge Forest Plan

The US Forest Service Beaverhead-Deerlodge National Forest (BDNF) adopted a Forest Plan in 2009 (US Forest Service, 2009). The plan covers the entire forest of 3.38 million acres, of which the Middle-Lower Big Hole watershed is a part. The BDNF manages for four forest services and commodities: recreation, timber, grazing, and leasable minerals. Within the plan, BDNF addresses several natural resource and forest condition goals, objectives and standards (listed in [Table 6](#)). A link to the plan is provided:

- [Beaverhead Deerlodge National Forest Plan](#)

Table 6: USFS Beaverhead Deerlodge National Forest Plan - Resource Categories. Each category lists goals, objectives and standards. (US Forest Service, 2009)

Resource Categories - Chapter 3 of Forest Plan
Forest Wide
Air Quality
American Indian Rights & Interests
Aquatic Resources
Economic & Social Values
Fire Management
Heritage Resources
Infrastructure
Lands
Livestock Grazing
Minerals, Oil, Gas
Recreation & Travel Management
Scenic Resources
Soils
Special Designations
Timber Management
Vegetation
Wildlife Habitat

The plan outlines a move by the USFS to manage lands with an aquatics focus. New additions include the installation of a 300 foot buffer on each side of the stream to protect riparian zones, project work must not have a negative impact on aquatic resource without mitigation in key watersheds, and the creation of key watersheds for either 1) Fish, representing the highest quality watersheds, and 2) Restoration, representing the most impacted watersheds that are in need of restoration. As part of the plan, grazing plans are being reviewed to update grazing management and travel management is under review to address roads and road maintenance (US Forest Service, 2009). Appendix H of the Forest Plan outlines the key watersheds. The Middle-Lower Big Hole key watersheds are provided in [Table 7](#) and [Figure 4](#).

**Table 7: USFS Beaverhead Deerlodge National Forest Key watersheds in the Middle-Lower Big Hole watershed.
(US Forest Service, 2009)**

Key Watershed	Resource Emphasis
Seymour Creek	Restoration
Sullivan Creek	Restoration
Deep Creek	Fish
Upper Jerry Creek	Fish
Cherry Creek	Fish
Lost Creek	Restoration
Willow Creek (Upper and Lower)	Restoration
Birch Creek	Restoration

USFS Watershed Assessments in Middle-Lower Big Hole Watershed

See Also:

- Fleecer Mountains Watershed Assessment
- Birch Willow Lost Watershed Assessment

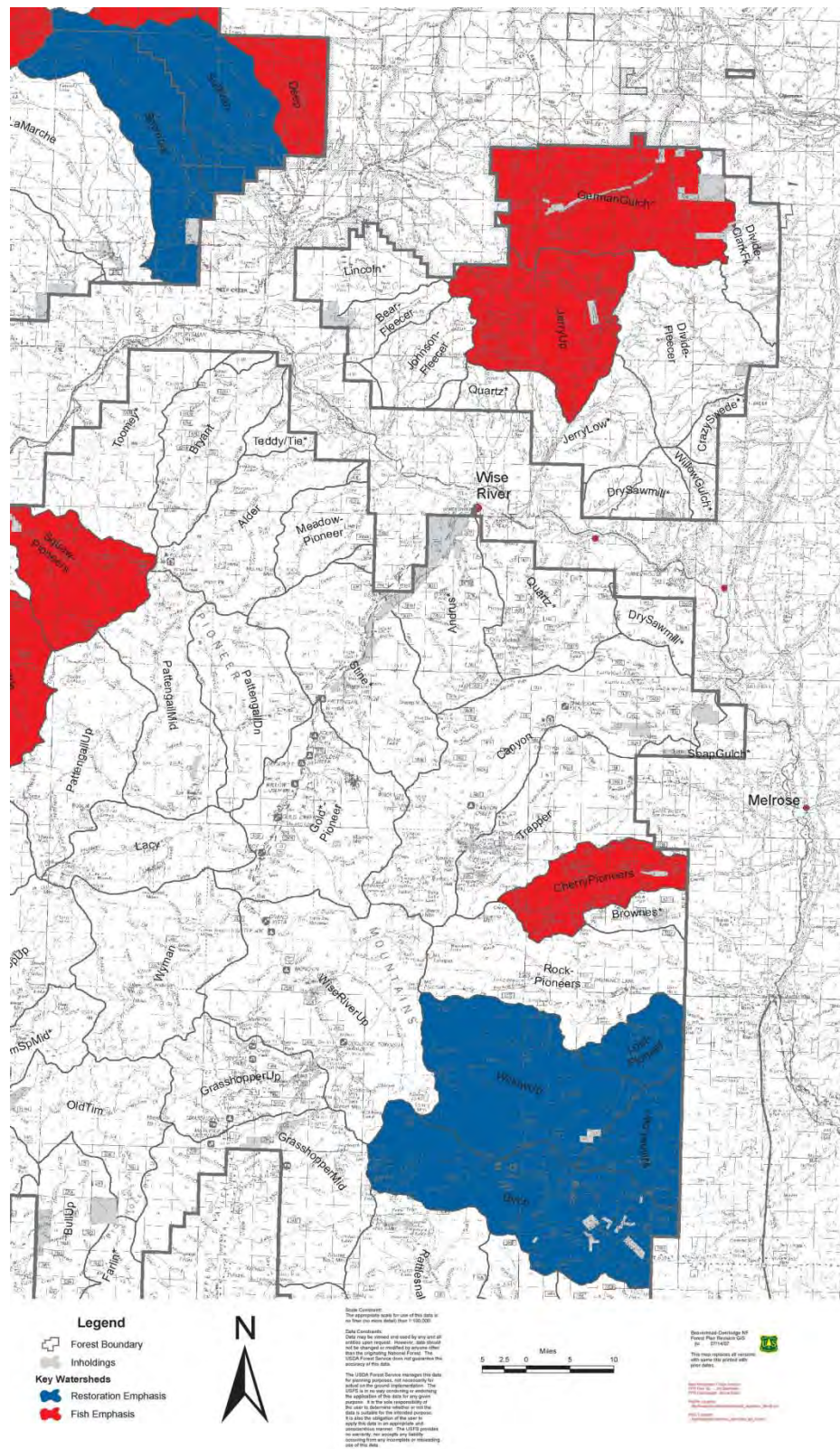


Figure 4: USFS Beaverhead-Deerlodge National Forest Plan - Key watersheds. Note: This map is cropped from its original size to show only the Middle-Lower Big Hole watershed. (US Forest Service, 2009)

The Forest Plan defines the area for the Middle-Lower Big Hole watershed in the "Management Area Direction: Big Hole Landscape."

The USFS Forest Plan specifically addresses water quality and the TMDL as "Total Maximum Daily Loads (TMDLs): Management actions are consistent with TMDLs. Where waters are listed as impaired and TMDLs and Water Quality Restoration Plans are not yet established, management actions do not further degrade waters. Water quality restoration supports beneficial uses." (US Forest Service, 2009).

The USFS also manages the Anaconda-Pintler Wilderness. The wilderness area is 158,516 acres and contains the headwaters of streams originating in the upper portion of the Middle-Lower Big Hole watershed, including Mudd Creek, Fishtrap Creek, LaMarche Creek, and Seymour Creek. Motorized travel is not allowed in the wilderness.

USFS Strategy

The USFS Beaverhead Deerlodge National Forest Plan outlines specific goals, objectives and standards for forest management in each category, one of which is Aquatic Resources, as "Chapter 3: Forestwide Direction." This chapter, and specifically the Aquatic Resources portion, details specific plans for how the USFS intends to meet water quality and other aquatic resources needs. Additional criteria are applied to the key watersheds described in section 1 of this document, a minimum of which is no negative ecological response in fish key watersheds. The objectives of the Aquatic Resources section is provided here, beginning on page 13 of the Forest Plan

- **Chapter 3: Forestwide Direction**

The following is a direct excerpt from the Forest Plan. Use the link above to see the entire document.

Objectives

Vegetation Management: Manage vegetation to reduce the risk of adverse wildfire impacts to isolated native fish populations and water resources at the sub-watershed scale (6th Code HUC).

TMDLs: Cooperate with the state, tribal, and other agencies and organizations to develop and implement Total Maximum Daily Loads (TMDLs) and their implementation plans for 303(d) impaired water bodies influenced by National Forest System lands.

Watershed Analysis: Prepare and maintain a schedule for completing watershed analysis, with emphasis on key watersheds shown on page 58, or listed in Appendix H (IN).

Management Indicator Species: Maintain habitat conditions for native species as reflected by changes in abundance of *Drunella doddsi* (Mayfly) as a Management Indicator Species (MIS).

Restoration Key Watersheds: Complete watershed assessments for restoration key watersheds and associated restoration activities.

Spawning Areas: Reduce impacts from grazing practices in known or suspected threatened, endangered or sensitive fish spawning areas to avoid or reduce trampling of redds that may result in adverse impacts to threatened or endangered species, loss of viability, or a trend toward federal listing of sensitive species (GM 4).

Riparian Management Objectives: Establish stream specific Riparian Management Objectives (RMOs) using watershed or other analyses incorporating data from streams at or near desired function. RMOs

are a means to define properly functioning streams and measure habitat attributes against desired condition. The following RMOs apply by stream reach until new RMOs are developed through watershed or other site specific analysis,

(West of the Continental Divide) *(not included in this document)*

(East of the Continental Divide)

- Entrenchment Ratio (all systems) Rosgen Channel: A - <1.4, B – 1.6 – 1.8, C - >10.3, E ->7.5.
- Width/Depth Ratio (all systems) Rosgen Channel: A - <11.3, B – <15.8, C - <28.7, E -<6.9.
- Sediment Particle size, % < 6.25mm (all systems) Stream Type: B3 - <12, B4 - <28, C3 - <14, C4 - <22, E3 - <26, E4 - <28.
- Large Woody Debris: (forested systems) >20 pieces per mile, > 6 inch diameter, >12 foot length.
- Bank Stability: (nonforested systems) >80% stable.

Wildland Fire Management: Suppression activities are designed and implemented so as not to prevent attainment of desired stream function, and to minimize disturbance of riparian ground cover and vegetation. Strategies recognize the role of fire in ecosystem function and identify those instances where fire suppression actions could perpetuate or damage long-term ecosystem function or native fish and sensitive aquatic species (FM 1).

Temporary Fire Facilities: Incident bases, camps, helibases, staging areas, helispots and other centers for incident activities are located outside of RCAs. An interdisciplinary team, including a fishery biologist, is used to predetermine incident base and helibase location during pre-suppression planning (FM 2).

Fire Suppression: Chemical retardant, foam, or additives are not delivered to surface waters. Guidelines (fire management plan) are developed to identify exceptions in situations where overriding safety or social imperatives exist (FM 3).

Mineral Inspection: Mineral activities are inspected and monitored. The results of inspections and monitoring are evaluated and applied to modify mineral plans, leases, or permits as needed to eliminate impacts that prevent attainment of desired stream function and avoid adverse effects on threatened and endangered aquatic species and adverse impacts to sensitive aquatic species (MM 6).

Road Drainage: Reconstruct road and drainage features that do not meet design criteria or operation and maintenance standards, or are proven less effective than designed for controlling sediment delivery, or retard attainment of desired stream function, or increase sedimentation in Fish or Restoration Key Watersheds (RF 3a).

Roads: Close and stabilize or obliterate and stabilize roads not needed for future management activities (RF 3c).

Recreation Sites: Existing, new, dispersed, or developed recreation sites and trails in RCAs are adjusted if they retard or prevent attainment of desired stream function, or adversely affect threatened or endangered species or adversely impact sensitive species. Adjustments may include education, use limitations, traffic control devices, increased maintenance, and relocation of facilities (RM 1).

Bull Trout Restoration: Prioritize bull trout restoration activities with consideration given to bull trout core areas population status and health. Coordination will occur with USFWS, other federal, state, and local agencies.

End excerpt from USFS Forest Plan, Chapter 3

Bureau of Land Management

The Bureau of Land Management (BLM) holds land in several locations in the Middle-Lower Big Hole watershed. The lands are managed by two field office: Butte Field Office and Dillon Field Office. Most BLM lands in the watershed are used primarily as leased grazing allotments. In the middle segment, the BLM also holds lands that are used often by recreationists.

The Dillon field office has completed several watershed assessments throughout the Big Hole. The Butte field office uses more site specific assessments called Land Health Evaluation Reports. Each evaluation reviews land health and water quality and provides recommendations based on reports. [Table 8](#) summarizes the evaluation results pertaining to water quality.

Dillon Office: East Pioneer Watershed Assessments

- East Pioneer Watershed Assessment
- Beaverhead West Watershed Assessment (Small , most north-east portion)

Butte Office: Land Health Evaluation Reports (to link to report, Ctrl + Click on allotment name)

- **Copp-Jackson Allotment**
- **Deep Creek Allotment**
- **Indian Creek Allotment**
- **Jerry Creek Allotment**
- **Moose Creek AMP Allotment**
- **Moose Creek Non-AMP Allotment**
- **Alder Creek Allotment**
- **Charcoal Mountain Allotment**
- **Dickie Allotment**
- **Foothills Allotment**
- **Harriet Lou Allotment**
- **Leffler Allotment**
- **Quartz Hill Allotment**

Table 8: BLM Allotments and Watershed Assessments pertaining to water quality (Source: See links to allotments and watershed assessments above)

Allotment	Sub-Watershed	Impaired Stream?	Meeting Riparian Standard? Cause?
Copp-Jackson	Big Hole River-Divide	No	Yes
Deep Creek	Deep Creek	Yes	Yes
Indian Creek	Big Hole River - Divide	No	No - Sedimentation
Jerry Creek	Big Hole River - Divide	Yes	No – Vegetation Loss
Moose Creek AMP	Big Hole River - Melrose	Yes	No – Channel degradation
Moose Creek Non-AMP	Big Hole River Melrose	Yes	Not Applicable
Alder Creek	Big Hole River - Fishtrap	No	Yes
Charcoal Mountain	Big Hole River - Divide	Yes	Yes
Dickie	Big Hole River - Fishtrap	No	Not Applicable
Foothills	Wise River	No	Yes
Harriet Lou	Wise River	No	Yes
Leffler	Big Hole River - Divide	No	Yes
Quartz Hill	Big Hole River - Divide	No	Yes
East Pioneer	Big Hole River Melrose Lower Big Hole River	Yes: Birch Creek Willow Creek Lost Creek	Varied

CCAA Program

The Candidate Conservation Agreement with Assurances (CCAA) program assesses and identifies impairments for restoration on lands enrolled in the CCAA program (Figure 5). Each land is assessed individually and the results of the assessment are largely confidential. Each land is required to follow guidelines for restoration and for meeting milestones in order to be part of the program. Program staff reviews lands for riparian condition, irrigation infrastructure condition, noxious weed infestation, and so on. More information is available in the CCAA plan and can be accessed using the following link:

- [Candidate Conservation Agreement with Assurances for Fluvial Arctic Grayling in the Upper Big Hole River](#)

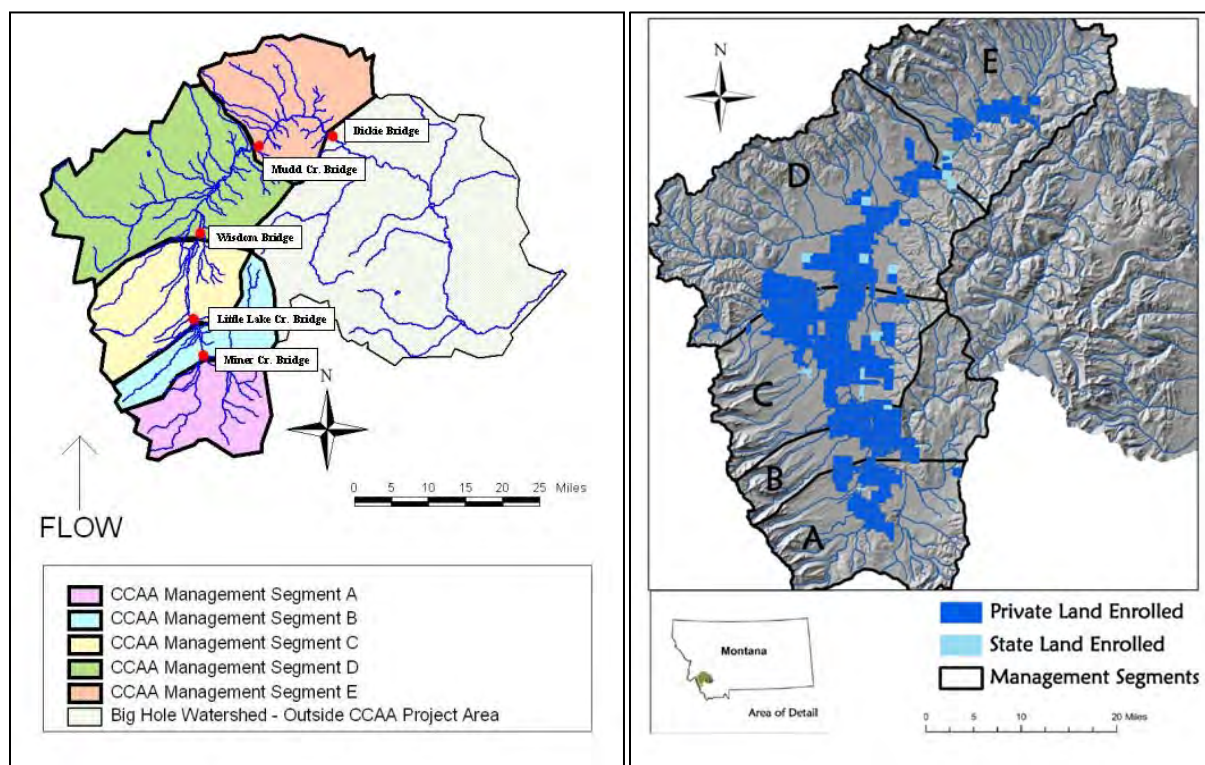


Figure 5: Left: CCAA Management Sections. Right: Area of state and private land enrolled into the Big Hole Grayling CCAA Program since August 1, 2006.

The CCAA program implements strategies and reviews progress to improve the Arctic grayling fishery through six mechanisms:

- I. Fisheries Population Monitoring
- II. Entrainment Surveys
- III. Instream Flow Monitoring
- IV. Instream Temperature Monitoring
- V. Channel Morphology Measurements
- VI. Riparian Health Monitoring

The strategies are in place to achieve three goals:

1. Improve riparian and channel function - Includes channel restoration, riparian fencing, willow planting, stockwater systems, grazing management plans, weed control.
2. Improve instream flows - Include communication, education, hydrological monitoring network, flow/drought management plans, improved infrastructure, programmatic effort.
3. Provide connectivity to important life-history habitats - includes improving stream flows, improve channel function, remove barriers - i.e. fish ladders, culvert replacements, minimize/eliminate entrainment.

The overarching goals of the program are two positive indicators:

1. Numbers of Arctic grayling show a positive population trend.
2. Arctic grayling occupy historic habitat.

CCAA Strategy

The CCAA program works towards five positive indicators. Progress towards these goals are measured and reviewed annually and every 5 years (Montana Fish, Wildlife and Parks and the U.S. Fish and Wildlife Service, 2006):

- Improve riparian and channel function - Measure: Sustainable Riparian Areas in 15 Years
- Improve instream flows - Measure: Meet established flow targets
- Provide connectivity to important life-history habitats - Measure: Increased fish distribution/use
- There will be and continue to be a positive trend in Arctic grayling numbers
- Arctic grayling will occupy historic habitats within 10 years of CCAA start (2006)

Middle-Lower Big Hole watershed CCAA Segments

The CCAA is divided into five management sections labeled sections A-E. A portion of section D and all of section E are located within the Middle-Lower Big Hole watershed.

Montana Fish, Wildlife and Parks

Montana Fish, Wildlife and Parks (MFWP) prioritize fisheries management work statewide under a Statewide Fisheries Management Plan, approved in 2012 and in action 2013-2018. Follow the link below to view the entire plan:

[Montana Fish, Wildlife and Parks Statewide Fisheries Management Plan](#) (Big Hole River, page 219)

The plan contains priorities by species and location for the entire Big Hole watershed. While MFWP works to improve fisheries is species driven, the environment for which these species rely is dependent on good water quality. Therefore, the BHCW can work with MFWP on restoring fish populations by addressing the water quality portion of their habitat needs. Portions of the plan that apply to the Middle-Lower Big Hole portions of the watershed are provided in **Table 9**.

Table 9: MFWP Statewide Fisheries Management Plan priorities for the Big Hole Watershed. This table includes priorities that apply to the Middle-Lower Big Hole River Watershed. The contents of this table for a direct copy from the statewide plan (Montana Fish, Wildlife and Parks, 2012). * denotes priority that applies to entire Big Hole River watershed.

Water	Miles/A cres	Species	Origin	Management Type	Management Direction
Big Hole River and Tributaries - Headwaters to Dickey Bridge	93 miles	Arctic grayling, Lake trout, Mountain whitefish, Burbot, Westslope cutthroat trout Brook trout, Rainbow trout, Brown trout, Hybridized cutthroat trout	Wild Wild	Conservation General/ Special Regulations	Continue native species conservation to maintain a viable, self-sustaining population Continue to manage to minimize potential impact on viability of Arctic grayling and secondarily for recreational angling
Habitat needs and activities: Continue to improve stream flows, improve riparian habitats, improve stream channel form and function, continue to prevent fish entrainment into irrigation ditches.					
Big Hole River and Tributaries - Dickey Bridge to Mouth	72 miles	Brook trout, Rainbow trout, Brown trout, Hybridized cutthroat trout, Mountain whitefish(N)	Wild	General	Maintain present numbers and sizes. Consider increasing angler harvest to reduce numbers if necessary to maintain fish growth and, in some instances, to ensure they are not limiting the viability of westslope cutthroat trout or Arctic grayling populations.
		Westslope cutthroat trout (N)	Wild	Conservation	Continue native species conservation to maintain a viable, self-sustaining population
Habitat needs and activities: Implement and refine drought management plans to minimize impacts on fish populations. Continue to look for opportunities to increase river flows and develop spawning habitat in the Big Hole River downstream from Notch Bottom FAS. Pursue Fishing Access acquisition near High Road Bridge at Twin Bridges and between East Bank FAS and Jerry Creek FAS.					

Wise River and Tributaries	25 miles	Brook trout, Rainbow trout, Brown trout, Hybridized cutthroat trout, Mountain whitefish (N) Westslope cutthroat trout (N)	Wild Wild	General Conservation	Maintain present numbers and sizes. Consider increasing angler harvest to reduce numbers if necessary to maintain fish growth and, in some instances, to ensure they are not limiting the viability of westslope cutthroat trout. Continue native species conservation to maintain a viable, self-sustaining population
Habitat needs and activities: Develop drought management plan for Wise River. Pursue opportunities for habitat improvements in river section from Pettengill Creek to confluence with Big Hole which was affected by the Pettingill Dam breach in 1920's. Determine if Wise River could serve as possible Arctic grayling reintroduction area.					
*Mountain Lakes		Westslope cutthroat trout, Hybridized cutthroat trout, Yellowstone cutthroat trout, Rainbow trout, Brook trout, Golden trout	Wild	Put- Take/ General	Monitor mountain lakes. Continue to manage stocking and harvest to maintain present numbers and sizes. Consider increasing angler harvest to reduce numbers if necessary to maintain fish growth. Where appropriate pursue opportunities to expand golden trout into mountain lakes where such management would not conflict with cutthroat conservation.
*Cutthroat Conservation Streams	350 miles	Westslope cutthroat trout and other native fish species	Wild/ Transport	Conservation	Secure populations in tributary streams by removing non-native fish upstream of fish barriers and restoring westslope cutthroat trout.
Habitat needs and activities: Work with Forest Service, BLM and DRNC and private landowners on grazing regimes to minimize livestock impacts to streams. Work on water conservation projects to improve stream flows. Construct or utilize natural fish barriers to preclude non-native fish movement upstream. Remove non-native fish and restore WCT upstream.					

Water	Miles/A cres	Species	Origin	Management Type	Management Direction
Big Hole River and Tributaries - Headwaters to Dickey Bridge	93 miles	Arctic grayling, Lake trout, Mountain whitefish, Burbot, Westslope cutthroat trout Brook trout, Rainbow trout, Brown trout, Hybridized cutthroat trout	Wild Wild	Conservation General/ Special Regulations	Continue native species conservation to maintain a viable, self-sustaining population Continue to manage to minimize potential impact on viability of Arctic grayling and secondarily for recreational angling
Habitat needs and activities: Continue to improve stream flows, improve riparian habitats, improve stream channel form and function, continue to prevent fish entrainment into irrigation ditches.					

Big Hole River and Tributaries - Dickey Bridge to Mouth	72 miles	Brook trout, Rainbow trout, Brown trout, Hybridized cutthroat trout, Mountain whitefish(N)	Wild	General	Maintain present numbers and sizes. Consider increasing angler harvest to reduce numbers if necessary to maintain fish growth and, in some instances, to ensure they are not limiting the viability of westslope cutthroat trout or Arctic grayling populations.
		Westslope cutthroat trout (N)	Wild	Conservation	Continue native species conservation to maintain a viable, self-sustaining population
Habitat needs and activities: Implement and refine drought management plans to minimize impacts on fish populations. Continue to look for opportunities to increase river flows and develop spawning habitat in the Big Hole River downstream from Notch Bottom FAS. Pursue Fishing Access acquisition near High Road Bridge at Twin Bridges and between East Bank FAS and Jerry Creek FAS.					
Wise River and Tributaries	25 miles	Brook trout, Rainbow trout, Brown trout, Hybridized cutthroat trout, Mountain whitefish (N)	Wild	General	Maintain present numbers and sizes. Consider increasing angler harvest to reduce numbers if necessary to maintain fish growth and, in some instances, to ensure they are not limiting the viability of westslope cutthroat trout.
		Westslope cutthroat trout (N)	Wild	Conservation	Continue native species conservation to maintain a viable, self-sustaining population
Habitat needs and activities: Develop drought management plan for Wise River. Pursue opportunities for habitat improvements in river section from Pettengill Creek to confluence with Big Hole which was affected by the Pettingill Dam breach in 1920's. Determine if Wise River could serve as possible Arctic grayling reintroduction area.					
*Mountain Lakes		Westslope cutthroat trout, Hybridized cutthroat trout, Yellowstone cutthroat trout, Rainbow trout, Brook trout, Golden trout	Wild	Put- Take/ General	Monitor mountain lakes. Continue to manage stocking and harvest to maintain present numbers and sizes. Consider increasing angler harvest to reduce numbers if necessary to maintain fish growth. Where appropriate pursue opportunities to expand golden trout into mountain lakes where such management would not conflict with cutthroat conservation.
*Cutthroat Conservation Streams	350 miles	Westslope cutthroat trout and other native fish species	Wild/ Transport	Conservation	Secure populations in tributary streams by removing non-native fish upstream of fish barriers and restoring westslope cutthroat trout.
Habitat needs and activities: Work with Forest Service, BLM and DRNC and private landowners on grazing regimes to minimize livestock impacts to streams. Work on water conservation projects to improve stream flows. Construct or utilize natural fish barriers to preclude non-native fish movement upstream. Remove non-native fish and restore WCT upstream.					

Big Hole Watershed Committee

The BHWC met with its board members, residents, landowners, agencies, counties and conservation groups to determine the top priorities and methods for watershed restoration planning. The results are consolidated and provided in [Figure 6](#).

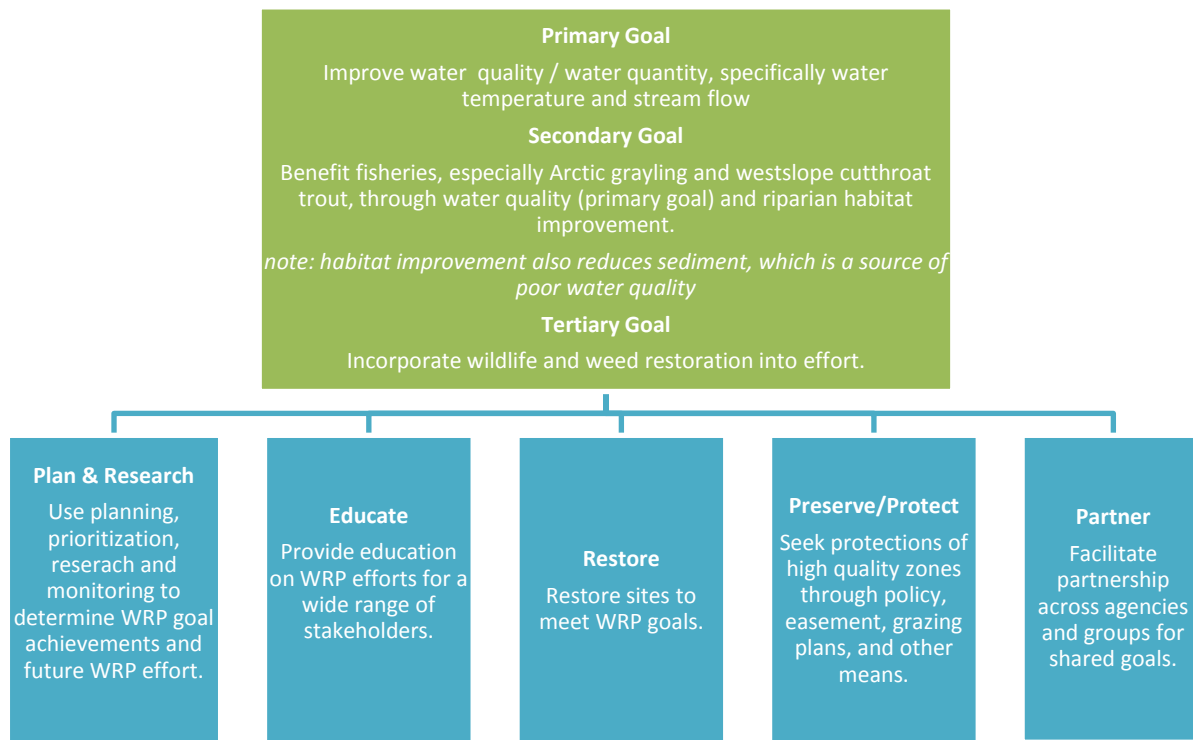


Figure 6: BHWC Watershed Restoration Planning Goals and Methods

The BHWC implements the goals and methods through four categories:

- Land use planning
- Wildlife
- Weeds/invasive Species
- Water quality/quantity

BHWC Strategy

The BHWC is a strong supporter of the restoration in the entire Big Hole watershed. The BHWC will measure success by:

1. Support and participation or partnership with Middle-Lower Big Hole restoration efforts. This includes continued close contact with agency employees, private landowners, and other stakeholders and continued fiscal support of restoration efforts.
2. Work with private landowners outside of the CCAA program on restoration goals when applicable.
3. Restore natural function ecosystems. Primarily, this means restoring adequate riparian vegetation and appropriate channel shape to meet water quality and fish and wildlife needs. Advocate the use the wetlands in wetland restoration as an important watershed restoration tool to improve water quality.
3. Support installation of functioning headgates, water measurement, and fish passage of every irrigation withdrawal point in the Big Hole watershed. In addition, BHWC supports the use of stockwater tanks to reduce late season irrigation withdrawals and supports the reconfiguration of irrigation systems for overall water savings to maintain instream flows. The BHWC recognizes that increased stream flows are critical to the health of the entire watershed.
4. Engagement and Education: The BHWC role in the restoration is to provide opportunities and encourage participation from stakeholders in activities, learning, listening and education on restoration activities. The BHWC will work to continue and increase support and engagement the restoration. Methods include monthly meetings with presentations, invitations to agencies to present progress and needs, information and announcements posted on website, social media, e-mail and newsletters, host public events called "tours" to view completed work, and more. This is measured by:
 - Attendance at BHWC monthly meetings
 - Number of social media members
 - Number of members and/or annual donations
 - Attendance at BHWC "tours" or other public events.
 - Participation in BHWC Drought Management Plan

Wetlands for Water Quality

Montana Department of Environmental Quality and Montana Wetlands Legacy Partnership embarked on a project from 2011-2012 to incorporate wetlands into local watershed restoration plans as a means to meet water quality targets set forth by the TMDL. Historically, there has not been a large focus on using wetlands to help meet water quality goals in streams and rivers in the state. Two watershed groups were chosen to serve as a demonstration - the Big Hole and the Gallatin. These two groups were chosen because they were each beginning their watershed restoration plan, neither group had previously done wetland projects, and they represented a diverse area - the Big Hole as a rural and agricultural watershed and the Gallatin as an urban and developed watershed. For two field seasons, watershed representatives worked with Steve Carpenedo of Montana DEQ and Tom Hinz of Montana Wetlands Legacy Partnership to review the existing wetlands capacity, the water quality needs, and identified how wetlands could benefit water quality. Using reports generated by Montana DEQ, potential wetlands projects were sought based on TMDL targets and the potential for wetlands to aid in meeting TMDL targets. The scope and area were narrowed based on TMDL planning areas and the potential for sites to be impacted (See [Figure 7](#) and [Figure 8](#)). Sites were reviewed on the ground and a short list of potential projects was generated in Section IV under "Restore". An end goal of the project was to incorporate wetlands into this watershed restoration plan.

Resources

Montana DEQ's Exploring Your Aquatic Resources Mapping Program

Middle-Lower Big Hole River TMDL

Purpose

The BHCW is one of two demonstration watersheds hosted by the Montana Department of Environmental Quality Wetland Program and Montana Wetlands Legacy Partnership. The goal of the program was to incorporate wetlands into watershed restoration planning for watershed groups. Specifically, wetland priorities were established to meet water quality goals within the watershed restoration plan.

Partners

Currently several groups address wetland and water quality related issues. Our partners for this project include:

- Big Hole Watershed Committee
- Montana Department of Environmental Quality Wetland Program
- US Forest Service/Beaverhead-Deerlodge National Forest
- Montana Wetlands Legacy Partnership
- Montana Fish, Wildlife and Parks
- Montana Natural Heritage
- Private Landowners

Middle and Lower Big Hole TMDL Planning Areas: TMDL Contributing Areas Map



Figure 7: Middle-Lower Big Hole Planning Area TMDL Contributing Areas map. Watershed labels refer to a contributing area report (use the link provided above to see these reports). From Steve Carpenedo, Montana Department of Environmental Quality Wetlands.

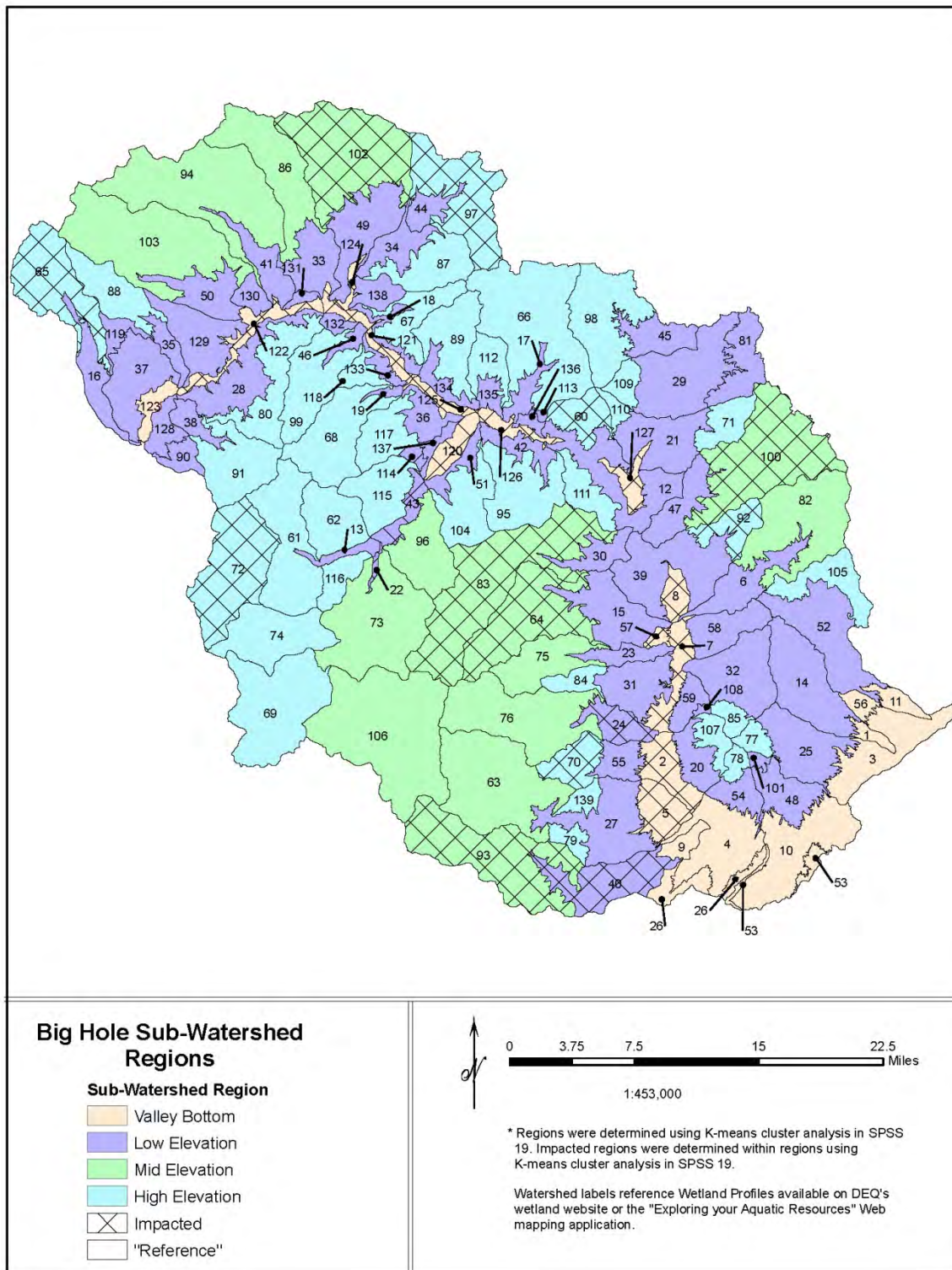
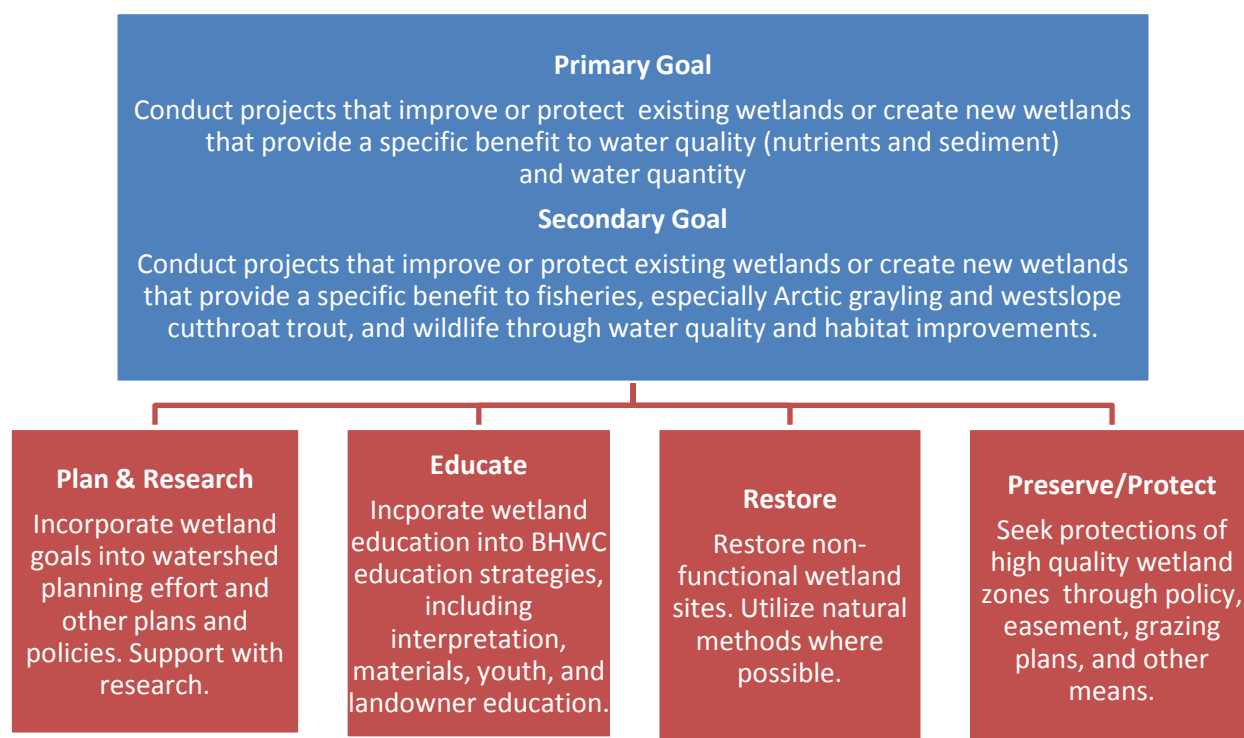


Figure 8: Middle-Lower Big Hole TMDL Planning Area Sub-Watersheds. Cross-hatched watersheds are considered more likely to be impacted based on many factors including roads, mining, irrigation, timber, water quality data, etc. Map created by Steve Carpenedo, Montana Department of Environmental Quality Wetlands. Sub-watershed labels refer to a short report.

Wetlands Goals and Priorities



Priority Wetland Reaches:

Priority reaches were selected based on impacted water quality and the availability of wetland resources. See [Figure 3](#) for map.

- **Top Priority: Big Hole River Mainstem - Pintlar Creek to Mouth**

Mitigate for water temperature by seeking wetlands that will have a direct effect on water temperature, and wetlands that will have an indirect effect on water temperature by improving resiliency through stream flow maintenance, vegetation, and channel shape alteration.

- **Secondary Priority: Impaired Waters**

Listed tributaries with listings other than metals

Address tributaries on a case by case basis based on recommendations made by the TMDL, existing and available wetland zones, and sources for water quality improvement. Several tributaries are listed for metals. While metals are a significant negative impact, wetlands were not targeted towards metals reduction for this project. Tributaries with the greatest available wetland potential and identified as impacted watersheds are:

Top Priority Tributaries:

<i>Fishtrap Creek</i>	<i>Deep Creek</i>
<i>Wise River</i>	<i>Jerry Creek</i>
<i>Divide Creek</i>	<i>Trapper Creek</i>
<i>Willow Creek</i>	<i>Birch Creek</i>

Wetlands for Water Quality Objectives

Plan and Research

- Incorporate wetlands prioritization into the Middle-Lower Watershed Restoration Plan.
- Support the wetland prioritization with research and studies.

Education

- Provide wetland interpretation where appropriate, such as within fishing access sites.
- Include wetland function in landowner education efforts.

Restore

- Identify and implement high quality wetland restoration projects that will have direct impact on goals.

Preserve & Protect

- Work with four counties to include wetland protection in county Growth Policies.
- Work with three Conservation Districts on wetland permitting, protection and education.
- Include language for wetland role and protection in the Big Hole Watershed Committees Land Use Planning effort - a committee working towards protection of channel migration zones from development.
- Seek support for landowners to protect lands through easement or other protections. Solicit landowners with identified high quality wetlands to participate in easement.

Section III: What Should the Watershed Look Like?

Water Quality Goals & Priorities



Blended Watershed Restoration Goals

There are several working watershed restoration plans in the Middle-Lower Big Hole watershed. Each varies by location, lead agency or group, and goals. However, many of the actions described in these plans ultimately benefit water quality. These plans work in unison in the Middle-Lower Big Hole watershed and are summarized in Section II of this document.

In order to fully reach watershed restoration and water quality goals in a timely and cost effective manner and to leverage expertise and resources most effectively, it is important to blend goals from the several current watershed restoration plans (see Section II) into one meaningful summary that focuses on watershed restoration. **Table 10** combines the goals of each of these plans into seven watershed restoration categories.

Table 10: Blended watershed restoration goals from state, federal, and local groups.

Watershed Restoration Category	Category Goal
Water Temperature	<ul style="list-style-type: none"> ● Improve water temperature, especially during July - September
Stream Flow	<ul style="list-style-type: none"> ● Improve stream flows, especially during July - September
Sediment	<ul style="list-style-type: none"> ● Reduce sediment inputs
Nutrients	<ul style="list-style-type: none"> ● Reduce nutrient inputs
Fish & Wildlife	<ul style="list-style-type: none"> ● Conduct activities that will improve fish and wildlife population, diversity, and native species. ● Prevent the decline of species considered threatened or endangered. ● Support coexistence with predator species and reduce human-predator conflict. ● Reduce the spread of wildlife-cattle diseases.
Weeds/Invasive Species	<ul style="list-style-type: none"> ● Prevent the spread of noxious weeds and invasive species already present. Prevent the introduction of new noxious weeds and invasive species.
Regulatory Protections	<ul style="list-style-type: none"> ● Support existing regulatory protections. ● Advocate and support the development and implementation of new regulatory protections. ● Advocate for the insertion of watershed protections wherever possible into revision or development processes.

Restoration Priorities and Locations

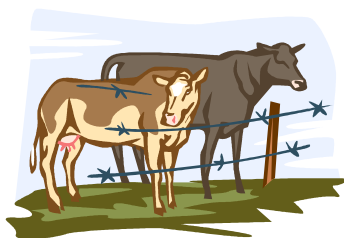
The top restoration priorities are:

- Repair damaged riparian zones
- Improve irrigation infrastructure, add water measurement and fish passage devices.
- Take all measures possible to improve stream flows and water temperatures. This includes the use of wetlands, voluntary irrigation reductions and improvements, riparian corridors, etc.
- Protect completed restoration and lands in good condition. Incentivize good watershed stewardship.
- Protect the river corridor with land use planning and regulatory protections.
- Promote collaboration among stakeholders

The top restoration priority regions are:

- Section D & E of the CCAA
- USFS Restoration Watersheds Seymour Creek, Sullivan Creek, Lost Creek, Willow Creek and Birch Creek.
- BLM lands allotments not meeting riparian standards or water quality standards
- Stream Restoration:
 - French Creek* *Middle Big Hole River*
 - Lower Big Hole River* *Big Hole River at Glen*
- Wetlands Top Priority Tributaries:
 - Big Hole River Mainstem – Pintlar to the mouth*
 - Fishtrap Creek* *Deep Creek*
 - Wise River* *Jerry Creek*
 - Divide Creek* *Trapper Creek*
 - Willow Creek* *Birch Creek*

Best Management Practices



The Big Hole watershed has a reputation for its progressive, grassroots efforts towards watershed restoration. This is largely due to the immense challenges the watershed has faced in the last two decades and the dedication of the people who live and work here. As a result, many of the restoration and management tactics used are bottom-up. That is, they are developed by the people who use them. Therefore, we know the practices are used since they are bought-into, they are reasonable,

and they are effective. They are also voluntary, yet there is a high rate of participation and support. Many of the methods rely on conversations, understanding, long-term solutions that work for all (consensus), partnership/coordination, and education. Our Best Management Practices mirror this approach. See [Table 11](#) for Best Management Practices.

Table 11: Best Management Practices

Management Strategy	Watershed Restoration Category	Schedule
Education <i>Private land ownership and public land manager buy-in to restoration goals is critical to ensure participation and support.</i> Request reporting of progress annually from CCAA program, USFS, BLM and BHWC (Watershed Restoration Plan review, report on progress). Presentations will be made to the BHWC meetings. Provide public opportunity for involvement to promote restoration goals. This occurs through student education, public tours, seminars, web and social media management, printed media, etc. Encourage involvement, partnership and collaboration from diverse viewpoints and open communication.	All All All	BHWC meetings occur monthly. Each group will be invited to present 1 time/year. Several times annually/ongoing
Drought Management Plan <i>The BHWC Drought Management Plan includes triggers and voluntary actions to increase stream flow, and subsequently decrease water temperature, during times of drought. This plan is reviewed annually and implemented when triggers are met. Enrolled landowners in the CCAA program follow additional drought management triggers.</i>	Temperature Stream Flow Fish & Wildlife	Reviewed annually, implemented as needed.
Irrigation Infrastructure <i>Just as it is important to restore the watershed, it is equally important to maintain the ranching operations located in the valley. While irrigation is critical to watering stock and pasture for feed production, infrastructure improvements can improve efficiency and water quality.</i> BMPs for irrigation improvements include:	Stream Flow, Temperature Fish	One per year

<ul style="list-style-type: none"> • Replace/improve headgates located on rivers and tributaries to allow water control, water measurement, and fish passage/deter fish entrainment. • Install offsite stockwater tanks when doing so would provide an instream water savings. • Conversion of one type of irrigation system to a more efficient system to improve instream flows (without compromising other water quality parameters) 	<p>In some cases, sediment</p> <p>Stream Flow, Temperature</p>	<p>until complete - led by CCAA program, supported by BHWC. As needed</p>
<p>Riparian Vegetation</p> <p><i>The restoration of riparian vegetation was identified in the TMDL as the top rated activity to achieve multiple watershed restoration goals and can decrease sediment loading, increase stream flows, and decrease stream temperatures. Several projects to improve riparian restoration in the Big Hole River have been completed, both through active manipulations (i.e. plantings, machine manipulated channels) and passive (i.e. fencing to reduce grazing pressure) restoration. In a review of CCAA restoration, staff reported passive restoration to be the best means of riparian restoration for use of funds and results. Therefore, efforts in riparian restoration will focus on passive restoration. In select cases, active restoration may need to supplement passive restoration.</i></p> <p>BMPs to improve riparian vegetation include:</p> <ul style="list-style-type: none"> • Fencing to reduce grazing pressure • Off-stream watering facilities or water gaps • Livestock protection structures • Hardened stream crossings with fencing to protect riparian vegetation • Grazing management plans to improve upland and riparian vegetation conditions <p>BLM and USFS: Review grazing leases to promote healthy riparian zones and wetlands and to sustain the fishery.</p> <p>CCAA: Continue implementation of grazing management plans including the use of riparian fencing to reduce riparian pressure and allowing riparian zones to return to functioning condition.</p>	<p>Nutrients Sediment Stream Flow Temperature Fish & Wildlife</p>	<p>On-going</p>
<p>Wetlands</p> <p><i>The restoration of degraded wetlands can provide a positive impact to water quality and quantity. Wetlands can retain water for late season flows, cool waters, absorb nutrients, and trap sediment and other toxic substances.</i></p> <p>BMPs for wetland restoration or creation can include:</p> <ul style="list-style-type: none"> • Education on the value and function of wetlands • Proper identification of potential wetland areas that can improve water quality/quantity 	<p>Stream Flow Temperature Nutrients Fish & Wildlife Sediment</p>	<p>Identify opportunities - 2013</p>

<ul style="list-style-type: none"> • Restore/repair dikes, ditches, and other irrigation control structures to improve hydrologic connectivity in potential wetland areas • Support efforts that can protect existing wetlands, such as easements, NRCS's conservation and wetland reserve programs, and grazing management plans • Beaver management where appropriate <p>BLM: Notes degraded wetlands. Work with BLM staff on remedy.</p> <p>USFS: Identify degraded wetlands for possible restoration. Work with BLM staff on remedy.</p> <p>CCAA: Support incorporation of wetlands in landowner plans as a grazing management or irrigation management strategy. Support restoration as needed.</p> <p>Other: Support restoration of wetlands outside of the CCAA enrolled lands, USFS and BLM lands.</p>		
<p>Regulatory Environment</p> <p><i>Regulations are an important tool for long-term watershed protections. An existing 150 foot development setback is in place and growth policies touch on the importance of resources in the Big Hole watershed. The following are guidelines for a positive regulatory environment:</i></p> <ol style="list-style-type: none"> 1. Land use development standards should be in place to adequately protect the most sensitive watershed resources, particularly those under restoration currently (this includes riparian zones and wetlands) from development. 2. Incentives should be used to encourage landowner driven conservation, such as the use of easements and payment for ecological services. 3. County Growth Policies should reflect the importance the protection of watershed resources in the Big Hole watershed for water quality, tourism, fish and wildlife, and rural landscape. 	Regulatory protections	In-process

Restoration Objectives and Load Reductions

Riparian restoration goals can be further broken down into objectives. Each restoration objective can be tied to a reduction in load causing the water quality impairment or the resolution of a water quality or natural resource issue. These improvements are based on estimates and represent a best guess as to potential watershed improvement as a result of an activity. [Table 12](#) lists watershed restoration objectives, potential load reductions and the source of the provided information. See [Table 18](#) through [Table 26](#) for detailed targets by watershed and stream reach.

Table 12: Restoration objectives and associated potential load reductions.

Remedy	Watershed Restoration Category	Restoration Objective	Load Allocation Associated with:	Source
Riparian Condition	Temperature	<p>Riparian Shade: Middle Big Hole: Existing percent shade is between 1.4% and 7.9% Lower Big Hole: Existing percent shade is between 2.1% and 14.2%.</p> <p>Big Hole River between Pintlar Creek and Wise River should be 80% willows, 20% grass cover (3.5% shade) Big Hole River from Butte Diversion to mouth should be 30% cottonwood gallery, 70% grass cover (7.4% shade) Divide Creek should be 80% willows, 20% grass cover (27% shade).</p>	<p>Middle Big Hole: Increase percent shade between 5% and 15% Lower Big Hole: Increase percent shade between 3.5% and 42%</p>	DEQ TMDL (Table 8-10, Table 8-11, Table 8-1)
		<p><i>On USFS Lands:</i> Large Woody Debris: (forested systems) >20 pieces per mile, > 6 inch diameter, >12 foot length. Bank Stability: (nonforested systems) >80% stable.</p>		USFS Plan
	Sediment	Stream banks should have a stable or improving trend. Non-eroding banks for at least 85% of reach for A, B and C type streams.		DEQ TMDL (Table 5-2)
	Sediment	Percent of streambank with riparian shrubs >48%		DEQ TMDL (Table 5-2)
		Conservation and restoration of riparian habitats by fencing, off-channel livestock watering facilities,		CCAA (Table 5)

		<p>prescribed grazing plans, more active livestock management, etc.</p> <ul style="list-style-type: none"> Frequency of livestock presence in riparian areas with decrease significantly during first 5 years leading to rapid improvement. Steady riparian recovery thereafter with "sustainable" status achieved on 95% of enrolled lands by year 15. <p>Current Riparian Assessment Rankings:</p> <ul style="list-style-type: none"> 9.5 miles "Not Sustainable" 110 miles "At Risk" 57 miles "Sustainable" 176.5 total assessed miles 	<p>68% or 119.5 miles of enrolled lands need to achieve "Sustainable Rating"</p> <p>Priority Areas: Sections C & D of CCAA (near Wisdom)</p>	
Width-Depth Ratio (w/d ratio)	Temperature, Sediment	On the Middle Big Hole River between Pintlar Creek and Wise River, decrease the median w/d ratio from 92 to ≤ 60	34% decrease in width-to-depth	DEQ TMDL (Table 8-10)
	Sediment	<p><i>On USFS Lands:</i></p> <p>Entrenchment Ratio (all systems) Rosgen Channel: A - <1.4, B - $1.6 - 1.8$, C - >10.3, E - >7.5.</p> <p>Width/Depth Ratio (all systems) Rosgen Channel: A - <11.3, B - <15.8, C - <28.7, E - <6.9.</p>		USFS Plan
Irrigation	Temperature	Warm water irrigation return flows to the Big Hole River and its tributaries are unknown, but likely a minor source. Address in adaptive management.	If present, reduce warm water irrigation return flows by 50%.	DEQ TMDL (Table 8-10)

		Improve irrigation efficiency	15% improvement in irrigation efficiency during warmest months (mid-June through August)	DEQ TMDL (Table 8-1)
In-Stream Flow	Temperature	Big Hole River and its tributaries, stream flows are often below flows recommended for most sensitive uses.	All reasonable irrigation water management practices with water savings applied to in-stream flow via local, voluntary approach.	DEQ TMDL (Table 8-10)
		Increased flows through: water rights compliance, improved irrigation management, less water intensive crops, instream flow leases, stockwater wells, etc. (Table 5, CCAA Plan)	Water right compliance, installation of headgates/measuring devices within 5 years of enrollment As part of landowner site plans, ensure streamflows meet flow targets 75% of the time by 2015.	CCAA (Table 5)
In-Stream Sediment	Sediment	Percent fine surface sediment <6mm comparable to reference. Percent fine surface sediment <2mm average value not to exceed 15% for E channels and 13% for all other channels. Width/Depth ratio, see above. Entrenchment ratio >1.8 for E Channels, >5.1 for C Channels, >3.7 for E channels. Pool frequency 5.5 to median bankfull width per reach. Sediment load reductions achieved through riparian re-vegetation, riparian and upland grazing management, and road maintenance BMP's.	Sediment load varied by segment (See Table 18 through Table 26). Sediment loads ranged from 129 tons per year to 191,651 tons per year. Sediment load reductions required to meet water quality targets ranged between 8% - 40%.	DEQ TMDL Table 5-2 Table 9-1
		<i>On USFS Lands:</i> Sediment Particle size, % < 6.25mm (all systems) Stream Type: B3 - <12, B4 - <28, C3 - <14, C4 - <22, E3 - <26, E4 - <28.		USFS

Fish: Wild (not Arctic Grayling)	Temperature	<p><i>Improve wild fisheries:</i></p> <ul style="list-style-type: none"> • Secure and restore native Westslope Cutthroat Trout Populations • Alter harvest to maintain growth • Improve stream channels • Reduce fish entrainment in ditches • Improve flows to benefit fish • Improve and expand drought management plans 		MFWP
		<p><i>On USFS Lands:</i></p> <p>Spawning Areas: Reduce impacts from grazing practices in known or suspected threatened, endangered or sensitive fish spawning areas to avoid or reduce trampling of redds that may result in adverse impacts to threatened or endangered species, loss of viability, or a trend toward federal listing of sensitive species (GM 4).</p> <p>Management Indicator Species: Maintain habitat conditions for native species as reflected by changes in abundance of <i>Drunella doddsi</i> (Mayfly) as a Management Indicator Species (MIS).</p>		USFS
Fish: Arctic Grayling		Positive trend grayling population within 5 years (2010)	n/a	CCAA
		Grayling reoccupation of historic waters within 10 years (2015)	n/a	CCAA
Nutrients	Nutrients	Immediate reduction in threat at time of site specific plan implementation	varied	CCAA
		<p>Total Nitrogen < 0.320 mg/l</p> <p>NO₃ + NO₂ as N < 0.100 mg/L</p> <p>Total Phosphorous < 0.048 mg/L</p> <p>Chlorophyll a < 150 mg/m² for foothill/valley</p> <p>Percent shrubs along greenline, except where</p>	<p>15%-92% reduction in nitrogen</p> <p>0%-90% reduction in phosphorus</p>	DEQ TMDL (Table 6-2, Section 6-

		<p>coniferous $\geq 49\%$ Percent bare ground along greenline $\leq 5\%$</p> <p>Restoration to improve nutrients most often relates to improving riparian grazing and fertilizer use. Recommendations include improving streamside grazing management, off-stream livestock watering, irrigation and fertilizer improvement, and improving streamside vegetative buffer (TMDL Section 9.4.2 and Table 9-1)</p>		0, Table 9-1)
Roads	Sediment	<p><i>On USFS Lands:</i></p> <p>Road Drainage: Reconstruct road and drainage features that do not meet design criteria or operation and maintenance standards, or are proven less effective than designed for controlling sediment delivery, or retard attainment of desired stream function, or increase sedimentation in Fish or Restoration Key Watersheds (RF 3a).</p> <p>Roads: Close and stabilize or obliterate and stabilize roads not needed for future management activities (RF 3c).</p>		USFS Plan
Wetlands	Temperature, Sediment, Nutrients	Improve and expand wetland resources to benefit water quality.	See DEQ water quality targets - wetlands are used to achieve these targets.	BHWC

Section IV: How Will We Get There?

Road Map to Watershed Restoration



Restoration activities that can support improvements in water quality as defined in the previous section are divided into four watershed restoration goals:

- Plan & Research
- Restoration
- Education
- Preservation

In order to achieve water quality goals and ultimately our vision for the Big Hole watershed, activities will need to occur in each of the four categories for a balanced approach to restoration that is calculated, timely, sustainable, and cost effective.

In addition, significant restoration activity has occurred since 2005 when the TMDL data was collected.

This section includes activities for watershed restoration in each of the four categories. Activities in each category that have occurred between 2005 and the present are listed and are followed by proposed future activities. *Note: Past projects are not a comprehensive list, but do serve to identify many important landmark projects or events.* Each activity's anticipated watershed restoration impact is listed. For future activities, anticipated costs and funding sources are indicated.

The watershed restoration categories are:

Watershed Restoration Goal Category
Water Temperature
Stream Flow
Sediment
Nutrients
Fish & Wildlife
Weeds/Invasive Species
Regulatory Protections

This section is divided into two parts:

1. Projects Completed or On-Going
2. Projects On-Going or Proposed

Projects Completed or On-Going:

Plan & Research



Plan & Research Projects Completed Since 2003:

Year	Project	Watershed Restoration Category	Lead	Reference or Contact
2003	Lower Wise River Stream Corridor Assessment	Water Temperature, Sediment, Nutrients	BHWC, NRCS, DNRC	(NRCS, DNRC, 2003)
2003	Southwest Highlands Watershed Assessment Report	Water Temperature, Sediments, Nutrients, Fish & Wildlife, Weeds/Invasive Species	BLM	(U.S. Bureau of Land Management, 2003)
2005	Flood Inundation Potential Mapping and Channel Migration Zone Delineation, Big Hole River, Montana	Water Temperature, Sediment, Nutrients, Regulatory Protections	BHWC	(Thatcher & Boyd, 2005)
2007	Montana Non-Point Source Management Plan	Water Temperature, Sediment, Nutrients	DEQ	(Montana Department of Environmental Quality, 2007)
2008	Using Historic Aerial Photography and Paleoflood Hydrology to Assess Long-term Ecological Response to Two Montana Dam Removals	Water Temperature, Sediment	MSU	(Schmitz, 2008)
2008	Modeling Stream Flow and Water Temperature in the Big Hole River, Montana	Water Temperature, Stream Flow	DEQ	(Flynn, 2008)
2008	Beaverhead West Watershed Assessment Report	Water Temperature, Sediments, Nutrients, Fish & Wildlife, Weeds/Invasive Species	BLM	(U.S. Bureau of Land Management, 2008)
2008	Lower Big Hole Irrigation Infrastructure Survey & Prioritization	Water Temperature, Stream Flow, Fish & Wildlife	BHWC	(PBS&J, March 2008)
2009	East Pioneer Watershed Environmental Assessment	Water Temperature, Sediments, Nutrients, Fish & Wildlife, Weeds/Invasive Species	BLM	(U.S. Bureau of Land Management, July 2, 2009)
2009	Middle-Lower Big Hole River TMDL	Water Temperature, Sediment, Nutrients	DEQ	(Montana DEQ, September 2009)
2010	Freshwater Mussels in Montana . . .	Fish & Wildlife	Montana	(Stagliano, 2010)

			Natural Heritage	
2010	Big Hole River Thermal Infrared (TIR) Temperature Analysis Interpretive Report	Water Temperature	USGS, BHWC	(Watershed Consulting, LLC, July 2010)
2010	Wise River Irrigation Infrastructure Survey & Prioritization	Water Temperature, Stream Flow, Fish & Wildlife	BHWC	(Oasis Environmental, 2010)
	Fluvial Arctic Grayling Pit-Tag Study	Fish & Wildlife	MSU, BHWC	
2011	Streb-Gallagher Ditches, Alternatives Assessment	Water Temperature, Stream Flow, Sediment	BHWC	(Mainstream Restoration and Allied Engineering, 2011)
2011	Beaver Habitat Suitability Model - Big Hole Watershed	Water Temperature, Sediment, Fish & Wildlife	DEQ	(Carpenedo, March 2011)
2012	Lower Big Hole River Corridor Assessment	Fish & Wildlife, Water Temperature, Stream Flow	BHWC	(Confluence Consulting, Inc., 2012)
2011-2012	Wetlands and Watershed Restoration	Water Temperature, Stream Flow	BHWC & DEQ	Included in this document.
2013	Middle-Lower Big Hole Watershed Restoration Plan	All	BHWC	(This document)
2013	Big Hole River Trend Analysis	Water Temperature, Stream Flow	BHWC, USFS	(Big Hole Watershed Committee and Beaverhead Deerlodge National Forest, 2013)

Educate



Educate - Projects Completed or On-Going since 2005:

Year	Project	Watershed Restoration Category	Lead
<i>Big Hole Watershed Committee</i>			
	Big Hole Watershed Committee Online Resources <ul style="list-style-type: none"> • Website • Social Media • E-Mails 	All	BHWC
1995 -	Monthly Watershed Meetings (10 meetings/year)	All	BHWC
Annual	Weed Whackers Ball Fundraiser	Weeds	BHWC
3-4 times per year	Newsletters	All	BHWC
Annual	Watershed Tours	All	BHWC
Annual	Youth Field Days	All	BHWC
Occasional	Classroom visits to MSU, MSU-Western, University of Montana	All	CCAA
Annual	CCAA Annual/5 Year Report Presentations to local meetings of American Fisheries Society, Trout Unlimited, BHWC, etc.	All	CCAA
<i>Other Education and Outreach</i>			
May	Arctic Grayling Recovery Program (AGRP) Annual Meeting	All	AGRP
2008-	Kids Day on the Big Hole at Meriwether Ranch	All	BHRF
2012	"Landscape Conversations" Seminar with Montana Wildlife Society	All	CCAA
2012-2013	CCAA Landowner Appreciation Dinner & Progress Report	All	CCAA
	Newsletters	All	BHRF
2012 -	Arctic Grayling Genetics Project - Spokane High School	Fish & Wildlife	CCAA
2013 -	Wildlife Workshops "Living with Wildlife Series"	Fish & Wildlife	WCS, et. al.

Restore



Restoration - Projects Completed or On-Going Since 2004:

Year(s)	Project	Watershed Restoration Category	Lead, Partner
<i>Irrigation Infrastructure Improvements</i>			
2004	Company & Truman Ditch Flow Control Structure, Company Ditch Headgate (Wise River)	Fish & Wildlife	BHWC
2007	Hagenbarth Big Hole Ditch	Water Temperature, Stream Flow	BHWC
2007	Carpenter Ditch	Water Temperature, Stream Flow	BHWC
2010	Kalsta Spring Creek Slough	Water Temperature, Stream Flow, Fish & Wildlife, Nutrients, Sediment	BHWC
2010	Kamperschroer Stockwater Tanks	Stream Flow	USFWS - BHWC
2010	Big Hole Cooperative Ditch	Water Temperature, Stream Flow	BHWC, RVCD
2011-12	Corder Ditch	Sediment, Stream Flow	Future West Sonoran Institute
2012	Wise River Irrigation Infrastructure <i>5 points of diversion consolidated into one with new headgate, flow measurement. In addition, landowner replaced one remaining Wise River headgate.</i>	Stream Flow, Water Temperature, Sediment, Fish & Wildlife	BHWC - DEQ
<i>Other Restoration</i>			
2012	Carpenter Fence Project	Sediment, Water Temperature	BHRF, BHWC
2011-12	Cherry Creek Barrier and WCT	Fish & Wildlife	FWP, USFS, BLM, BHWC
2011-2012	Divide Diversion Dam and Pump House Replacement	Fish & Wildlife	BSB County
<i>Invasive Species Management</i>			
On-going	Weed Spray Days	Weeds/Invasive Species	BHWC, County, BLM, USFS
On-going	Oxeye Daisy Test Site	Weeds/Invasive Species	BHWC

Preserve & Protect



Preserve & Protect – Projects Completed Since 2000:

Year(s)	Project	Watershed Restoration Category	Lead
2000	Land Use Development Standards: Subdivision Setback: Building site must be >150ft from Big Hole River. Big Hole River Conservation Development: No structure with a roof within 500ft of Big Hole River Floodplains: Building in 100 year floodplain requires mitigation. Septic/Sewage: All buildings required to have water and sewer.	Water Temperature, Sediment, Nutrients, Regulatory Protections	BHWC, Future West, Counties
1997 - ongoing	Big Hole River Drought Management Plan	Stream Flow, Water Temperature, Fish & Wildlife	BHWC, DNRC, FWP (Big Hole Watershed Committee, 1997 - 2013)
2005	Beaverhead County Growth Policy	Regulatory Protections	Beaverhead County (Beaverhead County, 2005)
2008	Butte-Silver Bow Growth Policy	Regulatory Protections	Butte-Silver Bow County (Butte-Silver Bow County, 2008)
2011	Anaconda Deer Lodge County Growth Policy	Regulatory Protections	Anaconda-Deer Lodge County (Anconda-Deer Lodge County, 2010)
2012	Madison County Growth Policy	Regulatory Protections	Madison County (Madison County, 2012)

Projects On-Going or Proposed

Plan & Research:
Future and On-Going:



Year	Project	Watershed Restoration Category	Lead (Partner)	Cost & Potential Funding Source
Lower Wise River Water Resources Investigation				
2011-2013	<p><i>Monitoring included groundwater levels, surface water flow and temperature, and fisheries collected 2011-2012. The results will be available summer 2013.</i></p> <p>Continuation: Portions of this project will continue including continuous stream flow and water temperature, continuous groundwater level monitoring, habitat changes, and fisheries. This information will provide baseline data for future work and will aid in developing future restoration projects.</p>	Water Temperature, Stream Flow, Fish & Wildlife	BHWC, DNRC, MBMG, FWP	BHWC, DEQ, GWIP
Big Hole River Water Monitoring				
On-going	<p><i>There are several continuous USGS real-time gages in the Middle-Lower Big Hole. Maintaining the monitoring network is critical to the BHWC Drought Management Plan and monitoring water quality improvements. Funding for existing gages is required annually. In addition, there are several upgrades identified:</i></p> <ul style="list-style-type: none"> • Maintain existing USGS stream gages. • Upgrade USGS gages to include water temperature, weather. • Install a USGS real time flow & temperature gage near the mouth of Wise River. • Include air temperature with all water temperature gages. • Maintain two weather stations in the Big Hole that track air temperature, precipitation, solar radiation, etc. 	Water Temperature Stream Flow Fish & Wildlife	BHWC, DNRC MFWP, USGS	BHWC, DNRC, MFWP
Other Planning Efforts				
	Watershed Assessment - Seymour Creek Deep Creek Watershed Assessment	Sediment, Fish & Wildlife	USFS	USFS
2008 -	Macroinvertebrates	Fish & Wildlife	BHRF	BHRF, BHWC



Educate:

Future or On-Going:

Year or Time Period	Project	Watershed Restoration Category	Lead	Cost - Source
Big Hole Watershed Committee				
Monthly - 3rd Wednesdays	Monthly Watershed Meetings <i>Includes seminars on watershed topics, updates from 4 BHWC subcommittees, updates from BHWC, and new watershed news. Serves as monthly opportunity to address watershed issues. Public welcome.</i>	All	BHWC	\$10,000/year - Private funds, project specific sources
~1/year	Watershed Tours <i>1-2x/year depending on topics. Public opportunity to visit projects and hear watershed restoration progress.</i>	All	BHWC	\$4,000/year - Project specific sources
~1-2/year	Youth Programs <i>Annual events for kids grades K-8 with watershed related activities. Opportunity to build watershed stewardship among students. Field days are science based on during a normal school day. Other school events may include presentations or activities in school.</i>	All	BHWC, Others	\$2000/year - Project specific sources, private funds
Continuous	BHWC Online Resources <i>E-mails Website Social Media</i>	All	BHWC	Private Donations
1/year	Weed Whackers Ball <i>Fundraiser put on by the Big Hole Watershed Weed Sub-Committee each September to raise money to fight weeds.</i>	Weeds	BHWC	Fundraiser
~3/year	BHWC Newsletters	All	BHWC	BHWC

Pending	Interpretation <i>Notch Bottom Fishing Access Site</i> Due to the high traffic volume and the poor habitat condition, this site could be restored and used to provide interpretation on the importance of wetlands to the river landscape.	All	BHWC	DEQ Mini Grant, MFWP
	Conservation Easement Seminar <i>Provide seminar on methods, resources, and benefits of conservation easements. The goal of the seminar would be to encourage landowners to seek long-term land protections.</i>	All	BHWC and Partners	Partners
CCAA				
March/year	AGRP - Arctic Grayling Restoration Annual Meeting	Fish & Wildlife	CCAA/AGRP	CCAA
2012	CCAA Tours <i>Agencies involved in CCAA program visit CCAA to view progress.</i>	Fish & Wildlife	CCAA	CCAA
Annual	CCAA Annual/5 Year Report Presentations To local meetings of American Fisheries Society, Trout Unlimited, BHWC, etc.	All	CCAA	CCAA
Other Education & Outreach Efforts				
May/year	Kids Day on the Big Hole at Meriwether Ranch <i>Kids invited to spend day fishing and learning topics surrounding fishing. Program is recreation based.</i>	All	BHRF	Varied, but requires \$2000-\$5000/year
~3/year	Newsletters	All	BHRF	BHRF
Ongoing	Local Museum and Historical Compilation	All	Wise River Community Foundation	Wise River Community Foundation
Varied	Community Exchange Days, Wildlife Series	All	Wildlife Conservation Society	Wildlife Conservation Society
July Annually	Big Hole River Day	Fish & Wildlife	BHRF	BHRF

Restoration:

Future and On-Going:



Projected Year	Project	Watershed Restoration Category	Partners	Potential Funding Source
Riparian Restoration				
High Priorities:				
2013 - 2017	French Creek Restoration (includes California Creek) <i>Repair sediment issues associated with historic placer mining and smelter damage by reducing sediment loads reaching the stream via a gully wash, reconnecting the stream to its floodplain, and restoring upland, riparian and wetland areas.</i> <i>→ California Creek headwaters to French Creek/French Creek Headwaters to Deep Creek</i>	Sediment, Fish & Wildlife	MFWP, NRDP, BHCW	MFWP, Private Foundations, BHCW, NRDP, DEQ Cost: >\$100,000
2014 - ongoing	Middle Big Hole River Riparian Re-Vegetation and Channel Restoration. <i>Encourage implementation of riparian and streambank BMPs to restore riparian vegetation growth, reduce bank erosion, and narrow the river channel over time.</i> <i>→ Big Hole River Pintlar Creek to Deep Creek</i>	Water Temperature, Sediment	BHCW, BLM, DNRC, MFWP, NRCS	Dependent on Method Cost: >\$100,000
2013 - ongoing	Lower Big Hole River <i>Restoration activities to occur as recommended by the BHCW Lower Big</i>	All	BHCW, MFWP, Private Landowners	BHCW, Madison County, MFWP, Private, NRCS

	<p><i>Hole River Sub-Committee, Lower Big Hole River Corridor report, etc. Improvements needed in riparian health and bank erosion, fish habitat, and irrigation infrastructure</i></p> <p><i>→ Glen to the Big Hole River mouth</i></p>			Cost: >\$100,000
2013 - ongoing	<p>Big Hole River Channel at Glen</p> <p><i>The Big Hole River in the Glen area has several in-stream alterations that may cause the river to form a new channel in time which could have detrimental effects on property, roads, etc. Potential solutions could include identifying appropriate channel migration areas, small natural structures to encourage the river to maintain the existing channel.</i></p> <p><i>→ Big Hole River at Glen</i></p>	Sediment	BHWC, Beaverhead County, Madison County, NRCS	<p>Beaverhead County, Madison County, NRCS</p> <p>Cost: Dependent on method.</p>
Lower Priorities:				
	<p>Upper Jerry Creek Restoration</p> <p><i>Fisheries and riparian restoration and protection to reduce nutrient inputs, sediment and habitat degradation. Restore native fish populations.</i></p> <p><i>→ Jerry Creek headwaters and headwater tributaries.</i></p>	Fish & Wildlife Sediment Nutrients	USFS	USFS
	<p>Birch-Willow-Lost Creeks Restoration</p> <p><i>Wide-spread vegetation management /watershed restoration that includes reducing conifer encroachment to</i></p>	Sediment, Fish & Wildlife, Weeds/Invasive Species	USFS	USFS

	<p><i>revitalize aspen-dominated riparian areas to improve water quality.</i></p> <p>→ Upper Birch, Willow and Lost Creeks (USFS Lands)</p>			
	<p>Upper Wise River</p> <p><i>Work with USFS to alter grazing management to allow riparian re-vegetation and channel restoration.</i></p> <p>→ Wise River headwaters to Pattengail Creek</p>	Stream Flow, Sediment, Fish & Wildlife	BHWC, USFS	USFS
	<p>Lower Wise River Habitat Improvement</p> <p><i>Repair historic channel disruption resulting from Pattengail Dam failure by increasing channel complexity.</i></p> <p>→ Wise River Pattengail Creek to mouth</p>	Fish & Wildlife	Private, BHWC, MFWP	DEQ, MFWP, NRCS, DNRC Cost: Dependent on method.
	<p>Lower Moose Creek</p> <p><i>Work with landowner to alter livestock management and encourage riparian re-vegetation.</i></p> <p>→ Moose Creek private lands</p>	Sediment, Water Temperature	Private, BHWC	BHWC, DEQ Cost: <\$100,000
Wetlands to Improve Water Quality				
High Priorities:				
2013 - 2015	<p>French Creek (Includes California Creek)</p> <p><i>Restoration work planned with FWP to restore damaged riparian zones and wetlands in upper French Creek. Plans include implementing road and riparian BMPs to reduce sediment loading to the creek.</i></p>	Sediment	BHWC, MFWP, DEQ	BHWC, MFWP, DNRC, NRDP, DEQ Cost: >\$100,000

	→ California Creek headwaters to French Creek, French Creek to Deep Creek			
2014 - ongoing	Lower Big Hole River Corridor <i>Alter existing irrigation system with upgrades to irrigation structures and rewetting of historic wetlands. See "Lower Big Hole River Corridor Phase I Report, 2012" for specific details. (Confluence Consulting, Inc., 2012)</i> → Big Hole River High Road Bridge and 3 miles upstream	Stream Flow, Water Temperature	BHWC, MFWP	MFWP, DNRC Cost: >\$100,000
2014	Big Hole River Pintlar to Deep Creek <i>This reach of the Big Hole River suffers from a widespread lack of streamside vegetation and over widened channel causing high late summer water temperatures. Create long-term plan for targeted small area restoration to stabilize banks and retain flows/temperature.</i> → Big Hole River Pintlar Creek to Deep Creek	Stream Flow, Water Temperature	BHWC, BLM, DNRC, MFWP, NRCS	BHWC, BLM, DNRC, MFWP, NRCS Cost: >\$100,000
	Wise River Beaver Recolonization <i>Wise River is entrenched in several segments near Lacy Creek. Beaver recolonization could repair widespread bank destabilization</i> → Wise River headwaters to Pattengail Creek	Sediment, Stream Flow	BHWC, USFS	BHWC, USFS, DEQ Cost: <\$100,000

Lower Priorities:				
	Zuckers Big Hole Pasture Land <i>Work with landowner to alter pasture management and grazing plan to allow rewetting of historic wetland. Presently a ditch drains this pasture.</i> <i>→ Big Hole River near Wise River</i>	Stream Flow, Water Temperature	BHWC	BHWC, Private Cost: <\$100,000
	North Fork Pasture Land & Toomey Lake <i>Work with landowner to alter pasture management and grazing plan to allow rewetting of historic wetland and improve pond on site.</i> <i>→ Big Hole River near North Fork Road</i>	Stream Flow, Water Temperature	BHWC	BHWC, Private Cost: <\$100,000
	Jerry Creek <i>Work with landowners on grazing management plans to improve bank stabilization. Revegetation of willows.</i> <i>→ Jerry Creek near Delano Creek</i>	Nutrients, Sediment	BHWC	BHWC Cost: <\$100,000
	Lower Big Hole River near Twin Bridges <i>Hydro-modified. Alter pasture management to allow rewetting of historic wetland</i> <i>→ Twin Bridges</i>	Stream Flow, Water Temperature	BHWC	DEQ Cost: <\$100,000
	Burma Road Pinch Point <i>This region is also referred to as the turtle ponds due to many water potholes. However, chronic dewatering in the region causes late season water issues. Reduce dewatering impacts.</i>	Stream Flow, Water Temperature	BHWC, MFWP	BHWC, MFWP, Private Cost: <\$100,000

	<p><i>Follow with long term land protection.</i></p> <p><i>→ Big Hole River Burma Road near Glen</i></p>			
	<p>Bacon Modified Pasture</p> <p><i>Need onsite view, but listed as large hydrologically modified wetland. May be good site for rewetted area with alteration in grazing and irrigation practice.</i></p> <p><i>→ Big Hole River near Seymour Creek</i></p>	Stream Flow, Water Temperature	BHWC	<p>BHWC, DEQ, DNRC, NRCS</p> <p>Cost: Dependent on method.</p>
	<p>Mt. Haggin Wildlife Refuge</p> <p><i>Alter range management to protect wetlands.</i></p> <p><i>→ Mt. Haggin Wildlife Refuge</i></p>	Sediment	BHWC, MFWP	<p>MFWP</p> <p>Cost: <\$100,000</p>
	<p>Moose Creek Headwaters</p> <p><i>This high elevation pasture land suffers from extreme hummacing. Alter grazing management to allow willow growth</i></p> <p><i>→ Moose Creek headwaters</i></p>	Stream Flow	BHWC	<p>DEQ</p> <p>Cost: <\$100,000</p>
	<p>Pintlar Creek/Christensen Complex</p> <p><i>The region of the Big Hole River on the east end of the North Fork Road and its intersection with Highway 43 holds many opportunities to alter current land use to allow for water storage and late season temperature buffers.</i></p> <p><i>→ Big Hole River near Pintlar Creek</i></p>	Water Temperature	BHWC	<p>BHWC, Private</p> <p>Cost: Dependent on method.</p>
	<p>Pattengail Dam Site</p> <p><i>Pattengail Dam site as storage wetland.</i></p> <p><i>→ Pattengail Creek</i></p>	Fish & Wildlife, Stream Flow	BHWC , USFS	<p>BHWC, Private, USFS, MFWP</p> <p>Cost: Dependent on method.</p>

<i>Irrigation Infrastructure Improvements</i>				
Big Hole River Irrigation High Priority				
2012-?	Lower Big Hole River Corridor Restoration Lott-Harvey & Logan-Smith Ditch Orphan Home Ditch <i>→ Near Twin Bridges</i>	Water Temperature, Stream Flow, Fish & Wildlife	MFWP, BHCW	BHCW, DNRC Cost: >\$100,000
	Streb-Gallagher Ditches <i>→ Near Melrose</i>	Water Temperature, Stream Flow, Sediment	BHCW	DEQ, DNRC, NRCS Cost: >\$100,000
	Garrison-Kilwien Ditch <i>→ Near Glen</i>	Water Temperature, Stream Flow	BHCW	DEQ, DNRC, NRCS Cost: >\$100,000
	Rafferty's Upper South Side <i>→ Near Melrose</i>	Water Temperature, Stream Flow	BHCW	DEQ, DNRC, NRCS Cost: Dependent on method.
2013	Lower McCauley <i>→ Near Melrose</i>	Water Temperature, Stream Flow	BHCW or Landowner	Private Cost: <\$100,000
	Meriwether's & Meriwether's Buyan Slough <i>→ Near Melrose</i>	Water Temperature, Stream Flow	BHCW or Landowner	DEQ, DNRC, NRCS Cost: Dependent on method.
	Melrose Canal <i>→ Near Melrose</i>	Water Temperature, Stream Flow	BHCW or Landowner	DEQ, DNRC, NRCS Cost: Dependent on method.
	Hamilton Ranch Ditch <i>→ Twin Bridges</i>	Water Temperature, Stream Flow	Landowner	Private Cost: Dependent on method.
	Sandy Ditch <i>→</i>	Water Temperature, Stream Flow	BHCW or Landowner	DEQ, DNRC, NRCS Cost: Dependent on method.

Wise River Irrigation High Priority				
	<p><i>The following ditches need flow measurement devices installed, a need for participation in a proposed Wise River Drought Management section. Additional needs are noted when applicable.</i></p> <p><i>Jolly Ditch – Review status and needs</i></p> <p><i>Town Ditch –Stabilize</i></p> <p><i>Truman Ditch – Stabilize</i></p> <p><i>Company Ditch - Stabilize</i></p> <p><i>Vineyard Ditch</i></p> <p><i>Connolly Ditch</i></p> <p><i>Split Diamond – Review POD change and flow control options</i></p> <p style="text-align: right;"><i>→ Lower Wise River</i></p>	Water Temperature, Stream Flow	BHWC, DNRC	<p>BHWC, DNRC</p> <p>Cost: Flow Measurement Devices are usually <\$2500.</p> <p>Other upgrades dependent on method, but all expected to be <\$100,000 each.</p>

Preserve & Protect



Future and On-Going:

Year(s)	Project	Watershed Restoration Category	Lead	Cost - Potential Source
2012-2014	Big Hole River Floodplain Maps <i>Floodplain Approximate Zone A mapping was complete November 2012. The state of Montana will adopt the map in 2013. Anaconda-Deer Lodge, Beaverhead and Madison counties will seek county adoption of the maps followed by their own regulatory ordinances associated with the maps. This will provide a strong regulatory environment to protect the river corridor.</i>	Water Temperature, Sediment, Nutrients, Regulatory Protections	BHWC, Future West, Beaverhead, Butte-Silver Bow, Madison and Anaconda-Deer Lodge Counties, DNRC	Ongoing - FutureWest, DEQ, BHWC, Counties, DNRC
2010 -	Land Use Planning Incentive Program <i>Payment for Ecological Services.</i>	Water Temperature, Sediments, Nutrients, Fish & Wildlife, Stream Flow	BHWC, FutureWest, Counties	Ongoing - FutureWest, DEQ, BHWC, Counties
1997 -	Big Hole River Drought Management Plan <i>Review and update January annually.</i>	Water Temperature, Stream Flow	BHWC, DNRC, FWP	\$3000 annually - DEQ, BHWC
2014	Wise River Drought Management Plan <i>Include Wise River irrigators in the Drought Management Plan.</i>	Stream Flow	BHWC	BHWC
Varied	Easements <i>Seek land easements for protection</i>	Water Temperature, Nutrients, Sediment, Fish & Wildlife	BHWC and Partners	Varied - many sources
2013	Beaverhead County Growth Policy Revision (Last Update, 2005)	Regulatory Protections	BHWC, Beaverhead County, Future West	Beaverhead County
2014	Butte-Silver Bow County Growth Policy Revision (Last Update, 2008)	Regulatory Protections	BHWC, Butte-Silver Bow County, Future West	Butte-Silver Bow County

2017	Madison County Growth Policy Revisions (Last Update, 2012)	Regulatory Protections	BHWC, Madison County, Future West	Madison County
2015	Anaconda-Deer Lodge County Growth Policy Revision (Last Update, 2010)	Regulatory Protections	BHWC, Anaconda-Deer Lodge County, Future West	Anaconda-Deer Lodge County
Wetlands Specific Protection				
	Easements Encourage landowner to enter land into easement to preserve high quality sections: <ul style="list-style-type: none"> • Divide Creek • Deep Creek • Big Hole River near Burma Road 	Sediment, Stream Flow, Water Temperature, Fish & Wildlife		
	Wetland Protection Language <i>Work with greater land use planning efforts and agencies to incorporate wetland protection language where appropriate (i.e. Growth Policies, laws, plans, etc.)</i>	Regulatory Protections		

Partners



Partnership Collaboratives Existing & Ongoing:

Project, Status	Watershed Restoration Category
Big Hole Watershed Committee Sub-Committees <i>Sub-Committees provide an opportunity for partners to collaborate on a focused topic.</i>	
BHWC Wildlife Committee <i>Focus is on reducing predator conflict and the health of native wildlife populations.</i>	Fish & Wildlife
BHWC Weed Committee <i>Focus is on eliminating noxious weeds and preventing the introduction and spread of invasive and noxious terrestrial and aquatic plant species.</i>	Weeds
BHWC Land Use Planning Committee <i>Focus is to promote responsible land use development particularly in the Big Hole River floodplain. This includes maintaining and improving floodplain development standards and mapping, working with counties to strengthen regulatory protections, and developing an incentive program for appropriate floodplain conservation.</i>	Regulatory Protections
BHWC Lower Big Hole Committee <i>Focus is on the Big Hole River between Glen and the mouth and to be initiated in 2013. Partners will review issues at work in the Lower Big Hole including erosion, river migration, lack of fish habitat, low stream flows, high water temperatures, and more.</i>	Fish & Wildlife, Water Temperature, Stream Flow
Other Partnerships	
Missouri Headwaters Partnership - Annual meeting each fall.	All
Wildlife Conservation Society - Wolf deterrence, watershed restoration	All
Montana Watershed Coordination Council (MWCC) - Coordination between watershed groups	All
Montana Non-Profit Association (MNA) - Annual meeting each fall. BHWC's attendance brings watershed groups to the table with statewide non-profits and non-profit management.	All
Rural Voices for Conservation Coalition (RVCC)	All
High Divide/Crown of the Continent	All
Interagency Coordination Council of Beaverhead County	All

See next page (partners list) for a list of individual groups involved in the Middle-Lower Big Hole River watershed

Partners



The stakeholders of the Big Hole watershed and those who work, live and play here have a strong sense of partnership, from helping a neighbor or serving the community, to leveraging resources to accomplish big goals. There are many partners involved in the watershed and its restoration. Many have individual goals or methods, but in mass they have one common goal - to restore the watershed to fully functioning to sustain ranching, fish and wildlife, water quality, and communities. Each partner listed is also a link:

Conservation Groups & Related Non-Profit Organizations

- [American Fisheries Society \(AFS\) Montana Chapter](#)
- [American Rivers](#)
- [Arctic Grayling Recovery Program \(AGRP\)](#)
- [Center for Biological Diversity](#)
- [Big Hole River Foundation \(BHRF\)](#)
- [Big Hole Watershed Committee \(BHWC\)](#)
- [Blackfoot Challenge](#)
- [Ducks Unlimited, Inc.](#)
- [Missouri Headwaters Partnership \(MHP\)](#)
- [Montana Association of Land Trusts](#)
- [Montana Audubon](#)
- [Montana Land Reliance](#)
- [Montana Natural Heritage Program](#)
- [Montana Non-Profit Association \(MNA\)](#)
- [Montana Trout Unlimited \(TU\)](#)
- [Montana Watershed Coordination Council \(MWCC\)](#)
- [Montana Wetlands Legacy Partnership](#)
- [National Fish Habitat Action Plan](#)
- [People and Carnivores](#)
- [Pheasants Forever - Beaverhead Chapter](#)
- [Rocky Mountain Elk Foundation \(RMEF\) Montana](#)
- [The Conservation Fund](#)
- [The Nature Conservancy \(TNC\)](#)
- [The Trust for Public Land](#)
- [Western Native Trout Initiative](#)
- [Wildlife Conservation Society \(WCS\)](#)
- [Wildlife Society - Montana Chapter](#)

Agencies

- [Montana Bureau of Mines & Geology \(MBMG\)](#)
- [Montana Department of Environmental Quality - Water Quality Bureau \(MDEQ\)](#)
- [Montana Department of Natural Resources & Conservation \(DNRC\)](#)
- [Montana Department of Transportation](#)
- [Montana Fish, Wildlife & Parks](#)
- [Natural Resources Conservation Service \(NRCS\)](#)
- [Natural Resources Damages Program \(NRDP\)](#)
- [US Forest Service Beaverhead Deerlodge National Forest - Wisdom Ranger District \(USFS\)](#)
- [US Bureau of Land Management - Dillon Field Office \(BLM\)](#)
- [US Bureau of Land Management - Butte Field Office \(BLM\)](#)
- [US Fish & Wildlife Service - Partners Program](#)
- [US Geological Survey \(USGS\)](#)
 - [USGS Climate Change Center](#)

Local Government & Conservation Districts

- [Beaverhead County](#)
- Beaverhead Conservation District
- [Anaconda-Deer Lodge County](#)
- [Butte-Silver Bow County](#)
- Mile High Conservation District
- [Madison County](#)
- [Ruby Valley Conservation District](#)

Educational Institutions

- **Rural Schools (K-8):** Wise River School, Divide School, Melrose School , Reichle School
- **Elementary Schools:** Twin Bridges
- **High Schools:** Butte High School, Butte Central School, Beaverhead County High School, Twin Bridges High School, Spokane High School
- [University of Montana Western Environmental Studies & Biology Programs](#)
- [Montana Tech](#)
- [University of Montana](#)
 - [Avian Science Center](#)
- [Montana State University](#)
- [Montana State Fisheries Cooperative Unit \(MTCFRU\)](#)

Section V: How Will We Know When We Arrive?



Each plan discussed in this document describes its own goals, priorities and milestones. Yet, in mass many goals lead to improved water quality. The milestones, criteria and monitoring plans of each are summarized below. Success documented by these groups using their own criteria can show positive change in the watershed. This is followed by broader watershed milestone, criteria and monitoring. The professionals leading the plans for the CCAA, USFS, and BLM are dedicated and with a high skill level. The best use of resources is to refer to their work in assessing success. The monitoring components are provided in [Table 13](#). Progress in watershed restoration can be tracked by achieving interim milestones, provided in [Table 14](#). Finally, success targets can be viewed in [Table 15](#).

Table 13: Monitoring components, responsible party, and occurrence.

Monitoring Component	Primary Responsibility	Source	When
Stream Flows <ul style="list-style-type: none"> USGS Gaging Stations Individual Measurements TruTracks (Flow & Temp) 	DNRC	CCAA	CCAA reports annually and every 5 years.
Water Temperature <ul style="list-style-type: none"> USGS Gaging Stations Individual Measurements TruTracks/Thermographs Temperature Loggers 	DNRC, DEQ, MFWP	CCAA, DEQ (TMDL)	CCAA reports annually and every 5 years TMDL Implementation Evaluation (approx. 2014 or later)
Fish & Wildlife Arctic grayling	MFWP	CCAA,	CCAA reports annually and every 5 years
Other Fish & Wildlife	MFWP	MFWP projects	FWP reports are project specific.
Education and Outreach	BHWC, others	Attendance and involvement tracking	BHWC reports annually.
Weeds	BHWC, Counties, MFWP	CCAA, varied	CCAA reports annually and every 5 years Other weed support provided as needed.
Riparian conditions and/or streambank condition		Aerial Photographs, CCAA, varied	Associated with specific restoration projects, CCAA.

Table 14: Watershed restoration interim milestones.

Milestone	End Point
Irrigation Infrastructure: Minimum one improvement per year (headgate, diversion, flow measurement or stockwater tank)	All irrigation infrastructures are updated to allow for water control, water efficiency, water measurement and adequate diversion that do not cause stream degradation.
Minimum one riparian improvement project per year in a stream reach as identified as having sparse or moderate riparian density.	95% of CCAA enrolled lands have a riparian condition rating of sustainable.
10 public opportunities each year to participate in watershed restoration, i.e. tours, seminars, meetings, etc.	No end point
Meet with each of the following one time annually to identify needs for watershed restoration and to report progress on watershed restoration: <ul style="list-style-type: none"> • DEQ • USFS • BLM • CCAA • MFWP 	No end point

Table 15: Overarching watershed restoration success indicators.

Restoration Success Indicator	Goal
Positive restoration results in the CCAA restoration plan upon 5 year reviews	Results reported to BWHC every 5 years. Positive trends are based on CCAA approved monitoring plans and results.
Positive restoration results in BLM watershed assessments or land health evaluations every five years.	BLM Watershed Assessments reviewed every 5 years. Positive trends are based on BLM approved monitoring plans and results.
Positive restoration results in USFS efforts every three years.	Request updates from USFS every three years. Positive restoration includes expanded westslope cutthroat trout habitat, road improvements or closures that reduce sediment input, riparian restoration, etc.
Declining trend in water temperature over 10 year period.	Negative trend in water temperature is calculated as average water temperature from stream gages over a 10 year period July - September. Declining trend = average water temperature July - September is declining.
Positive trend in stream flow over 10 year period.	Positive trend in stream flow is calculated as average stream flow stream gages over a 10 year period July - September. Positive trend = average stream flow July - September is increasing.
Positive riparian vegetation growth throughout the Big Hole watershed.	Photo monitoring using both on site before and after photos and aerial photos or software.
Improve all river sources of irrigation withdrawals.	All irrigation structures are improved with flow measurement and fish passage.
100% participation in Drought Management	All irrigators and river users participate in the BWHC Drought Management Plan and/or the CCAA Drought Management Plan.
High education & engagement numbers in watershed activities.	A wide range of stakeholders and high number of stakeholders continue to regularly attend and engage in the restoration work of the Big Hole watershed. Measured by BHWC meeting attendance, online activity, and annual donations.
Regulatory environment provides increasing protections of sensitive watershed areas.	The number of easements or other land conservation protection measures are increasing. The development standards in the watershed protect sensitive riparian zones and wetlands from development and continue to strengthen.

Section VI: Discussion, Recommendations & Review



In the 1980's and 1990's the Big Hole watershed faced challenges that at the time seemed insurmountable. Ranchers, agencies, and other stakeholders were at odds. The drought, the dry river bed, the rapidly declining Arctic grayling population, and ranch livelihoods on the line resulted in an ugly finger pointing battle.

Fast-forward 20 years: While drought has reoccurred, the river has not run dry and Arctic grayling numbers are increasing. Landowners have embraced the notion of coexistence -- what's good for the watershed is good for ranching and good for neighbors. Agencies have embraced the notion of coexistence as well, with partnerships with landowners, listening to needs, and adapting restoration to meet those needs.

Coexistence has become the culture in the Big Hole, from predator deterrence to reduced wolf-human conflicts, to enrolled state and private lands in the CCAA program, to continued consensus based efforts of the BHWC, and the shared sacrifice of the Drought Management Plan.

Coexistence, or the collaboration and education of stakeholders, is why restoration is working in the Big Hole. It is trust and relationship building, teamwork, and patience. It is critical that this culture continues into the future for continued success. Without this continued culture, much of the work done to this point will unravel and be lost effort.

Much of this plan points to the coexistence culture as a high priority for restoration. Coexistence is not measured in, for example, miles of river restored or sediment load reduced. Therefore, indicators are developed to take into account a broader scope of restoration success, one that occurs over a long period and over a broad area. In reality, this broad scope for long-term success both fits the vision for the Big Hole watershed and is representative of a cumulative watershed effect.

Review the Watershed Restoration Plan

The Watershed Restoration Plan was compiled by the BHWC. The plan reviewed and takes into account existing plans and known upcoming projects. The next review of this plan should occur in 2018.

The 2018 review should include the revised BLM Watershed Assessment and the results of several monitoring and research studies that are currently in process. The results of those works will prove beneficial in future decision making. The 2018 version should also include updates in the Land Use Planning process and the updated Beaverhead County Growth Policy.

Note that 2015 is the 10th anniversary of the TMDL data collection for the Middle-Lower Big Hole watershed. It may be appropriate at this time to review Montana DEQ's targets and criteria for impairment and revise recommendations based on restoration efforts. This may be accomplished through Montana DEQ's own process of evaluating TMDL implementation activities. The Watershed Restoration Plan should be updated whenever a major landmark in the restoration plans occurs, such as a CCAA 5-year review, updated Forest Plan, updated BLM Watershed Assessment or other milestone.

Sub-Watershed Summaries

The Middle - Lower Big Hole watershed can be subdivided into smaller watershed basins (HUC 5). The sub-basins are ordered in the following pages upstream to downstream. Within each sub-basin, tributaries are ordered from upstream to downstream for easy reference.

Table 16: TMDL and 303d Listing Summary (2012) by HUC 5 watershed and grouped by impairment. Beneficial uses abbreviations: N=Not Supporting, P = Partially Supporting, F=Fully Supporting. Blue regions are potential water quality impairment sources with persistence in that stream marked with an x. Red regions are possible causes with persistence marked with an x. Source: (Montana DEQ, June 2009)

[illegible]

Table 17: TMDL and 303d Listing Summary (2012) by HUC 5 watershed and grouped by impairment. Beneficial uses abbreviations: N=Not Supporting, P = Partially Supporting, F=Fully Supporting. Blue regions are potential water quality impairment sources with persistence in that stream marked with an x. Red regions are possible causes with persistence marked with an x. Source: (Montana DEQ, June 2009)

[illegible]

Middle-Lower Big Hole Watershed - Whole

Water Quality Issues:

2012 303d Listed Streams: 13 streams listed - see [Table 16](#) and [Table 17](#) for streams

HUC 5 Watersheds within the Middle-Lower Big Hole Watershed

- Deep Creek
- Big Hole River - Fishtrap
- Wise River
- Big Hole River - Divide
- Divide Creek
- Big Hole River - Melrose
- Lower Big Hole River

Major Tributaries:

Fishtrap Creek
LaMarche Creek
Deep Creek
Bryant Creek
Johnson Creek
Wise River
Jerry Creek
Divide Creek
Canyon Creek
Moose Creek
Camp Creek
Trapper Creek
Cherry Creek
Rock Creek
Lost Creek
Willow Creek
Birch Creek

Major Issues: Fluvial Arctic Grayling, Wolves, Drought, High Water Temperatures, Lack of Riparian Vegetation and Appropriate Channel Shape.

Plans in place:

- USFS Beaverhead Deerlodge National Forest - Forest Plan
- Montana Fish, Wildlife & Parks - Conservation Strategy
- Big Hole Watershed Committee Drought Management Plan
- Bureau of Land Management Dillon & Butte Field Office Watershed Assessments
- Partners for Fish and Wildlife CCAA

Ownership: USFS Beaverhead Deerlodge National Forest & Anaconda-Pintler Wilderness, DNRC, BLM, Private Lands.

Watershed	Stream Reach	Sediment		Nutrients		Metals			Temperature	
		Total Sediment Load (tons/year)	Target % Reduction	Location	Target Percent Reduction	Metal	Metals Load (pounds/day)	Target Percent Reduction	Existing Condition	Target Reduction
Middle Big Hole River Mainstem	Middle Big Hole River (Pintlar Creek to Divide Creek)	191,651	28%			Copper	Hi Flow: 61.884 Lo Flow .743	Hi Flow: 5% Lo Flow: 0%	Reduce warm irrigation return flows by 50%	
	Pintlar Creek to Mudd Creek					Lead	Hi Flow: 12.377 Lo Flow .371	Hi Flow: 10% Lo Flow: 0%	Maintain instream flows	
									%shade = 1.4% to 1.7% Median Channel W/D = 92	%shade = 15% increase W/D <= 60 35% decrease
	Mudd Creek Bridge to Deep Creek								%shade = 4.8% to 5.1% Median Channel W/D = 92	% shade = 5% increase W/D <= 60 35% decrease
	Deep Creek to Wise River								%shade = 3.5% to 3.8%	% shade = 9% increase
	Wise River to Diversion								% shade = 7.9%	n/a

Table 18: Middle Big Hole River mainstem TMDL targets for sediment, nutrients, metals and water temperature. Data from the Middle-Lower Big Hole River TMDL (Montana DEQ, September 2009).

Watershed	Stream Reach	Sediment		Nutrients		Metals			Temperature	
		Total Sediment Load (tons/year)	Target % Reduction	Location	Target Percent Reduction	Metal	Metals Load (pounds/day)	Target Percent Reduction	Existing Condition	Target Reduction
Lower Big Hole River mainstem	Lower Big Hole River								Reduce warm irrigation return flows	
									Maintain instream flow	
	Butte Diversion to end of Lower End Maiden Rock Canyon								% shade = 14.2% to 14.7%	% shade = 3.5% increase
	Maiden Rock Canyon to Brownes Bridge FAS								% shade = 7.5% to 9.6%	% shade = 28% increase
	Browns Bridge FAS to Glen FAS								% shade = 6.3% to 7.5%	% shade = 19% increase
	Glen to Notch Bottom FAS								% shade = 2.1% to 3.2%	% shade = 52% increase
	Notch Bottom FAS to Pennington FAS								% shade = 3.1% to 4.1%	% shade = 32% increase
	Pennington FAS to Jefferson River								% shade = 3.8% to 5.4%	% shade = 42% increase

Table 19: Lower Big Hole River mainstem TMDL targets for sediment, nutrients, metals and water temperature. Data from the Middle-Lower Big Hole River TMDL (Montana DEQ, September 2009).

Deep Creek

Water Quality Issues Summary: Metals and Physical Habitat Alterations. Damages due to mining and atmospheric deposition, agriculture, roads, and natural causes.

2012 303d Streams: California Creek - Iron, Oregon Creek - Lead, Twelvemile Creek - Sediment

Area: 106.3 square miles

Hydrologic Unit Code: 1002000407

HUC 6 Watersheds within the Deep Creek watershed:

- California Creek
- French Creek
- Deep Creek

Major Infrastructure: Mill Creek Road (569), Past Anaconda Smelter Operation, Mount Haggin State Wildlife Management Area

High Priority Abandoned Hardrock Mines: None

Tributaries:



Watershed	Stream Reach	Sediment		Nutrients		Metals			Temperature	
		Total Sediment Load (tons/year)	Target % Reduction	Location	Target Percent Reduction	Metal	Metals Load (pounds/day)	Target Percent Reduction	Existing Condition	Target Reduction
Deep Creek	Deep Creek (headwaters to mouth)	9180	15%							
	California Creek	1328	32%			Arsenic	Hi Flow: 6.347 Lo Flow: .544	Hi Flow: 57% Lo Flow: 52%		
						Copper	Hi Flow: 3.035 Lo Flow: .052	Hi Flow: 62% Lo Flow: 0%		
	Sixmile Creek	528	24%			Arsenic	Hi Flow: 17.297 Lo Flow: .854	Hi Flow: 62% Lo Flow: 29%		
	Oregon Creek	n/a	19%			Arsenic	Hi Flow: .983 Lo Flow: .076	Hi Flow: 50% Lo Flow: 71%		
						Copper	Hi Flow: .541 Lo Flow: .006	Hi Flow: 74% Lo Flow: 0%		
	French Creek	3773	22%			Copper	Hi Flow: n/a Low Flow: .061	Hi Flow: 14% Lo Flow: 0%		
	Corral Creek	446	24%							
	Sevenmile Creek	468	18%							

Table 20: Deep Creek watershed TMDL targets for sediment, nutrients, metals and water temperature. Data from the Middle-Lower Big Hole River TMDL (Montana DEQ, September 2009).

Big Hole River - Fishtrap

Water Quality Issues Summary: Nutrients and physical habitat alteration due to agriculture and roads.

303d Listed Streams: Sawlog Creek - Phosphorous, Fishtrap Creek (Confluence of forks to mouth)
- Phosphorous

Area: 291.70 square miles

Hydrologic Unit Code: 1002000408

HUC 6 Watersheds within the Big Hole-Fishtrap watershed:

- Fishtrap Creek
- LaMarche Creek
- Big Hole River-Fishtrap
- Seymour Creek
- Bryant Creek
- Alder Creek
- Big Hole River - Dickie Bridge
- Big Hole River - Meadow Creek

High Priority Abandoned Hardrock Mines: None

Tributaries:

Big Hole River (Pintler (Pintlar) Creek Confluence to Wise River Confluence)

Salefsky (Squaw) Creek

Goris Gulch

Christiansen Creek

Papoose Creek

Shaw Creek

Mudd Creek

Mudd Lake

Toomey Lake

Toomey Creek

Sawlog Creek

Stewart Creek

Tucker Creek

Calvert Creek

Walker Creek

Fishtrap Creek

West Fork Fishtrap Creek

Middle Fork Fishtrap Creek

Swamp Creek

Minnie Creek

LaMarche Creek

West Fork LaMarche Creek

Warren Lake

Middle Fork LaMarche Creek

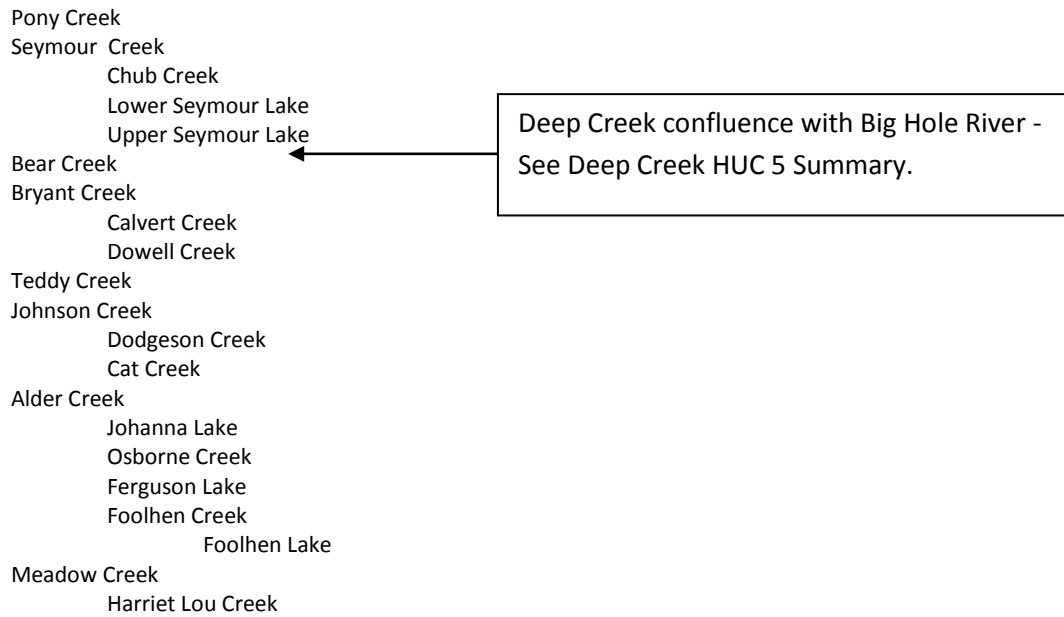
LaMarche Lake

Trout Creek

East Fork LaMarche Creek

Emerald Lake

Downstream
↓



Watershed	Stream Reach	Sediment		Nutrients		Metals			Temperature	
		Total Sediment Load (tons/year)	Target % Reduction	Location	Target Percent Reduction	Metal	Metals Load (pounds/day)	Target Percent Reduction	Existing Condition	Target Reduction
Big Hole River - Fishtrap	Fishtrap Creek	3234	18%							
	Sawlog Creek	373	18%							

Table 21: Big Hole River Fishtrap watershed TMDL targets for sediment, nutrients, metals and water temperature. Data from the Middle-Lower Big Hole River TMDL (Montana DEQ, September 2009).

Wise River

Water Quality Issues Summary: Metals, Phosphorous, Physical Habitat Alterations due to mine activity, agriculture, roads and past dam construction.

303d Listed Streams: Gold Creek – Phosphorous

Area: 261.90 square miles

Hydrologic Unit Code: 1002000409

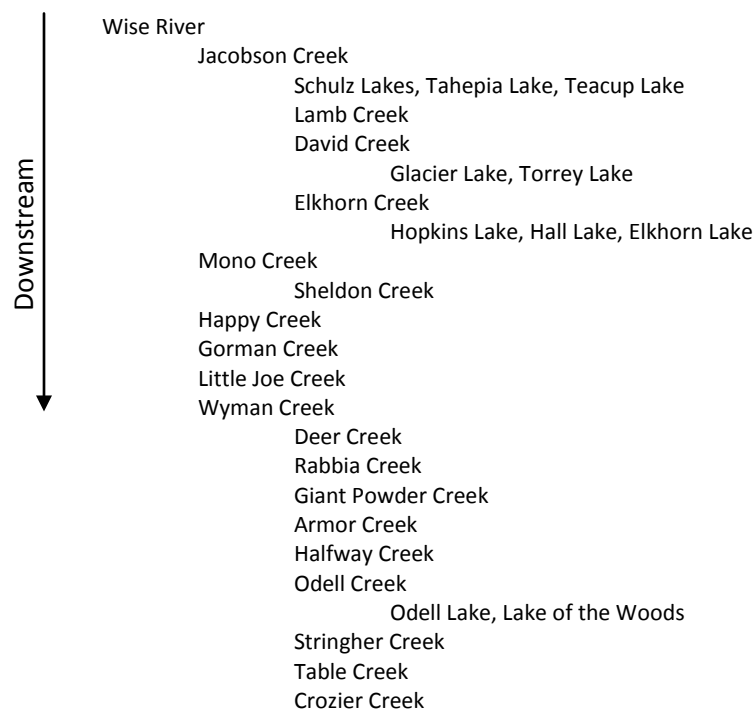
HUC 6 Watersheds within Wise River watershed:

- Headwaters Wise River
- Wyman Creek
- Lacy Creek
- Upper Wise River
- Upper Pattengail Creek
- Middle Pattengail Creek
- Lower Pattengail Creek
- Middle Wise River
- Lower Wise River

Major Infrastructure: Pattengail Dam and subsequent blowout, Pioneer Mountain Scenic By-Way, Elkhorn Mine (abandoned), Several USFS camping areas, Town of Wise River

High Priority Abandoned Hardrock Mines: Old Elkhorn (Elkhorn Creek)

Tributaries:



- Lacy Creek
 - Schwinger Lake
 - Skull Creek
 - Bobcat Creek
 - Bobcat Lakes
- Elk Creek
- Gold Creek
- Boulder Creek
 - Black Lion Creek
- Fourth of July Creek
- Pattengail Creek
 - Baldy Lake, Grassy Lake, Elbow Lake
 - Sand Creek
 - Sand Lake
 - Whiskey Creek
 - Demijohn Creek
 - Copper Creek
 - Stone Creek
 - Stone Lakes
 - Lost Horse Creek
 - Rocky Creek
 - Deboose Creek
 - Effie Creek
 - Cow Creek
 - Kelly Creek
 - Lambrecht Creek
 - Dicks Creek
 - Toland Creek
 - Reservoir Creek
 - Lews Creek
 - Evans Creek
 - Grouse Creek
 - Grouse Lakes
- Ross Gulch
- Sheep Creek
 - Clifford Creek
- Stine Creek
- Butler Creek
- Deno Creek
- Adson Creek
- Swamp Creek

Watershed	Stream Reach	Sediment		Nutrients		Metals			Temperature	
		Total Sediment Load (tons/year)	Target % Reduction	Location	Target Percent Reduction	Metal	Metals Load (pounds/day)	Target Percent Reduction	Existing Condition	Target Reduction
Wise River	Elkhorn Creek	491	22%			Copper	Hi Flow: 23.970 Lo Flow: .656	Hi Flow: 95% Lo Flow: 81%		
						Cadmium	Hi Flow: .306 Lo Flow: .013	Hi Flow: 99% Lo Flow: 97%		
						Zinc	Hi Flow: 44.344 Lo Flow: 4.024	Hi Flow: 63% Lo Flow: 60%		
	Pattengail Creek	2626	8%							
		12037	34%			Copper	Hi Flow: 16.200 Lo Flow: .408	Hi Flow: 43% Lo Flow: 5%		
	Wise River					Cadmium	Hi Flow: .389 Lo Flow: .005	Hi Flow: 92% Lo Flow: 0%		
						Lead	Hi Flow: 15.228 Lo Flow: .034	Hi Flow: 89% Lo Flow: 0%		
	Gold Creek	729	19%							

Table 22: Wise River watershed TMDL targets for sediment, nutrients, metals and water temperature. Data from the Middle-Lower Big Hole River TMDL (Montana DEQ, September 2009).

Big Hole River - Divide

Water Quality Issues Summary: Metals, Nutrients, Physical Habitat Alteration due to past mining activity, agriculture, roads, and development.

303d Listed Streams: Jerry Creek - Lead, Charcoal Creek - Phosphorous, Nitrogen, Sedimentation/Siltation

Area: 170.70 square miles

Hydrologic Unit Code: 1002000411

HUC 6 Watersheds within Big Hole River-Divide watershed:

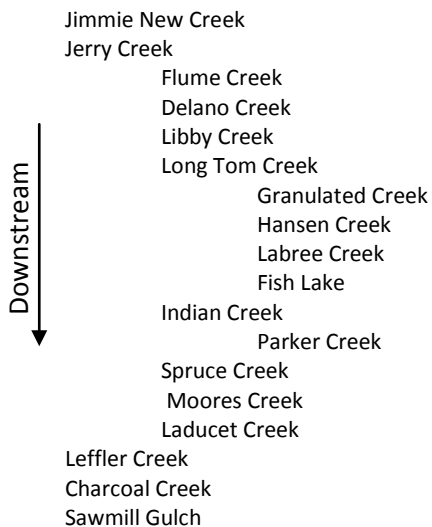
- Jerry Creek
- Big Hole River - Quartz Hill Gulch
- Canyon Creek
- Big Hole River - Dewey

Major Infrastructure: Highway 43, Divide Diversion Dam and Pumphouse (replaced 2011-2012), Town of Dewey, Town of Divide.

High Priority Abandoned Hardrock Mines: None

Tributaries:

Big Hole River



Watershed	Stream Reach	Sediment		Nutrients		Metals			Temperature	
		Total Sediment Load (tons/year)	Target % Reduction	Location	Target Percent Reduction	Metal	Metals Load (pounds/day)	Target Percent Reduction	Existing Condition	Target Reduction
Big Hole River - Divide	Jerry Creek	2640	19%			Copper	Hi Flow: n/a Lo Flow: 1.236	Hi Flow: 0% Lo Flow: 59%		
	Delano Creek	129	17%							

Table 23: Big Hole River Divide Creek watershed TMDL targets for sediment, nutrients, metals and water temperature. Data from the Middle-Lower Big Hole River TMDL (Montana DEQ, September 2009).

Divide Creek

Water Quality Issues Summary: Nutrients, temperature & water, and physical habitat alterations as a result of agriculture

303d Listed Streams: none

Area: 92.8 square miles *Hydrologic Unit:* 1002000410

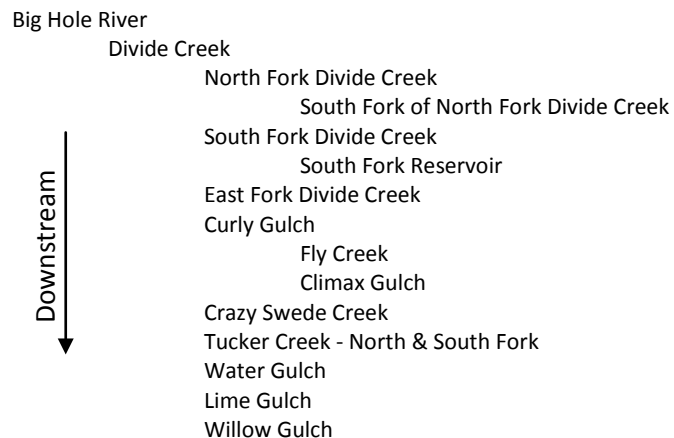
HUC 6 watersheds within Divide Creek watershed:

- North Fork Divide Creek
- Upper Divide Creek
- Lower Divide Creek

Major Infrastructure: Butte-Silver Bow Water Department Reservoir, railroad, Frontage Road, Interstate 15

High Priority Abandoned Hardrock Mines: None

Tributaries:



Watershed	Stream Reach	Sediment		Nutrients		Metals			Temperature	
		Total Sediment Load (tons/year)	Target % Reduction	Location	Target Percent Reduction	Metal	Metals Load (pounds/day)	Target Percent Reduction	Existing Condition	Target Reduction
Divide Creek	Divide Creek	4783	12%	Downstream of North & East Forks Near Mouth	N: 82% to 89% P: 78% to 88% N: 75% to 92% P: 50% to 65%				% shade = 22%	% shade = 23% increase

Table 24: Divide Creek watershed TMDL targets for sediment, nutrients, metals and water temperature. Data from the Middle-Lower Big Hole River TMDL (Montana DEQ, September 2009).

Big Hole River - Melrose

Water Quality Issues Summary: Metals, nutrients, physical habitat alterations as a result of past mine activity, agriculture, and roads.

303d Listed Streams: Camp Creek - Arsenic, Wikiup Creek - Bottom Deposits, Mercury, Phosphorous, Sassman Gulch - Arsenic

Area: 306.90 square miles

Hydrologic Unit Code: 1002000412

HUC 6 watersheds within Big Hole River - Melrose watershed:

- Moose Creek
- Big Hole River - Melrose
- Camp Creek
- Trapper Creek
- Cherry Creek
- McCartney Creek
- Big Hole River - Brownes Gulch
- Rock Creek
- Big Hole River - Lost Creek

Major Infrastructure: Railroad, Frontage Road, Interstate 15, County Barns, Town of Melrose, Glen and Twin Bridges.

High Priority Abandoned Hardrock Mines: Middle Fork Millsite (Moose Creek), Clipper (Camp Creek), Maiden Rock (Melrose), True Blue, Lower and Upper Cleve, Trapper, Silver King (Trapper Creek), Tungsten Mill Site (Lost Creek), Old Glory (Soap Gulch)

Tributaries:



Sappington Creek
Cherry Creek
Cherry Lake, Granite Lake
McCartney Creek
Brownes Creek
Rock Creek
Storm Park Creek
Long Creek
Long Lake, Long Branch Lake
Brownes Lake, Lake Agnes, Rainbow Lake, Green Lake, Waukena Lake
Lost Creek

	Stream Reach	Sediment		Nutrients		Metals			Temperature	
		Total Sediment Load (tons/year)	Target % Reduction	Location	Target Percent Reduction	Metal	Metals Load (pounds/day)	Target Percent Reduction	Existing Condition	Target Reduction
Big Hole River - Melrose	Grose Creek	294	40%	Upper Site	N: 31% to 45% P: 53% to 77%					
				Lower Site	N: 33% to 53% P: 43% to 78%					
	Camp Creek	3450	29%	Between Reservoir & Irrigation Ditch	N: 27% to 60% P: 0 to 90%					
				Near Mouth	N: 64% to 76% P: 4% to 37%					
	Wikiup Creek					Copper	Hi Flow: .447 Lo Flow: .556	Hi Flow: 90% Lo Flow: 97%		
	Trapper Creek	3326	22%			Copper	Hi Flow: 2.552 Lo Flow: .436	Hi Flow: 66% Lo Flow: 7%		
						Cadmium	Hi Flow: .076 Lo Flow: .019	Hi Flow: 66% Lo Flow: 38%		
						Lead	Hi Flow: 12.906 Lo Flow: 2.485	Hi Flow: 98% Lo Flow: 95%		
						Zinc	Hi Flow: 21.981 Lo Flow: 6.297	Hi Flow: 50% Lo Flow: 17%		
	Lost Creek	742	21%	Upper Site	N: n/a to 23% P: 59% to 64%	Arsenic	Hi Flow: .027 Lo Flow: .302	Hi Flow: 0% Lo Flow: 64%		
				Middle Site	N: n/a					
				Lower Site	P: 63% to 67% N: n/a P: 60%					

Table 25: Big Hole River Melrose watershed TMDL targets for sediment, nutrients, metals and water temperature. Data from the Middle-Lower Big Hole River TMDL (Montana DEQ, September 2009).

Lower Big Hole River

Water Quality Issues Summary: Metals and physical habitat alterations as a result of past mine activity, agriculture and dam construction.

303d Listed Streams: none

Area: 285.0 square miles

Hydrologic Unit Code: 1002000413

HUC 6 watersheds within Lower Big Hole River watershed:

- Upper Willow Creek
- Lower Willow Creek
- Birch Creek
- Big Hole River - Stevens Slough
- Big Hole River - Biltmore Hot Springs
- Nez Perce Creek
- Rochester Creek
- Big Hole River - Twin Bridges

Major Infrastructure: Railroad, Frontage Road, Interstate 15, Town of Glen and Twin Bridges, Burma Road

High Priority Abandoned Hard Rock Mines: Indian Queen (Birch Creek), Emma (Nez Perce Creek), Thistle Mine/Tailings, Watseca (Rochester Creek)

Tributaries:

Big Hole Creek

Willow Creek

Tendoy Lake

Gorge Creek

Gorge Lakes

Buckhorn Creek

Debois Creek

Barb Lake

Bond Creek

Bond Lake, Deerhead Lake

North Creek

Birch Creek

Lily Lake, Boot Lake, May Lake, Pear Lake, Tub Lake, Chan Lake, Anchor Lake

Mule Creek

Thief Creek & South Fork Thief Creek

Armstrong Gulch

Sheep Creek

Farlin Gulch

Bridge Gulch

Canyon Gulch

Garrison Ditch

Stevens Slough

Nez Perce Creek

Rochester Creek

Downstream
↓

Watershed	Stream Reach	Sediment		Nutrients		Metals			Temperature	
		Total Sediment Load (tons/year)	Target % Reduction	Location	Target Percent Reduction	Metal	Metals Load (pounds/day)	Target Percent Reduction	Existing Condition	Target Reduction
Lower Big Hole River	Birch Creek (Upper Segment)	2015	13%							
	Birch Creek (Lower Segment)	3827	21%							
		2288	32%			Arsenic	Hi Flow: .020 Lo Flow: .020	Hi Flow: 89% Lo Flow: 95%		
	Rochester Creek					Mercury	Hi Flow: .00001 Lo Flow: .00021	Hi Flow: 0% Lo Flow: 660%		
						Copper	Hi Flow: .004 Lo Flow: .004	Hi Flow: 6% Lo Flow: 75%		
						Lead	Hi Flow: .001 Lo Flow: .0009	Hi Flow: 0% Lo Flow: 55%		

Table 26: Lower Big Hole River watershed TMDL targets for sediment, nutrients, metals and water temperature. Data from the Middle-Lower Big Hole River TMDL (Montana DEQ, September 2009).

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http://fieldguide.mt.gov/detail_AFCHA02088.aspx

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Link Addresses

FWP

[Montana Field Guide Online - Montana FWP](http://fieldguide.mt.gov/statusCodes.aspx)

<http://fieldguide.mt.gov/statusCodes.aspx>

[Montana Statewide Fisheries Management Plan](http://fwp.mt.gov/fishAndWildlife/management/fisheries/statewidePlan/managementPlan.html)

<http://fwp.mt.gov/fishAndWildlife/management/fisheries/statewidePlan/managementPlan.html>

USFS

[Beaverhead Deerlodge National Forest Plan](http://www.fs.usda.gov/detailfull/bdnf/landmanagement/planning/?cid=stelprdb5052938&width=full)

<http://www.fs.usda.gov/detailfull/bdnf/landmanagement/planning/?cid=stelprdb5052938&width=full>

[Chapter 3: Forestwide Direction](http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5052768.pdf)

http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5052768.pdf

BLM

[BLM: Butte Field Office](http://www.blm.gov/mt/st/en/fo/butte_field_office.html)

http://www.blm.gov/mt/st/en/fo/butte_field_office.html

[BLM Dillon Field Office](http://www.blm.gov/mt/st/en/fo/dillon_field_office.html)

http://www.blm.gov/mt/st/en/fo/dillon_field_office.html

USFWS

[Candidate Conservation Agreement with Assurances for Fluvial Arctic Grayling in the Upper Big Hole River](http://www.fws.gov/mountain-prairie/species/fish/grayling/CCAA_June2006.pdf)

http://www.fws.gov/mountain-prairie/species/fish/grayling/CCAA_June2006.pdf

DEQ

[303d lists on CWAIC](http://cwaic.mt.gov/query.aspx)

<http://cwaic.mt.gov/query.aspx>

[Middle-Lower Big Hole River Planning area TMDL and Framework](http://www.deq.mt.gov/wqinfo/TMDL/finalReports.mcp)

<http://www.deq.mt.gov/wqinfo/TMDL/finalReports.mcp>

[Montana DEQ's Exploring Your Aquatic Resources Mapping Program](http://www.deq.mt.gov/wqinfo/wetlands/exploringaquaticresources.mcp)

<http://www.deq.mt.gov/wqinfo/wetlands/exploringaquaticresources.mcp>

[2012 Water Quality Integrated Report](http://cwaic.mt.gov/wq_reps.aspx?yr=2012qryId=102298)

http://cwaic.mt.gov/wq_reps.aspx?yr=2012qryId=102298

Conservation Groups & Related Non-Profit Organizations

[American Fisheries Society \(AFS\) Montana Chapter](http://www.fisheriessociety.org/AFSmontana/)

<http://www.fisheriessociety.org/AFSmontana/>

[American Rivers](http://www.americanrivers.org/)

<http://www.americanrivers.org/>

[Arctic Grayling Recovery Program \(AGRP\)](http://www.fishhabitat.org/)

<http://www.fishhabitat.org/>

[Center for Biological Diversity](http://www.biologicaldiversity.org/species/fish/Montana_fluvial_Arctic_grayling/index.html)

http://www.biologicaldiversity.org/species/fish/Montana_fluvial_Arctic_grayling/index.html

[Big Hole River Foundation \(BHRF\)](http://www.bhrf.org/)

<http://www.bhrf.org/>

[Big Hole Watershed Committee \(BHWC\)](http://bhwc.org/)

<http://bhwc.org/>

[Blackfoot Challenge](http://blackfootchallenge.org/)

<http://blackfootchallenge.org/>

[Ducks Unlimited, Inc.](http://www.ducks.org/)

<http://www.ducks.org/>

[Missouri Headwaters Partnership \(MHP\)](http://mtwatersheds.org/Watersheds/WatershedGroups/MissouriHeadwatersPartnership.html)

<http://mtwatersheds.org/Watersheds/WatershedGroups/MissouriHeadwatersPartnership.html>

[Montana Association of Land Trusts](http://www.montanalandtrusts.org/)

<http://www.montanalandtrusts.org/>

[Montana Audubon](http://www.mtaudubon.org/)

<http://www.mtaudubon.org/>

[Montana Land Reliance](http://www.mtlandreliance.org/)

<http://www.mtlandreliance.org/>

[Montana Natural Heritage Program](http://mtnhp.org/)

<http://mtnhp.org/>

Montana Non-Profit Association (MNA)

Montana Trout Unlimited (TU)

Montana Watershed Coordination Council (MWCC)

Montana Wetlands Legacy Partnership

National Fish Habitat Action Plan

People and Carnivores

Pheasants Forever - Beaverhead Chapter

Rocky Mountain Elk Foundation (RMEF) Montana

The Conservation Fund

The Nature Conservancy (TNC)

The Trust for Public Land

Western Native Trout Initiative

Wildlife Conservation Society (WCS)

Wildlife Society - Montana Chapter

Agencies

Montana Bureau of Mines & Geology (MBMG)

**Montana Department of Environmental Quality -
Water Quality Bureau (MDEQ)**

**Montana Department of Natural Resources &
Conservation (DNRC)**

Montana Department of Transportation

Montana Fish, Wildlife & Parks

Natural Resources Conservation Service (NRCS)

Natural Resource Damages Program (NRDP)

**US Forest Service Beaverhead Deerlodge National
Forest - Wise River Ranger District (USFS)**

**US Bureau of Land Management - Dillon Field Office
(BLM)**

**US Bureau of Land Management - Butte Field Office
(BLM)**

US Fish & Wildlife Service - Partners Program

US Geological Survey (USGS)

USGS Climate Change Center

Local Government & Conservation Districts

Beaverhead County

Anaconda-Deer Lodge County

<http://www.mtnonprofit.org/>

<http://montanatu.org/>

<http://www.mtwatersheds.org/>

<http://www.wetlandslegacy.org/>

<http://www.fishhabitat.org/>

<http://peopleandcarnivores.org/>

<http://montanapf.org/MTPF/mt-chapters/dillon-beaverhead-862/>

<http://www.rmef.org/Conservation/WhereWeWork/Montana/>

<http://www.conservationfund.org/>

<http://www.nature.org/ourinitiatives/regions/northamerica/unitedstates/montana/placesweprotect/big-hole-valley.xml>

<http://www.tpl.org/>

<http://www.westernnativetrout.org/>

<http://www.wcs.org/>

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<http://www.mbm.mtech.edu/>

<http://www.deq.mt.gov/wqinfo/default.mcp>

<http://dnrc.mt.gov/>

<http://www.mdt.mt.gov/>

<http://fwf.mt.gov/>

<http://www.mt.nrcs.usda.gov/>

<https://doj.mt.gov/lands/>

http://www.fs.usda.gov/wps/portal/fsinternet!/ut/p/c5/04_SB8K8xLLM9MSSzPy8xBz9CP0os3gjAwhwtDw9_Al8zPwhQoY6leDdGCqCPOBqwDLG-AAjgb6fh75uan6BdnZaY6OiooA1tkqIQ!!/dl3/d3/L2dJQSEvUUt3QS9ZQnZ3LzZfMjAwMDAwMDBBODBPSEhWTjBNMDAwMDAwMDA!/?ss=110102&navtype=forestBean

http://www.blm.gov/mt/st/en/fo/dillon_field_office.html

http://www.blm.gov/mt/st/en/fo/butte_field_office.html

<http://www.fws.gov/partners/>

<http://www.usgs.gov/>

<https://nccwsc.usgs.gov/>

<http://www.beaverheadcounty.org/>

<http://www.anacondadeerlodge.mt.gov/index.aspx>

Butte-Silver Bow County

<http://co.silverbow.mt.us/>

Madison County

<http://madison.mt.gov/>

Ruby Valley Conservation District

<http://www.rvcd.org/>

Educational Institutions

**University of Montana Western Environmental
Studies & Biology Programs**

<http://www.umwestern.edu/>

Montana Tech

<http://www.mtech.edu/>

University of Montana

<http://www.umt.edu/future.aspx>

Avian Science Center

<http://avianscience.dbs.umt.edu/default.php>

Montana State University

<http://www.montana.edu/>

Montana State Fisheries Cooperative Unit

<http://www.montana.edu/mtcfru/>



Montana Fish, Wildlife & Parks

1820 Meadowlark Lane, Butte, MT 59701

May 30, 2018

FFIP Review panel

Dear Pannel,

I am writing this letter in support of the Big Hole Watershed Committee's application for funding to restore reaches of French Creek that are suffering from significant streambank erosion. Significant channel alteration occurred in this reach of stream in the early 1900's (prior to 1940) where the stream appears to have been channelized and directed toward a work area. Historical records are unclear on the type of work that went on at this area. The stream has abandoned this straightened channel is attempting to reestablish itself. This his causing massive bank erosion and sedimentation (see photo below). Further the stream flows along the base of large chalky bluffs and is constantly eroding the toe of these slopes causing material fall into the stream. The stream channel downstream of this reach is choked with fine sediments from this high erosion area.



The potential solution for reducing long-term erosion of the site is to relocate the stream channel to a section of the floodplain with a flourishing riparian area. This area has abundant willows and sedges and would be an excellent area to for channel establishment. The potential benefits of the project will be significant reduction in sediment entering French Creek. Also, there would likely be improvements in aquatic habitat because the large sediment loads are

filling pools and clogging gravels. Reduced sediment would benefit spawning fish, aquatic invertebrates and pearlshell mussels.

The French Creek drainage has been a priority area for watershed restoration in the Big Hole River drainage. Work is currently underway in the headwaters (California Creek) to improve water quality affected by atmospheric deposition from the Anaconda Smelter. French Gulch which was heavily impacted by placer mining was also restored in 2016. French Creek is also slated for native fish restoration including Arctic grayling and westslope cutthroat trout. Native salmonids are not as tolerant to habitat alterations and fine sediment loading as non-native brook trout. Once restored to a native fish population, French Creek will represent the second largest interconnected stream system (over 40 miles of stream) in the upper Missouri River drainage with a native fish community. The project will also result in advancing the goal of restoring westslope cutthroat trout to 400 miles of stream in the Big Hole Drainage (Statewide Fisheries Management Plan 2011). French Creek is also home to a native population of pearlshell mussels. Pearlshell mussels have been documented downstream of the project area, but their numbers are few. It is likely that the altered habitat conditions and fine sediment inputs from upstream reaches limits mussel populations in the area. It may be possible to restore pearlshell mussels to French Creek once water quality and aquatic and riparian habitat is improved.

The collaboration between FWP, the Big Hole Watershed Committee and other partners to improve the water quality and fisheries of French Creek and its tributaries represents a huge step in the right direction in this area. While substantial healing has occurred over the past 100 years, there are still significant problems that are causing degradation of water quality. Many of these problems can be fixed with proper restoration. Efforts such as those proposed in this application will make great strides in reducing fine sediment loading to French Creek. I would hope that FFIP funds this grant proposal because of the potential improvements to water quality and stream and floodplain function of the area.

Sincerely,

Jim Olsen
Fisheries Biologist
Montana Fish Wildlife and Parks



May 24, 2018

Montana Fish, Wildlife & Parks
Fisheries Division
PO Box 200701
Helena, MT 59620-0701

Dear Ms. McGree,

Please accept this letter of support for the Big Hole Watershed Committee's proposal to restore an altered section of French Creek. The Watershed Protection Section (WPS) at the Department of Environmental Quality (DEQ) administers Clean Water Act Section 319 funding to address nonpoint sources of pollution impairing the state's water quality. WPS has an annual call for proposals and review internally and by an inter-agency review panel. In 2017, WPS elected to fund this project on French Creek for \$240,000 based on anticipated funding from the Environmental Protection Agency. Additional funding is necessary for the project to meet its proposed objectives and 319 match requirements.

French Creek is currently water quality impaired by excess fine sediment impacting aquatic life beneficial uses, including macroinvertebrates and native cold-water fish. Streambank erosion is a major source of sediment in French Creek and the TMDL requires a 36% reduction in anthropogenic causes of erosion to meet beneficial uses. This project will go a long way toward meeting target by addressing historical channel alterations that confine French Creek against a large eroding bank contributing tons of sediment annually. This project fits into a broad watershed approach to addressing sediment impairments from the headwaters downstream – including recent projects in California Creek, Moose Creek, and further upstream in French Creek. The Watershed Restoration Plan for the Middle-Lower Big Hole identifies French Creek as a priority for stream restoration. WPS encourages funding this proposal to improve water quality, promote natural stream functions, and restore a native fishery to this watershed.

Sincerely,

A handwritten signature in blue ink that reads "Dean Yashan".

Dean Yashan, Section Supervisor
MDEQ, Watershed Protection Section
1520 E 6th Ave
Helena, MT 59601
Email: dyashan@mt.gov
(406) 444-5317

Phil Ralston
Ralston Ranch
54289 MT Hwy 43
Wise River, MT 59762
September 14, 2017

Montana Department of Environmental Quality
PO Box 200901
Helena, MT 59620

Dear Montana DEQ,

I would like to communicate my support for the Big Hole Watershed committee's project to restore French Creek through the 319 application process.

Ralston Ranch is my family's cattle ranch and it is the only operating ranch in the Deep Creek drainage. My family began ranching here in 1886. The ranch property is located at the lower end of Deep Creek, and on the Big Hole River near Deep Creek which includes two miles of Deep Creek frontage and 4 miles of Big Hole River frontage. Ralston Ranch borders both Mt. Haggin Wildlife Management Area, and US Forest Service. I have a grazing lease for cattle on the Mt. Haggin Wildlife Management Area.

I have been a board member and supporter of the Big Hole Watershed Committee since its inception in 1995. Ralston Ranch is enrolled in the Candidate Conservation Agreement with Assurances (CCAA) program for restoration of arctic grayling. I welcomed the first restoration project completed under the CCAA program in 1998.

The entire upper drainage affected by the Anaconda Smelter fallout have long been a problem and its repair is of interest to me. The sediment wash from California Creek that enters the stream is very fine. In a heavy rain event white sediment from California Creek uplands enters the stream and washes down through Deep Creek and enters the Big Hole River. This sediment stays suspended in the river for miles. When placer mining was active in the entire drainage, similar white sediment washed downstream turning the water white. French Creek gulch and First Chance gulch were part of this placer mining, seasonally until the mid 1950's.

The Big Hole Watershed Committee has tried to bring attention to the significant impairments on Mt. Haggin since 2000. Working with Montana Fish, Wildlife and Parks and others to repair California Creek and the hillsides, French Gulch and Moose Creek have already made noticeable improvements to the land and water. I have seen a significant improvement in the water quality in lower Deep Creek in the last twenty years, and in the last couple of years there has been no evidence of the white, chalky water flowing by the ranch.

I urge Montana DEQ to support the Big Hole Watershed Committee's request to support the French Creek's repair. Its location at the headwaters of the Deep Creek drainage makes this a critical piece to watershed health and quality.

Sincerely,

A handwritten signature in black ink, appearing to read "Phil Ralston", with a stylized flourish at the end.

Phil Ralston

ANACONDA-DEER LODGE COUNTY
PLANNING DEPARTMENT

800 South Main
Anaconda, Montana 59711
Phone No. (406) 563-4010
Fax No. (406) 563-4076



September 18, 2017

Montana Department of Environmental Quality
Non-Point Source 319 Funding
PO Box 200901
Helena, Montana 59620

Dear Montana DEQ,

Anaconda-Deer Lodge County (ADLC) would like to pledge its support for stream restoration work on French Creek in the Mount Haggin Wildlife Management Area. We support the partnership and efforts of Montana Fish, Wildlife and Parks and the Big Hole Watershed Committee to complete this work. We strongly encourage the non-point source 319 program to fund the proposed work.

The French Creek portion of work will build upon successful restoration upstream in French Gulch, Moose Creek, and California Creek all of which now have rebuilt natural streams, connected floodplains, increased natural water storage, reduced sediment loads, and improved fish and wildlife habitat. The proposed French Creek work will continue to support a transformation on the state owned land from historic damage of Anaconda Company Smelter operations to a thriving ecosystem.

ADLC has had an opportunity to review the work recently completed in the French Gulch-Moose Creek drainages. We are very impressed by the results and encouraged that restoration of these watersheds can be accomplished as rapidly and cost-effectively as already demonstrated. 319 funding is a key factor in this success and we encourage continued support of these restoration efforts by MDEQ through this grant program.

As you may be aware, USEPA Region 8 is proposing a waiver/relaxation of state water quality standards for a number of high elevation watersheds in the County due to the "technical infeasibility" of implementing effective best management practices in these mountainous areas. The success of work performed in the French Gulch and Moose Creek drainages by the Big Hole Watershed Committee and its partners clearly demonstrates otherwise. Again, we strongly support continued funding of these restoration activities.

Respectfully,

Chas Ariss, PE
Public Works-Planning Director-County Engineer
Anaconda-Deer Lodge County



George Grant TU
PO Box 563
Butte, MT 59703

Cold Clean Fishable Water

Montana Department of Environmental Quality
Non-Point Source 319 Funding
PO Box 200901
Helena, Montana 59620

Dear Montana DEQ,

The George Grant Chapter of Trout Unlimited (GGTU) would like to pledge our support for stream restoration work on French Creek on the Mount Haggin Wildlife Management Area. We support the partnership and efforts of Montana Fish, Wildlife and Parks and the Big Hole Watershed Committee to complete this work and we encourage the non-point source 319 program to fund the proposed work.

The French Creek portion of work will build upon successful restoration upstream in French Gulch, Moose Creek, and California Creek all of which have rebuilt natural streams, connected floodplains, increased natural water storage, reduced sediment loads, and improved fish and wildlife habitat. The proposed French Creek work will continue to support a transformation on the state owned land from historic damage to a thriving ecosystem.

Projects like this and specifically this project fits perfectly with our mission statement to: Conserve, Protect and Restore cold water fisheries and their watersheds in southwest Montana. In fact, GGTU has been supporting this work with funding and volunteer hours to remediate and restore the drainage. Not only does it benefit the fisheries resource it also provides jobs in our area. There's no reason to continue to pollute the Big Hole River. It's not going to get better without help. Now is the time to fund and complete the project. ***Cold, Clean, Fishable Water*** benefits everyone in the Big Hole Valley.

Thank you.

Roy Morris
Past President
George Grant TU
PO Box 563
Butte, MT 59703
president@ggtu.org
406-491-4255

September 14, 2017

Montana Department of Environmental Quality
Non-Point Source 319 Funding
PO Box 200901
Helena, Montana 59620

Dear Montana DEQ,

As a local fly fisherman living close to French Creek I support the restoration work being done on French Creek in the Mount Haggin Wildlife Management Area. I bought property in 1982 and built our home in 1990 a mile from French Creek and I fish the creek as often as I can. Over the years I have seen a big improvement in the fishery since restoration work has been done in the French Creek drainage on the Wildlife Management Area.

I support the partnership and efforts of Montana Fish, Wildlife and Parks and the Big Hole Watershed Committee to continue their restoration work on this valuable fishery. I hope the non-point source 319 program will fund the proposed work. I have seen the clay banks eroding, discoloring the stream and having an impact on the fishery.

Other work already completed in French Gulch, the California uplands and California Creek have rebuilt natural stream channels and greatly reduced sediment loads in the creek. All this previous work has improved fish and wildlife habitat. I have noticed the fish are in better condition and larger than they have been prior to the restoration work that has been completed.

I would hope funding will be provided to continue restoration work on this fishery. I have seen an increase in the number of grayling being caught since sediment loads have been greatly reduce after completion of past restoration work. I've also noticed the health and condition of westslope cutthroat, brooktrout and rainbow trout has also improved.

Approval of funding under the non-point source 319 program will help in continuing the restoration work in French Creek.

Thank you.

Sincerely,



Paul Olson
524 Wolf Ridge Road
Wise River, MT 59762

Sunrise Fly Shop
472 Main St
Melrose, MT 59743
sunriseflyshop.com

Montana Department of Environmental Quality
Non-Point Source 319 Funding
PO Box 200901
Helena, Montana 59620

Dear Montana DEQ,

I would like to pledge my support for stream restoration work on French Creek on the Mount Haggin Wildlife Management Area. I support the partnership and efforts of Montana Fish, Wildlife and Parks and the Big Hole Watershed Committee to complete this work. I encourage the non-point source 319 program to fund the proposed work.

The French Creek portion of work will build upon successful restoration upstream in French Gulch, Moose Creek, and California Creek all of which have rebuilt natural streams, connected floodplains, increased natural water storage, reduced sediment loads, and improved fish and wildlife habitat. The proposed French Creek work will continue to support a transformation on the state owned land from historic damage to a thriving ecosystem.

Montana's fishing industry brings millions of dollars to State's economy every year. The success of the fishing and outfitting industries are dependent on healthy fish and naturally reproducing fish populations. Without clean water and thriving riparian habitats, healthy populations of fish cannot exist. The restoration work on French Creek will help to improve the overall water quality of the Big Hole River, which will insure future generations of healthy fish.

The Big Hole River is the lifeblood of all Big Hole Valley communities. Improving the overall health of the Big Hole Watershed directly benefits all the Big Hole River's rural communities.

Thank you.

Sincerely,

A handwritten signature in black ink, appearing to read 'Eric Thorson', with a long horizontal flourish extending to the right.

Eric Thorson
Co-Owner of Sunrise Fly Shop

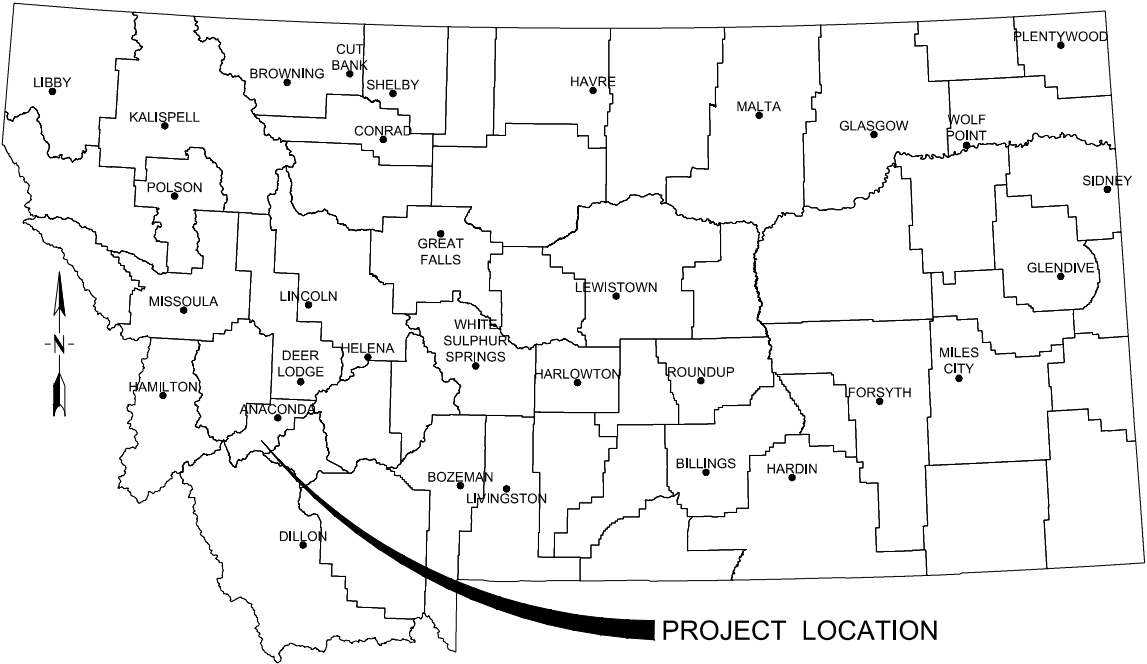
PRELIMINARY DRAWINGS FOR FRENCH CREEK STREAM RESTORATION

DEER LODGE COUNTY, MONTANA
11/2018

PREPARED BY:
 **Morrison
Maierle**
engineers • surveyors • planners • scientists

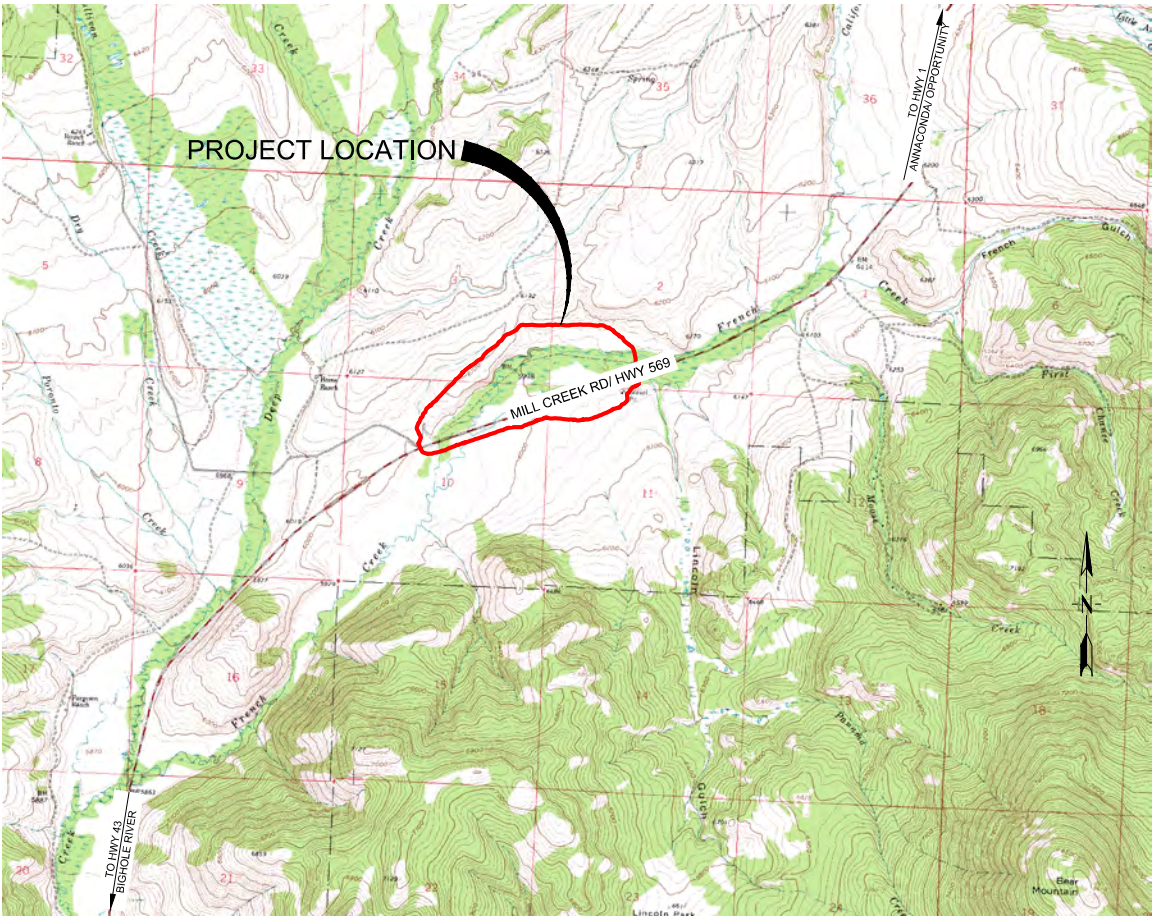
1 Engineering Place, Helena, MT 59602
406.442.3050 • www.m-m.net

PREPARED FOR:



LOCATION MAP

NOT TO SCALE



VICINITY MAP

NOT TO SCALE

SHEET LIST TABLE		
Sheet Number	DRAWING NUMBER	Sheet Title
0	-	COVER SHEET
1	G-1	GENERAL LEGEND AND NOTES
2	G-2	EXISTING CONDITIONS
3	C-1	OVERALL SITE MAP
4	C-2	PLAN & PROFILE STA. 0+00 TO STA. 12+00
5	C-3	PLAN & PROFILE STA. 12+00 TO STA. 24+00
6	C-4	PLAN & PROFILE STA. 24+00 TO STA. 36+00
7	C-5	PLAN & PROFILE STA. 36+00 TO STA. 40+31
8	C-6	CROSS SECTIONS STA. 0+50 TO STA. 13+25
9	C-7	CROSS SECTIONS STA. 13+75 TO STA. 27+75
10	C-8	CROSS SECTIONS STA. 29+00 TO STA. 39+50
11	C-9	CUT AND FILL MAP STA. 0+00 TO STA. 24+00
12	C-10	CUT AND FILL MAP STA. 24+00 TO STA. 40+31
13	D-1	CHANNEL TYPICAL SECTIONS AND DETAILS
14	D-2	FLOODPLAIN AND WETLAND TYPICAL SECTIONS AND DETAILS
15	D-3	FLOODPLAIN AND ABANDONED CHANNEL DETAILS
16	D-4	CHANNEL STABILIZATION STRUCTURE DETAILS
17	D-5	PLANTING SPECIFICATIONS NOTES

PRELIMINARY
NOT FOR CONSTRUCTION

APPROVED BY: MATT BARNES, PE, CFM
Project Manager

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VERIFY COLOR!
THIS SHEET IS INTENDED TO
BE IN COLOR. RED, GREEN
AND BLUE WILL BE VISIBLE IF
REPRODUCED CORRECTLY.



 **Morrison
Maierle**
engineers • surveyors • planners • scientists

QUALITY ASSURANCE

PROJECT MANAGER	Q.A. APPROVAL DATE
OFFICE QUALITY ASSURANCE COORDINATOR	Q.A. PROJECT NUMBER
PEER REVIEWER	

SET NO. _____

MORRISON-MAIERLE PROJECT NO. 5406.004.01

GENERAL NOTES

- 1. SITE SURVEYED ON 9/24/18 AND 9/25/18 WITH RTK AND UAS EQUIPMENT.
- 2. HORIZONTAL DATUM= NAD 83 MONTANA STATE PLANE, INTERNATIONAL FEET, VERTICAL DATUM= NAVD88.
- 3. ALL EXISTING CONTROL POINTS, SURVEY MONUMENTS, AND STAKING SHALL BE PRESERVED OR REPLACED. REPLACEMENT SHALL BE TO SAME LEVEL OF ACCURACY IN A TIMELY MANNER AT CONTRACTOR'S EXPENSE.
- 4. EXISTING FEATURES AND UTILITIES SHOWN ON PLANS ARE BASED ON INFORMATION AVAILABLE AT TIME PLANS WERE PREPARED. CONTRACTORS ARE RESPONSIBLE FOR BURIED UTILITY LOCATES. CONTRACTOR SHALL INFORM ENGINEER IMMEDIATELY IF DISCREPANCY IS FOUND IN EXISTING FEATURES OR CONDITIONS THAN THOSE SHOWN.
- 5. ACCESS TO WORK AREAS SHALL BE BY DEFINED ROUTES SHOWN ON PLANS OR AS APPROVED BY ENGINEER. AREAS OUTSIDE WORK AREAS, STAGING AREAS, AND STOCK PILE AREAS SHALL BE PRESERVED TO MAXIMUM EXTENT POSSIBLE.
- 6. ALL EXISTING ROADS, GATES, CROSSINGS, ETC. SHALL BE PRESERVED IN EXISTING CONDITION. IF IMPACTS OCCUR DURING CONSTRUCTION, CONTRACTOR SHALL REPAIR AND/ OR REPLACE AT CONTRACTORS EXPENSE. ENGINEER SHALL APPROVE ALL REPAIRS.
- 7. CONTRACTOR SHALL REVIEW AND ABIDE BY ALL INFORMATION AND REQUIREMENTS FOUND IN PROJECT PERMITS. COPIES OF PERMITS ARE INCLUDED IN PROJECT MANUAL.
- 8. PROJECT IS LOCATED ON THE MOUNT HAGGIN WILDLIFE MANAGEMENT AREA OWNED BY MONTANA FISH, WILDLIFE, AND PARKS.

EROSION CONTROL NOTES

- 1. CONTRACTOR IS RESPONSIBLE FOR MONTANA POLLUTANT DISCHARGE ELIMINATION SYSTEM (MPDES) PERMIT. CONTRACTOR SHALL DEVELOP STORM WATER POLLUTION PREVENTION PLAN (SWPPP), DEWATERING AND DIVERSION PLAN, EROSION AND DUST CONTROL PLAN FOR PERMIT REQUIREMENTS.
- 2. CONTRACTOR SHALL SUBMIT ALL MPDES DOCUMENTATION INCLUDING NOTICE OF INTENT, SWPPP, AND NOTICE OF TERMINATION. COPIES OF ALL MPDES DOCUMENTS SHALL BE PROVIDED TO ENGINEER WHEN SUBMITTED TO MONTANA DEQ.
- 3. WATER FOR CONSTRUCTION PURPOSES SHALL BE OBTAINED BY CONTRACTOR AT THEIR EXPENSE. ALL APPLICABLE PERMITS RELATED TO CONSTRUCTION WATER ALL THE CONTRACTOR'S RESPONSIBILITY AND ARE INCIDENTAL TO THE WORK.

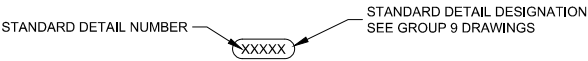
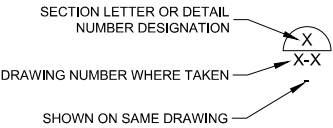
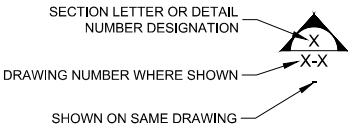
ABBREVIATION

NIC = NOT IN CONTRACT
FG = FINISHED GROUND
EG = EXISTING GROUND

LEGEND

- MINOR EXISTING CONTOUR
- MAJOR EXISTING CONTOUR
- MINOR PROPOSED CONTOUR
- MAJOR PROPOSED CONTOUR
- CONSTRUCTION ACCESS ROUTE
- EXISTING WETLAND AREAS
- EXISTING STREAM CHANNEL
- NEW STREAM CHANNEL
- EXISTING ROAD
- NEW WETLANDS CREATION AREAS
- BIOENGINEERED STREAM BANK
- ABANDONED CHANNEL RE-CONTOURING

GENERAL DESIGN DESIGNATIONS



STANDARD DETAIL DESIGNATION

DETAIL AND SECTION DESIGNATION - WHERE TAKEN DETAIL AND SECTION DESIGNATION - WHERE SHOWN

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	NO.	DESCRIPTION	BY	DATE			DEER LODGE COUNTY	MONTANA	SHEET NUMBER 1
							GENERAL LEGEND AND NOTES		DRAWING NUMBER G-1



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NO.	DESCRIPTION	BY	DATE

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DATE: _____

FRENCH CREEK STREAM RESTORATION	
DEER LODGE COUNTY	MONTANA
EXISTING CONDITIONS	

PROJECT NUMBER 5406.004.01
SHEET NUMBER 2
DRAWING NUMBER G-2

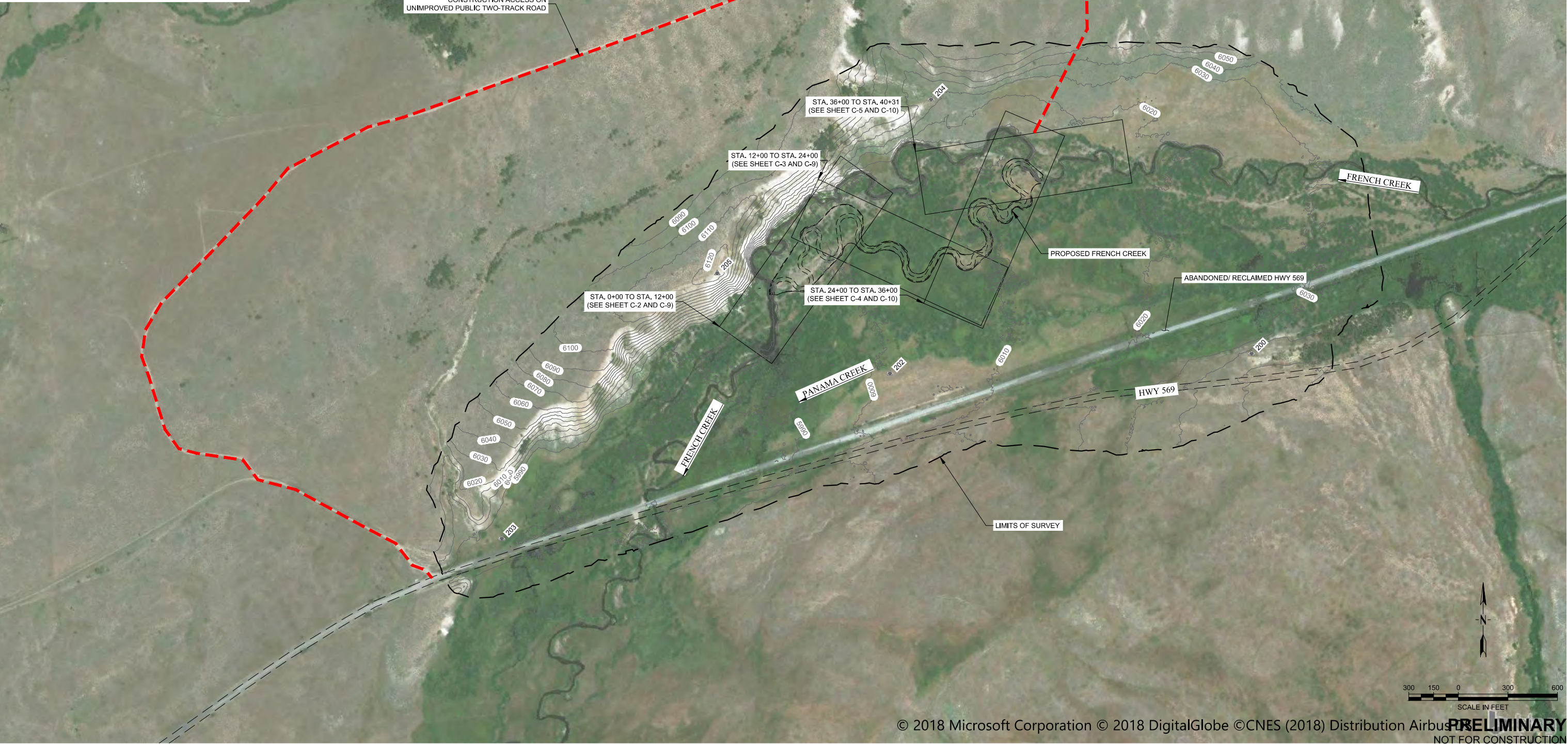
CONTROL POINT TABLE				
PNT. #	NORTHING	EASTING	ELEV.	DESC.
1	642945.36	1072736.05	6287.74	RPC-RPA
200	638410.31	1063579.90	6042.06	CP MMI 1
201	638932.63	1065808.22	6067.84	CP AERIAL TARGET
202	638290.08	1061391.00	6003.20	CP AERIAL TARGET
203	637290.56	1059041.34	5982.61	CP AERIAL TARGET
204	639948.34	1061639.93	6033.92	CP MMI 1
205	638897.18	1060345.60	6124.75	CP AERIAL TARGET

NOTES:

1. CONTROL POINT NUMBER 1 IS NOT SHOWN. LOCATED ABOUT 2 MILES NORTH ON HWY 569 ON FRENCH GULCH ROAD ABOUT ½ MILE EAST.

GENERAL NOTES

1. TOTAL AREA OF SOD SALVAGE SITE.
2. ROCK SALVAGE SITE SHALL BE USED AS SOURCE SITE FOR DOMINANT/ HABITAT ROCKS AND LARGE ROCKS IF CLEARING AND GRUBBING ACTIVITIES DO NOT GENERATE SUFFICIENT QUANTITY.



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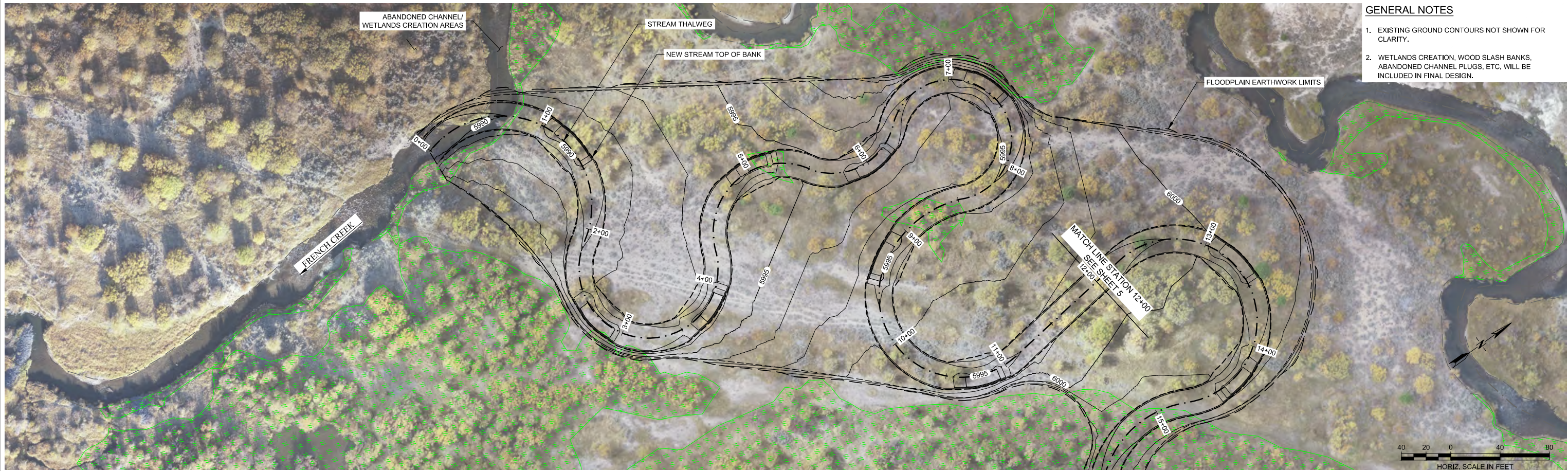
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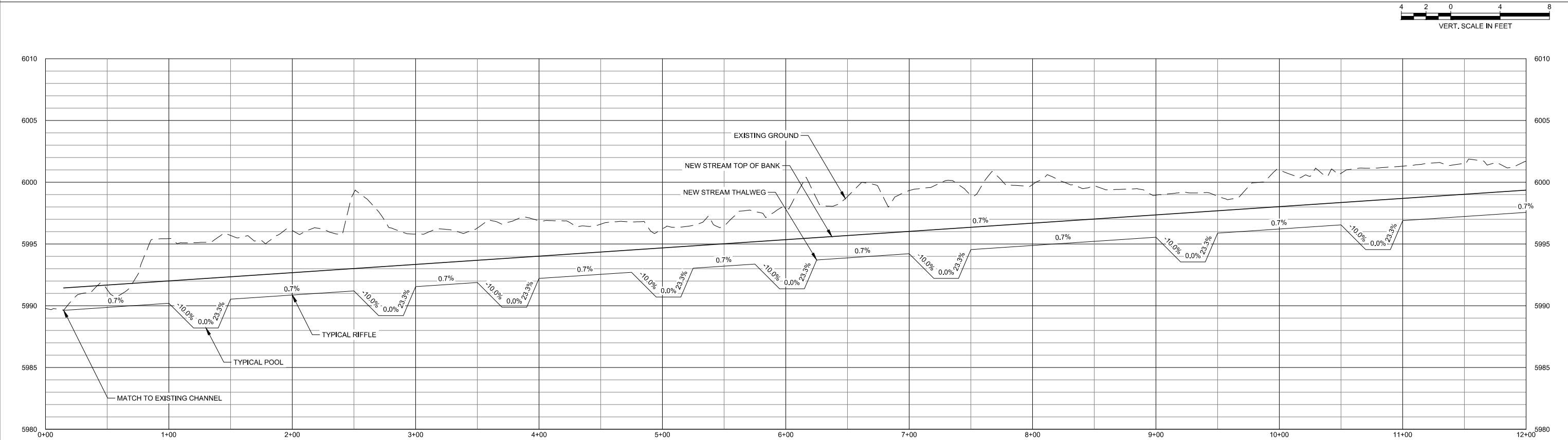
FRENCH CREEK STREAM RESTORATION	
DEER LODGE COUNTY	MONTANA
OVERALL SITE MAP	

PROJECT NUMBER 5406.004.01
SHEET NUMBER 3
DRAWING NUMBER C-1



GENERAL NOTES

- EXISTING GROUND CONTOURS NOT SHOWN FOR CLARITY.
- WETLANDS CREATION, WOOD SLASH BANKS, ABANDONED CHANNEL PLUGS, ETC. WILL BE INCLUDED IN FINAL DESIGN.



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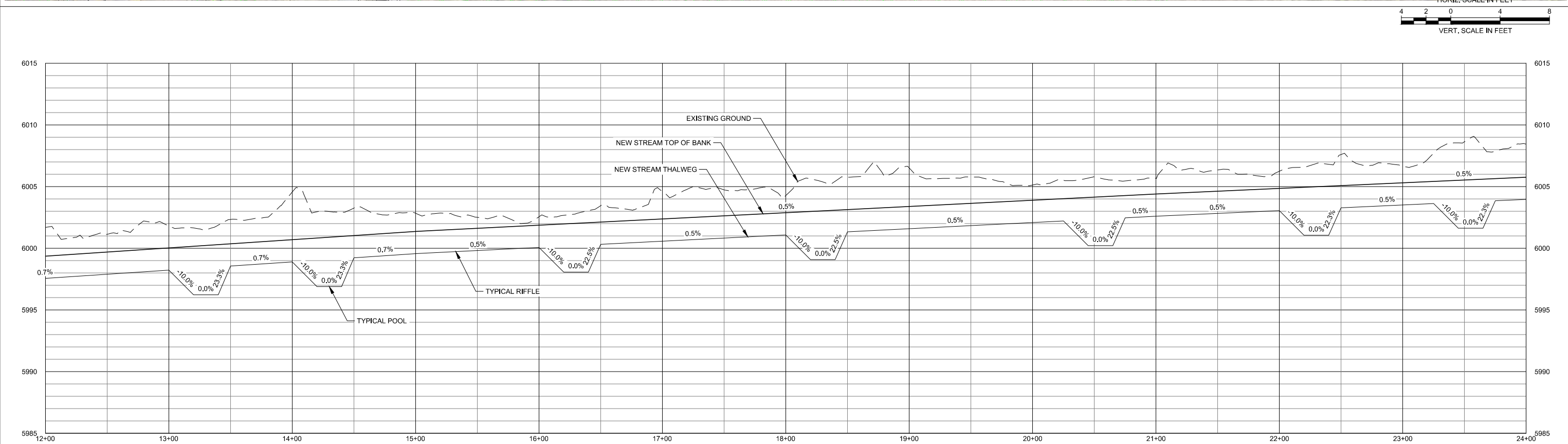
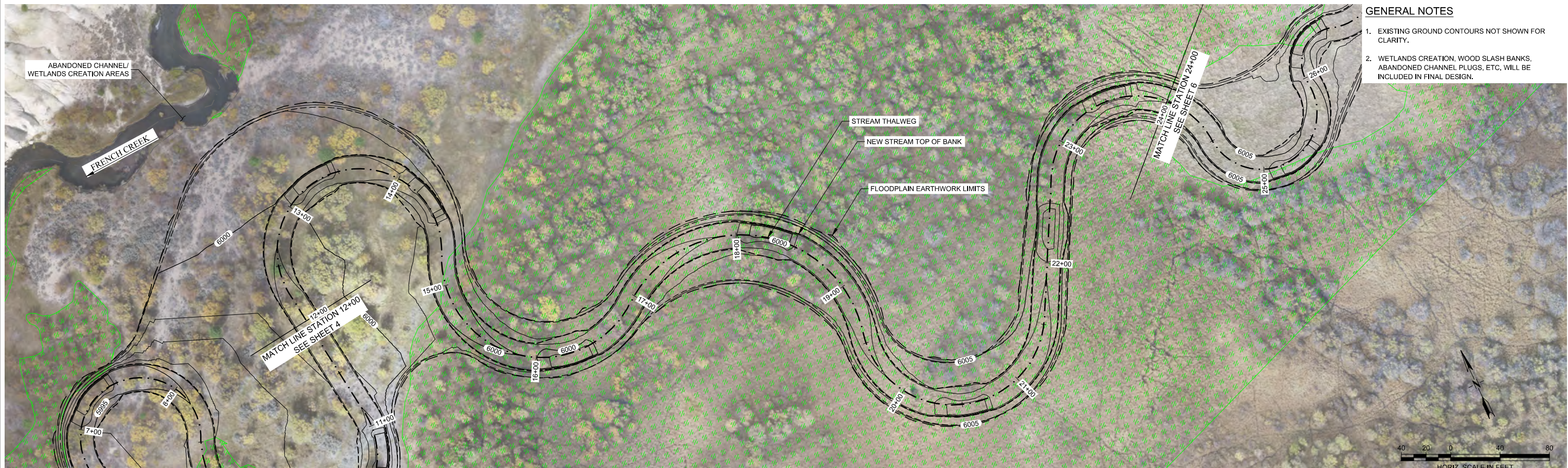
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FRENCH CREEK STREAM RESTORATION
DEER LODGE COUNTY MONTANA
PLAN AND PROFILE STA. 0+00 TO STA. 12+00

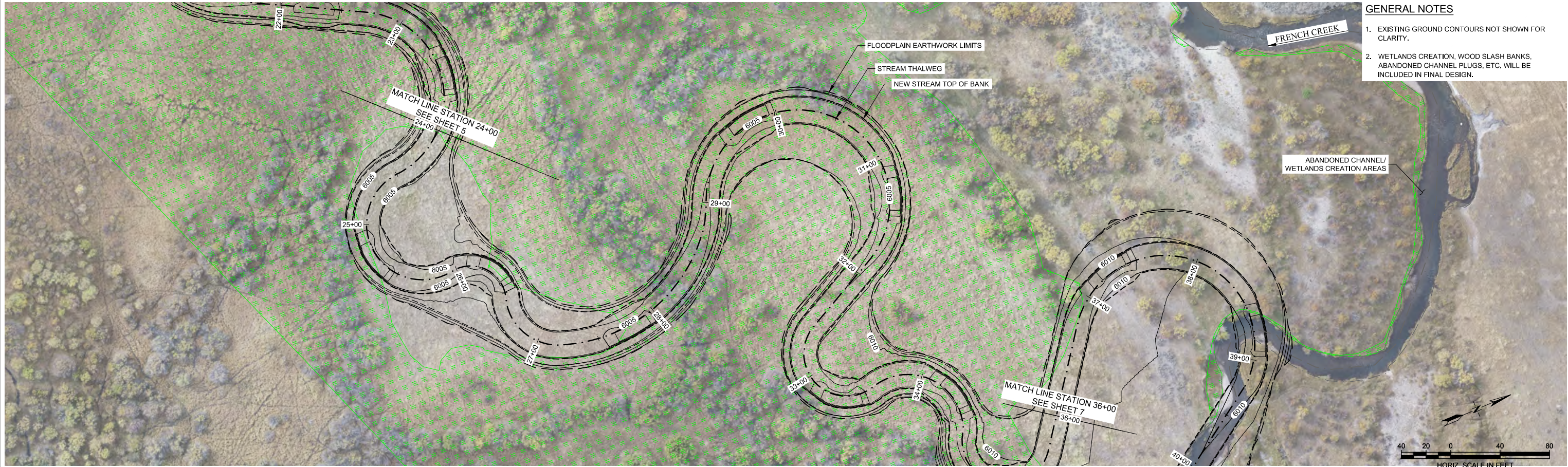
PROJECT NUMBER
5406.004.01
SHEET NUMBER
4
DRAWING NUMBER
C-2

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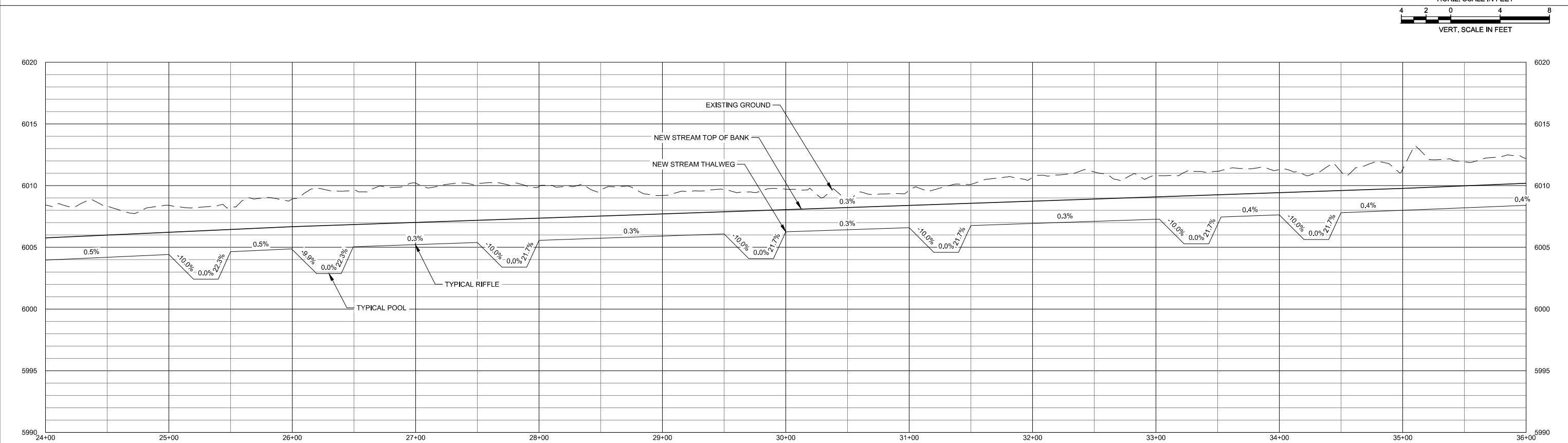


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	NO.	DESCRIPTION	BY	DATE					



- GENERAL NOTES**
- EXISTING GROUND CONTOURS NOT SHOWN FOR CLARITY.
 - WETLANDS CREATION, WOOD SLASH BANKS, ABANDONED CHANNEL PLUGS, ETC. WILL BE INCLUDED IN FINAL DESIGN.

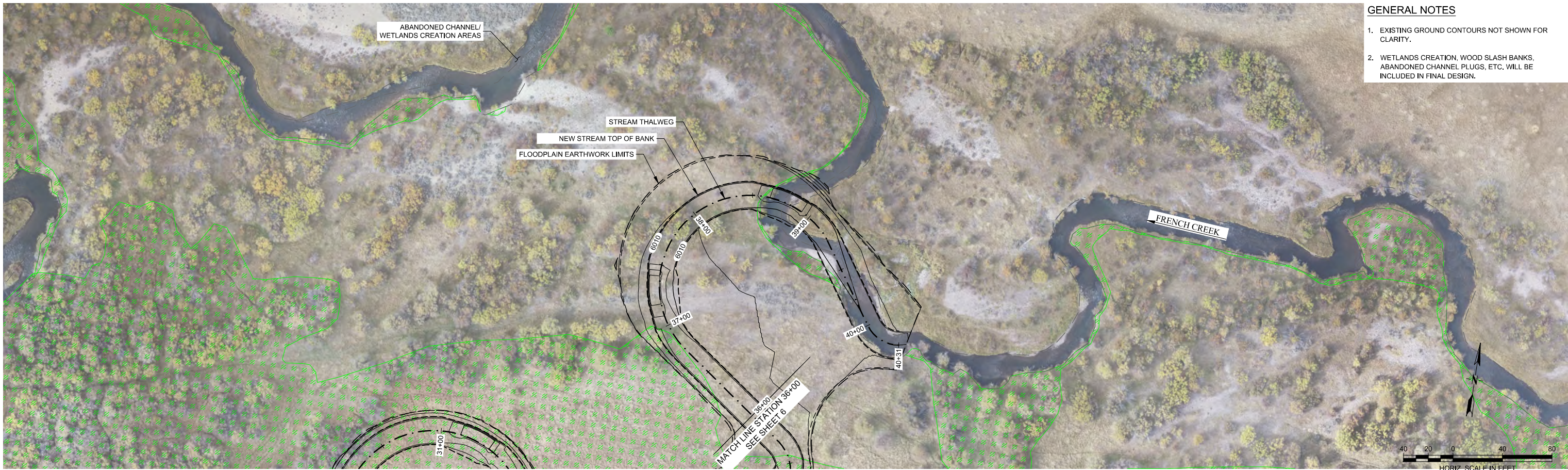


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	NO.	DESCRIPTION	BY	DATE		5406.004.01					
							SHEET NUMBER				
							6				
							DRAWING NUMBER				
R:\5406-BHW\00401\ACAD\SHEETS\6 PLAN & PROFILE STA. 24+00 TO STA. 36+00.DWG PLOTTED BY:DAVID A. HALLSTEN ON Nov/29/2018						DEER LODGE COUNTY		MONTANA		PLAN AND PROFILE STA. 24+00 TO STA. 36+00	C-4

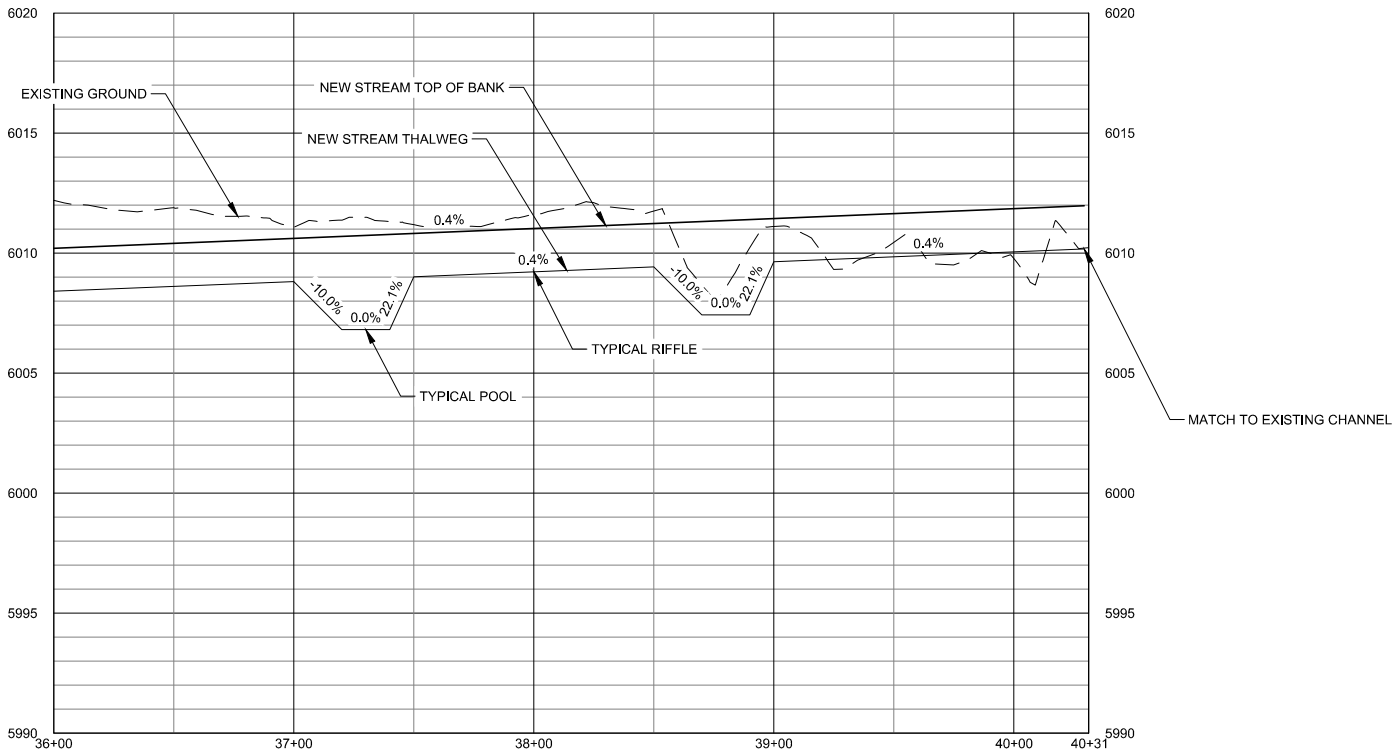
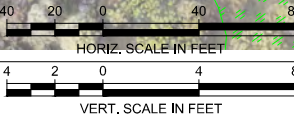
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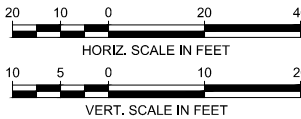
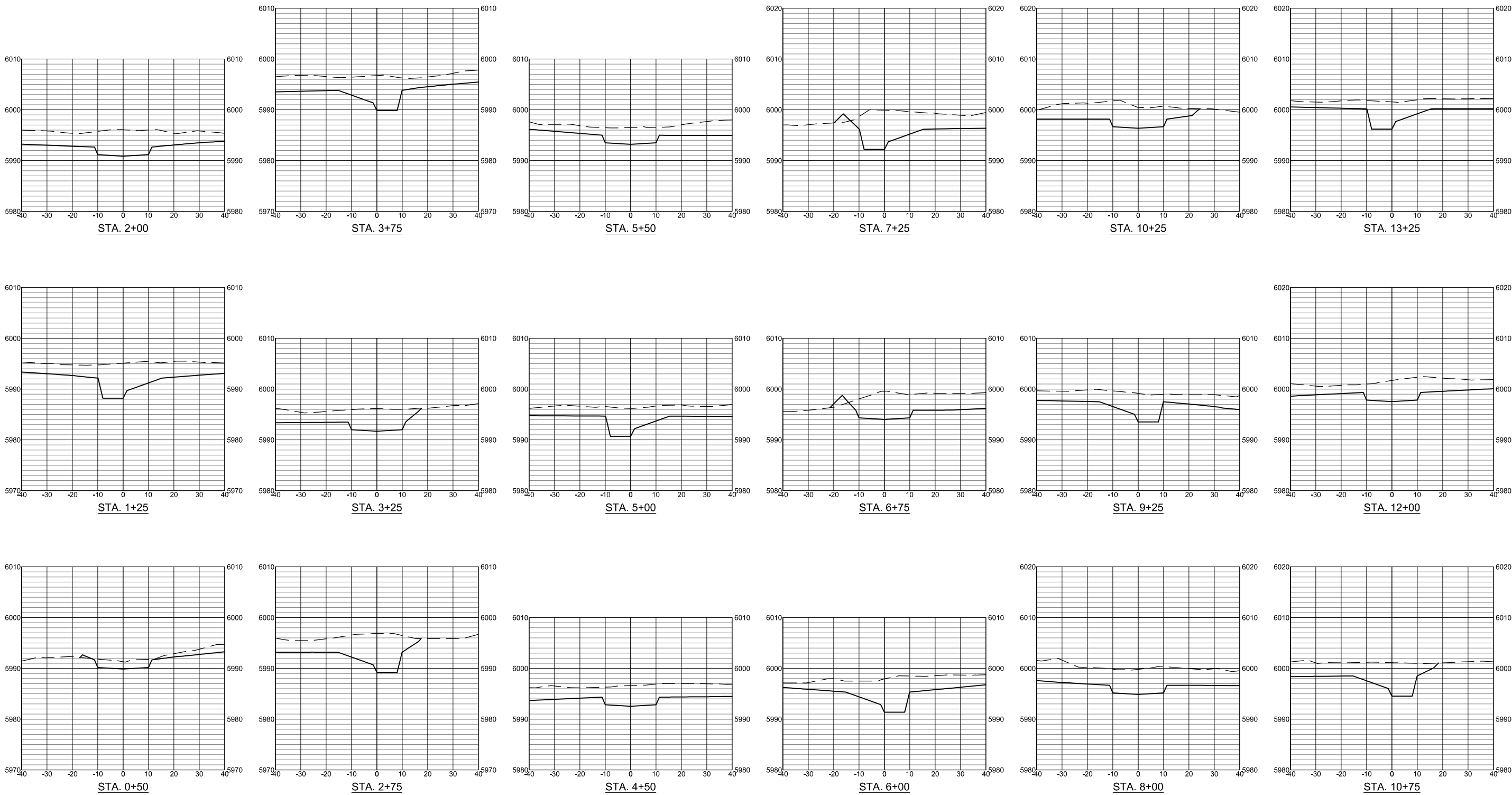
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FRENCH CREEK STREAM RESTORATION

DEER LODGE COUNTY MONTANA

PLAN AND PROFILE STA. 36+00 TO STA. 40+31

PROJECT NUMBER S406.004.01
SHEET NUMBER 7
DRAWING NUMBER C-5



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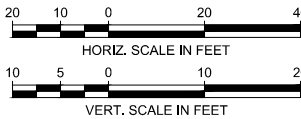
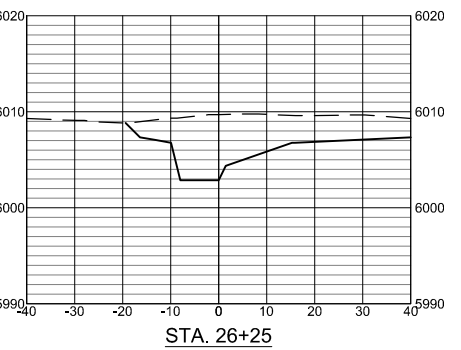
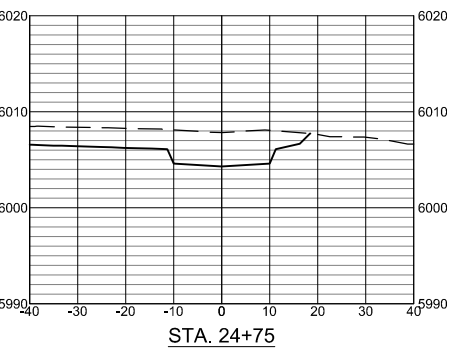
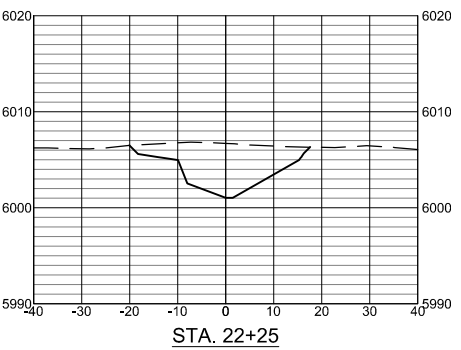
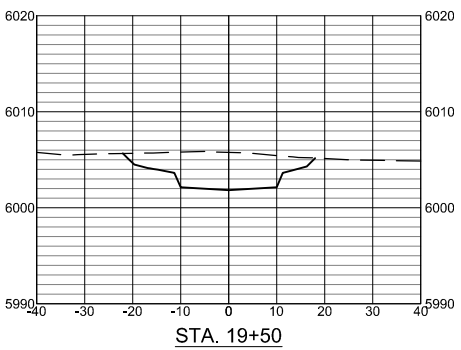
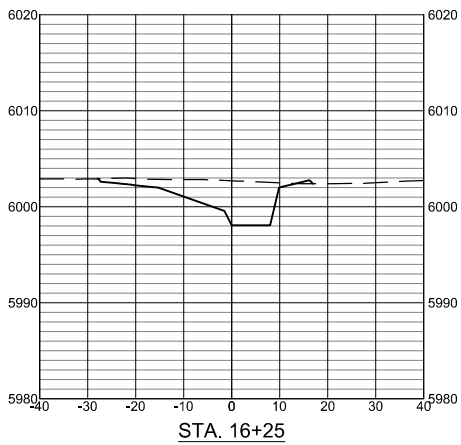
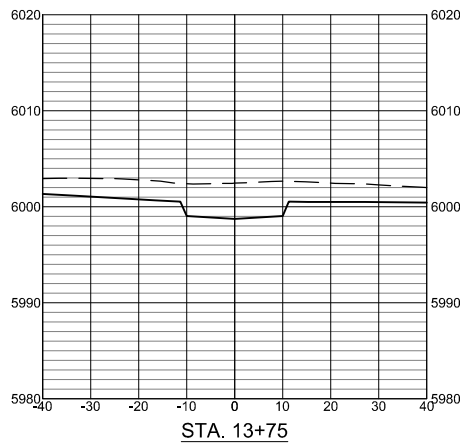
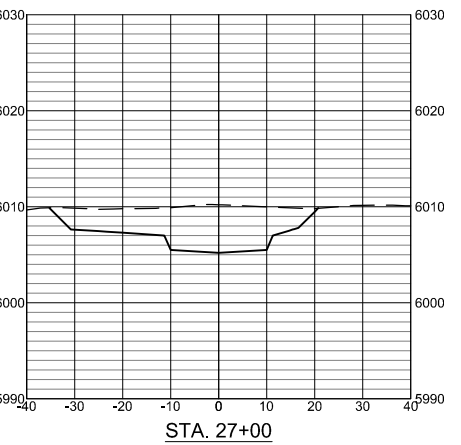
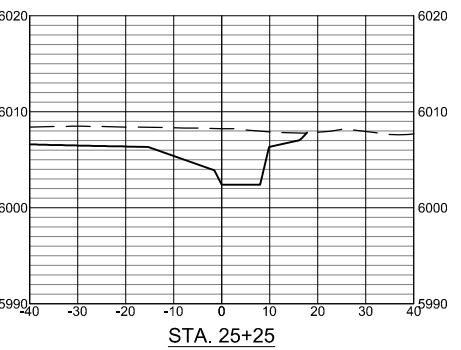
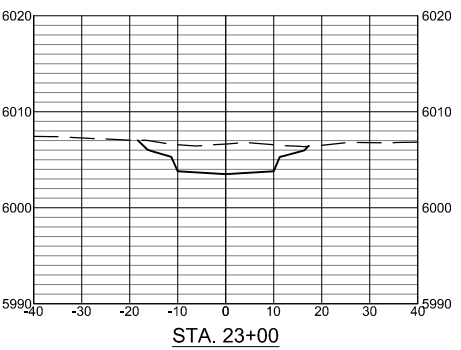
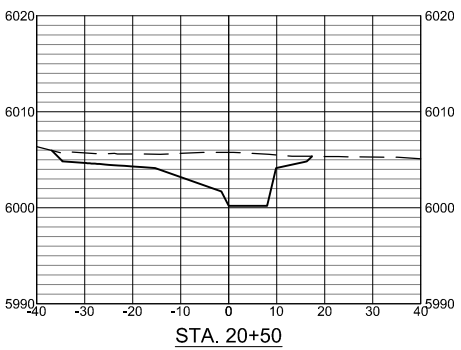
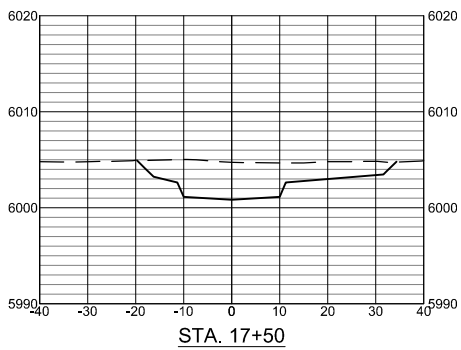
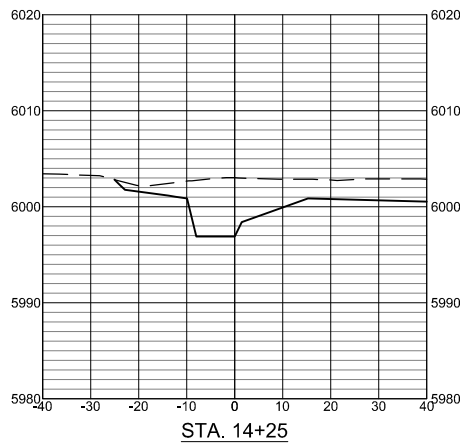
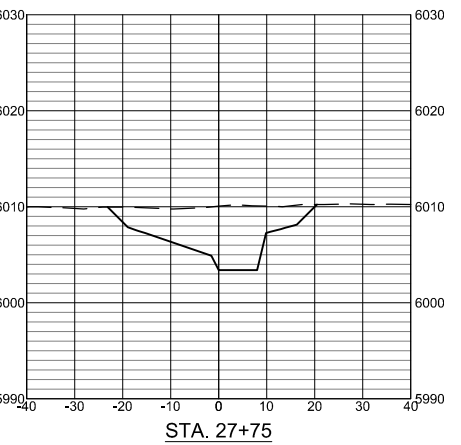
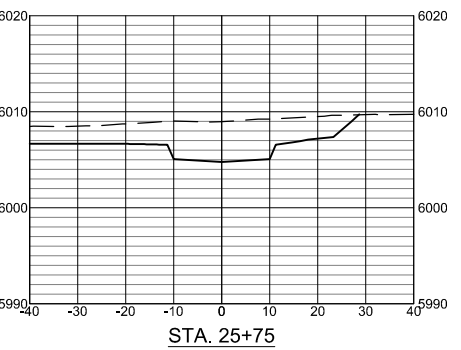
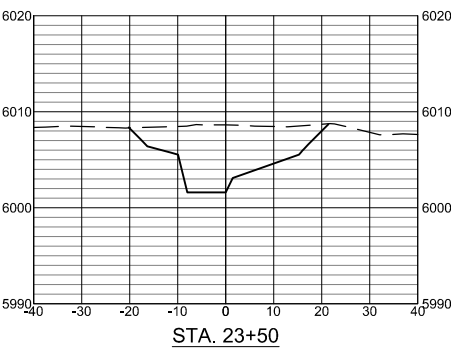
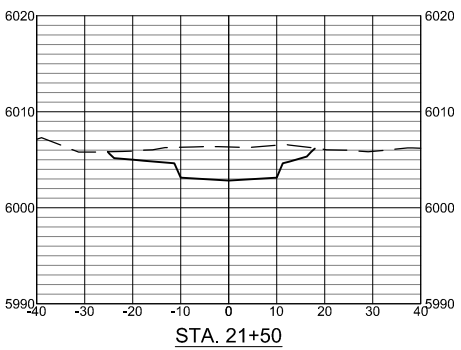
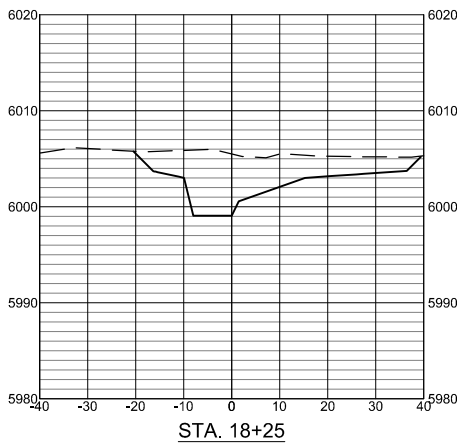
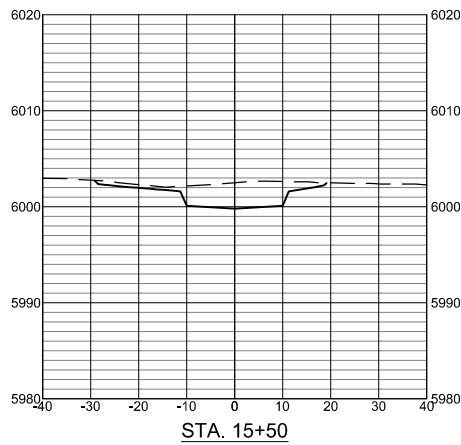
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FRENCH CREEK STREAM RESTORATION
DEER LODGE COUNTY MONTANA
CROSS SECTIONS STA. 0+50 TO STA. 13+25

PROJECT NUMBER
5406.004.01
SHEET NUMBER
8
DRAWING NUMBER
C-6

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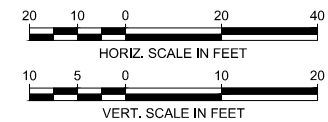
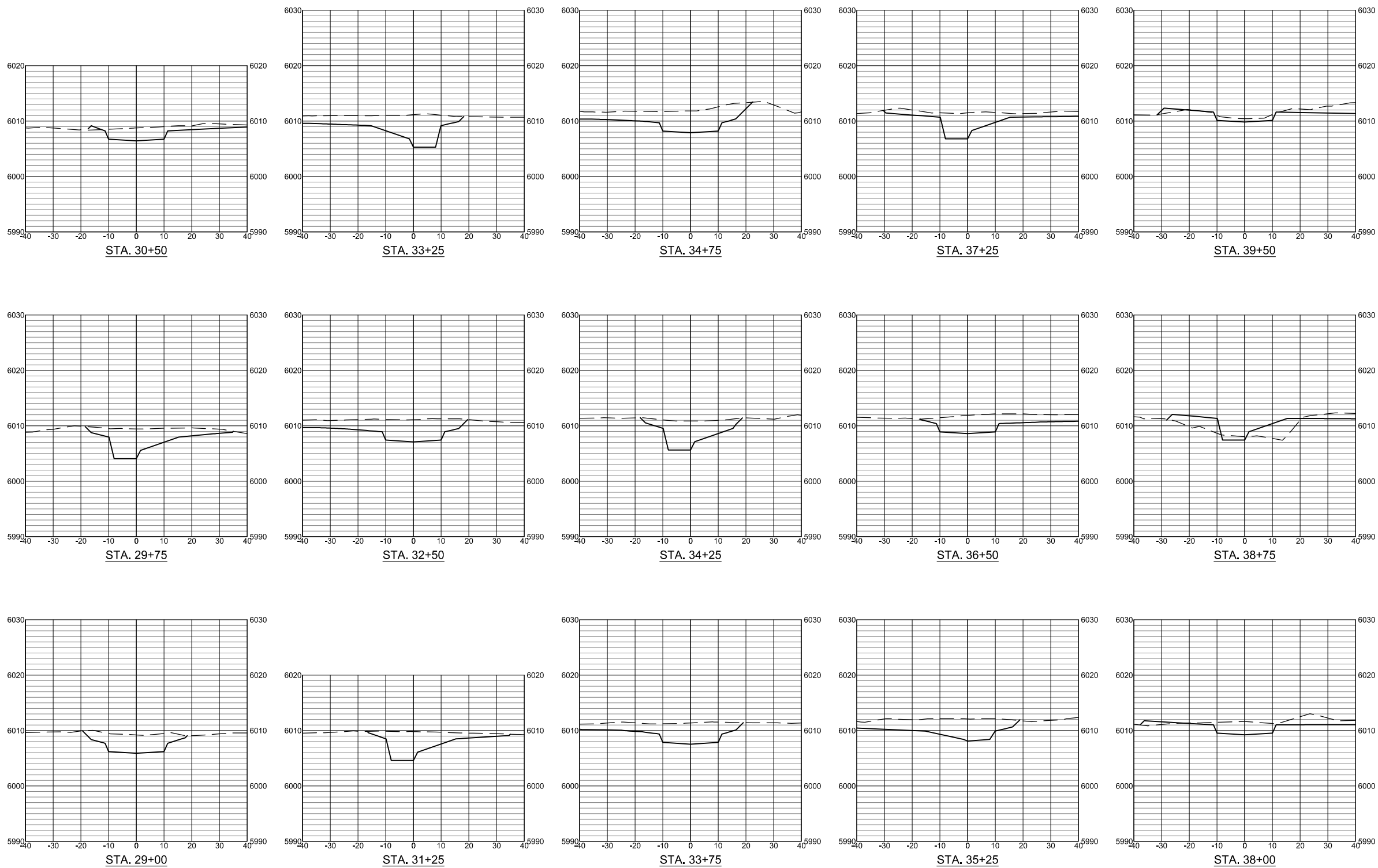
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FRENCH CREEK STREAM RESTORATION
DEER LODGE COUNTY MONTANA
CROSS SECTIONS STA. 13+75 TO STA. 27+75

PROJECT NUMBER
5406.004.01
SHEET NUMBER
9
DRAWING NUMBER
C-7

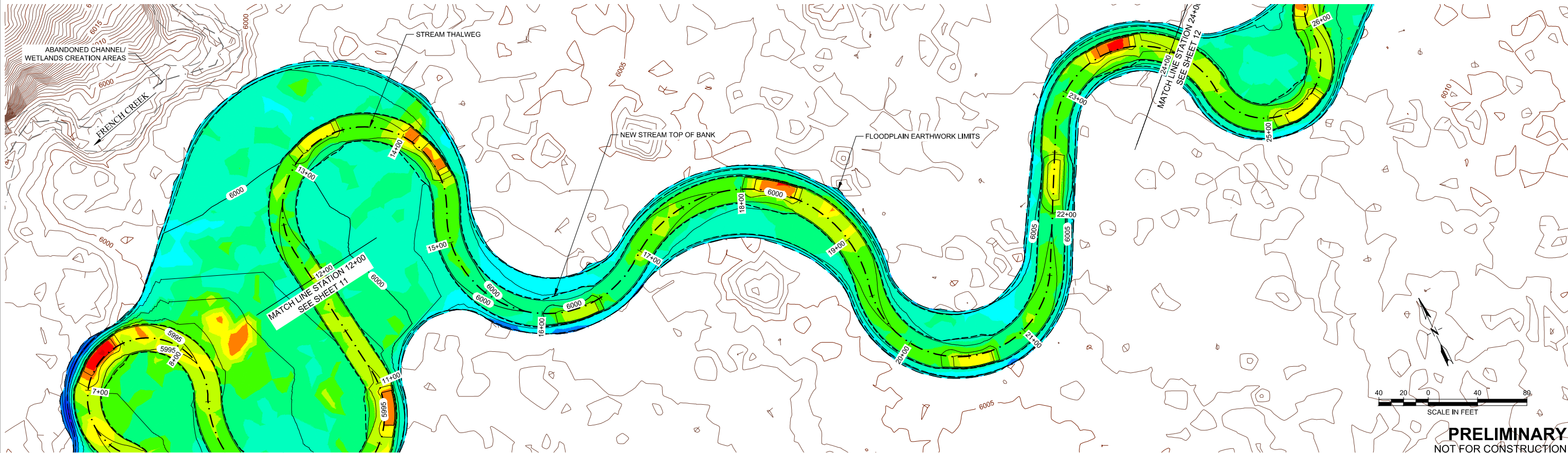
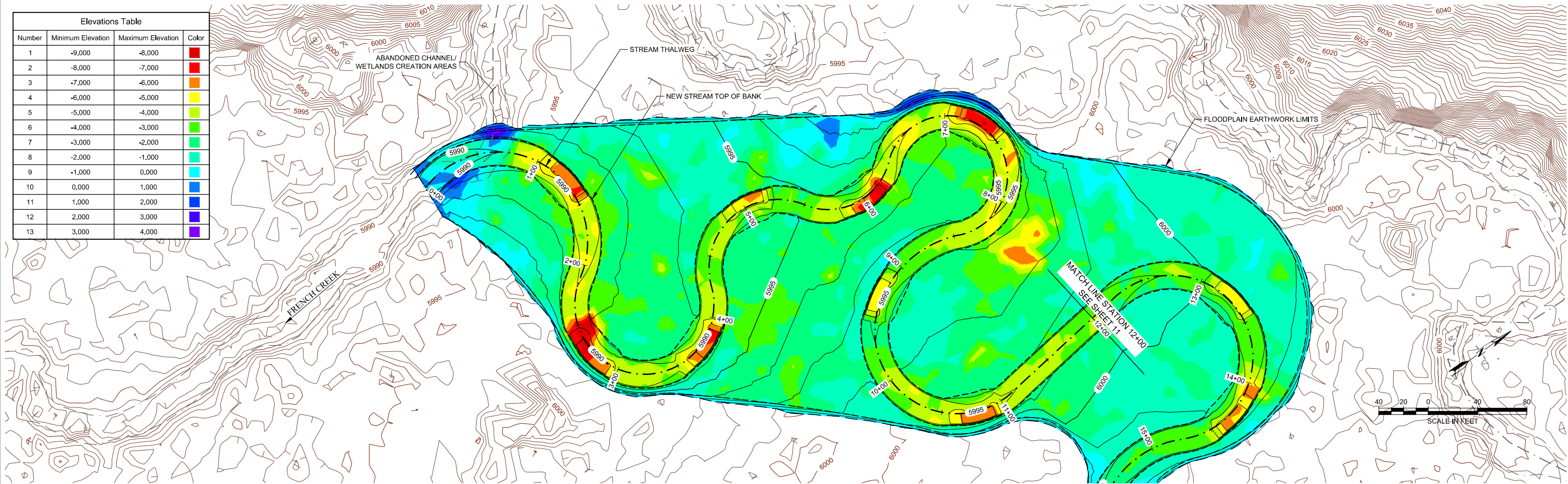
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	NO.	DESCRIPTION	BY	DATE			DEER LODGE COUNTY		SHEET NUMBER 10
							MONTANA		DRAWING NUMBER
							CROSS SECTIONS STA. 29+00 TO STA. 39+50		C-8

Elevations Table			
Number	Minimum Elevation	Maximum Elevation	Color
1	-9.000	-8.000	Red
2	-8.000	-7.000	Red
3	-7.000	-6.000	Orange
4	-6.000	-5.000	Yellow
5	-5.000	-4.000	Light Green
6	-4.000	-3.000	Green
7	-3.000	-2.000	Teal
8	-2.000	-1.000	Cyan
9	-1.000	0.000	Blue
10	0.000	1.000	Blue
11	1.000	2.000	Blue
12	2.000	3.000	Blue
13	3.000	4.000	Blue



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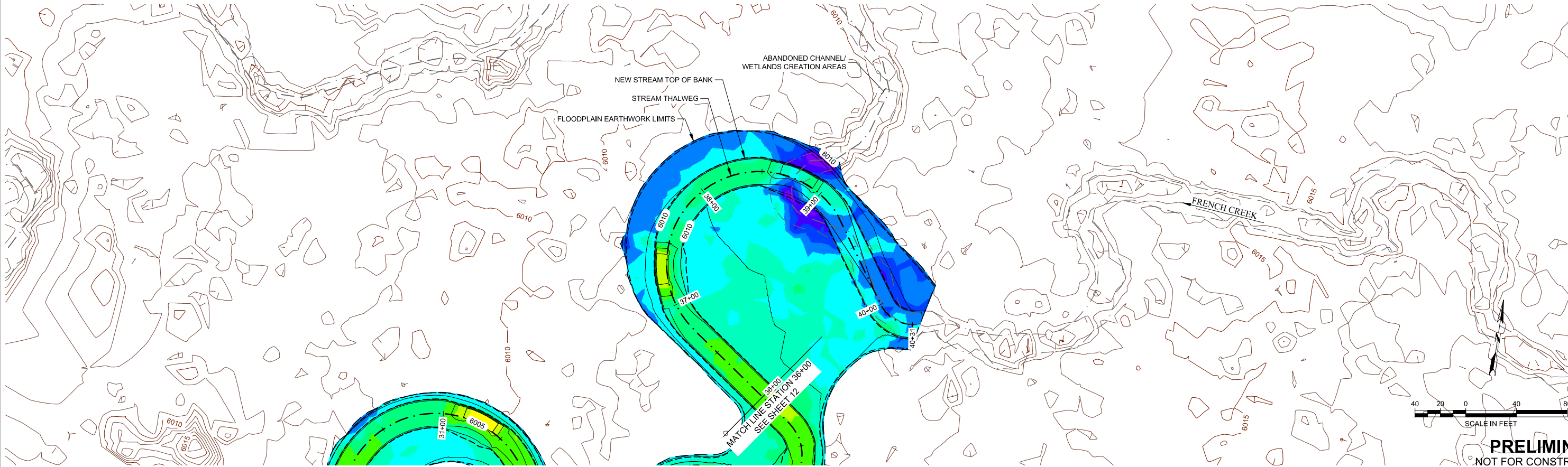
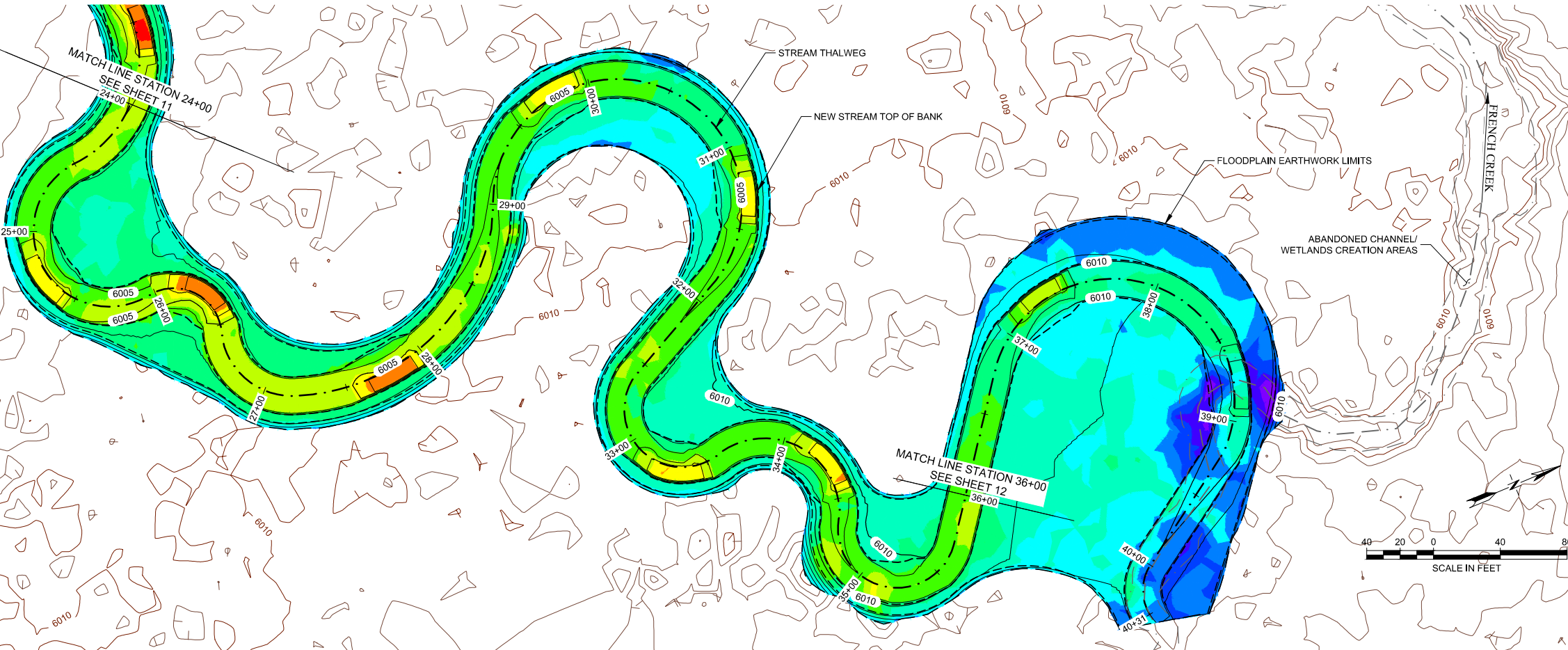
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DSGN. BY: MDB	
APPR. BY: MDB	
DATE: 11/2018	
Q.C. REVIEW	CUT AND FILL MAP STA. 0+00 TO STA. 12+00 AND STA. 12+00 TO 24+00
BY: _____	
DATE: _____	

PROJECT NUMBER 5406.004.01
SHEET NUMBER 11
DRAWING NUMBER C-9

R:\5406-BHWC\00401\ACAD\SHEETS\11 CUT AND FILL MAP STA. 0+00 TO STA. 24+00.DWG PLOTTED BY: DAVID A. HALLSTEN ON Nov/29/2018

Elevations Table			
Number	Minimum Elevation	Maximum Elevation	Color
1	-9,000	-8,000	Red
2	-8,000	-7,000	Red
3	-7,000	-6,000	Orange
4	-6,000	-5,000	Yellow
5	-5,000	-4,000	Light Green
6	-4,000	-3,000	Green
7	-3,000	-2,000	Green
8	-2,000	-1,000	Cyan
9	-1,000	0,000	Cyan
10	0,000	1,000	Blue
11	1,000	2,000	Blue
12	2,000	3,000	Purple
13	3,000	4,000	Purple



REVISIONS			
NO.	DESCRIPTION	BY	DATE

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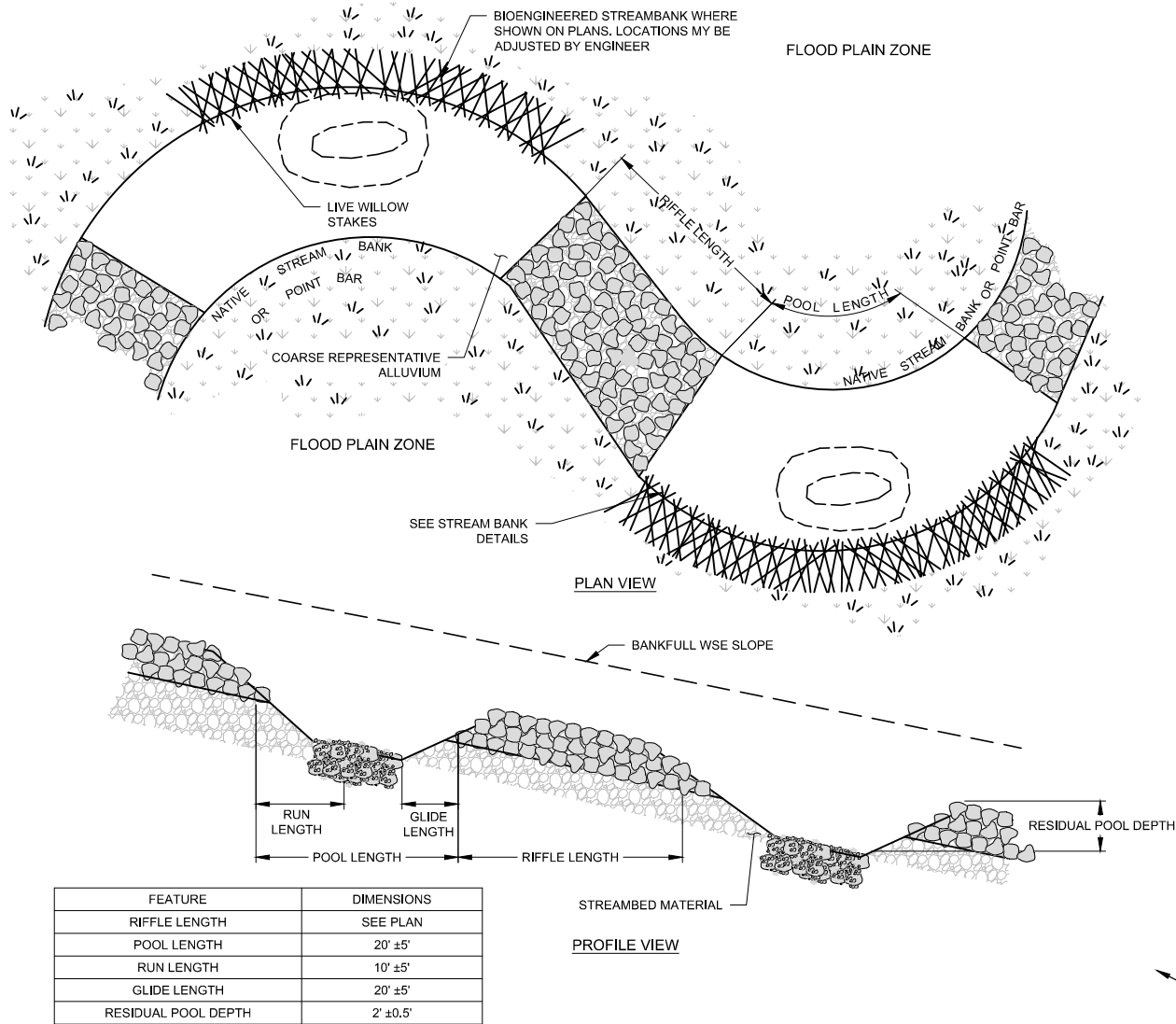
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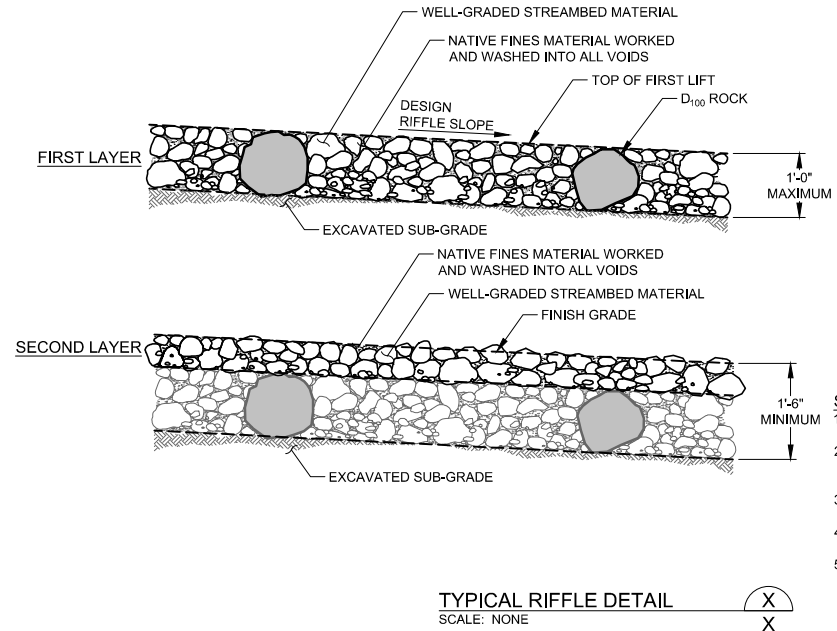
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DATE: 11/2018
Q.C. REVIEW
BY:
DATE:

FRENCH CREEK STREAM RESTORATION	
DEER LODGE COUNTY	MONTANA
CUT AND FILL MAP	
STA. 24+00 TO STA. 36+00 AND STA. 36+00 TO STA. 40+31	

PROJECT NUMBER 5406.004.01
SHEET NUMBER 12
DRAWING NUMBER C-10



POOL/RIFFLE SEQUENCE DETAIL
SCALE: NONE



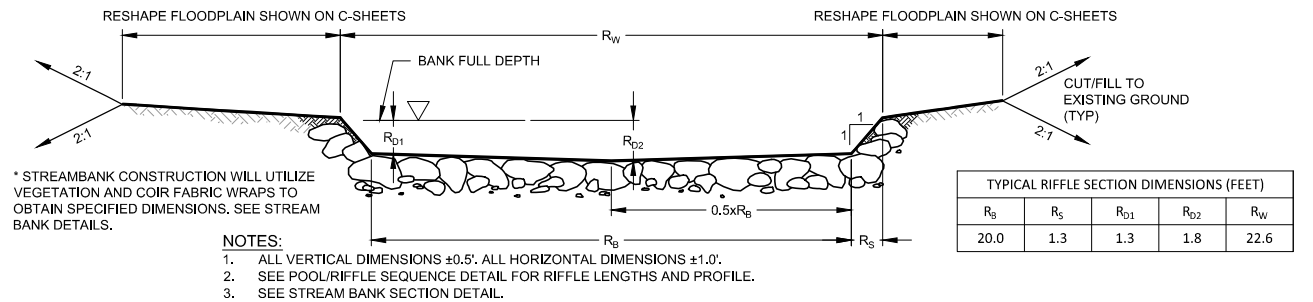
STREAMBED MATERIAL:

% PASSING	SIZE (INCHES)
D ₁₅ 10-15	0.5-1
D ₉₀ 40-60	5-8
D ₈₅ 85-100	8-10

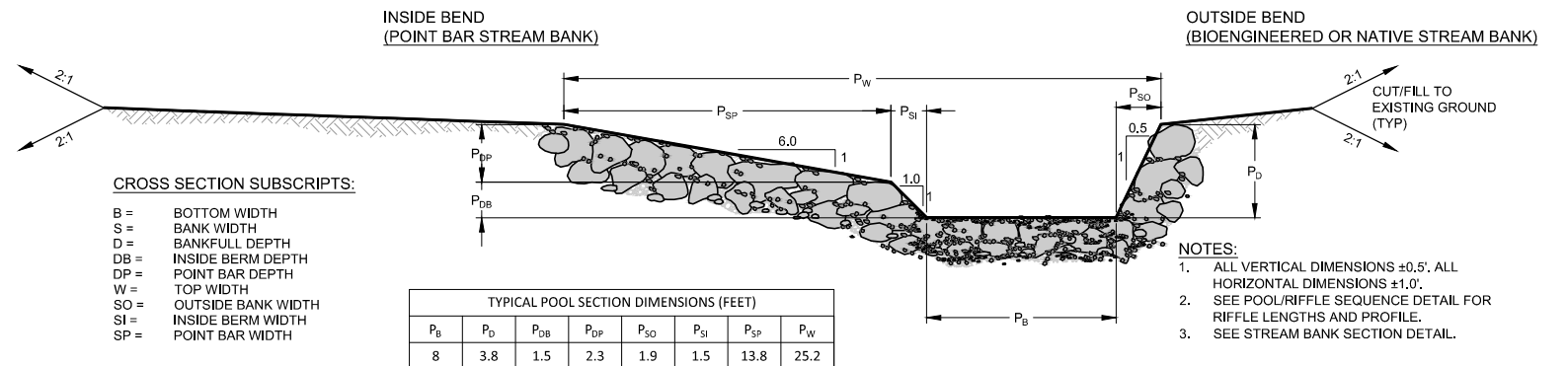
- APPROVED ALLUVIUM FOR STREAMBED AND BANK CONSTRUCTION SHALL HAVE MINIMUM 10% FINES. DETERMINATION SHALL BE MADE BY ENGINEER.

SEQUENCE NOTES:

- EXCAVATE AND SHAPE EXISTING SUB-GRADE TO PROVIDE CONSISTENT SURFACE A MINIMUM 1'-6" BELOW FINISH RIFFLE ELEVATIONS.
- STOCK PILE ALL EXCAVATED MATERIAL. ROCKS THAT MEET WELL-GRADED STREAMBED MATERIAL GRADATION AND REMAINING FINES SHALL BE SEPARATED FOR USE IN RIFFLE.
- PLACE FIRST LAYER OF MATERIAL TO PROVIDE A SOLID, WELL-GRADED, AND CONSISTENT SURFACE.
- WORK AND WASH NATIVE FINES (GENERALLY <D₁₅) INTO ALL VOID SPACES, TO TOP OF LAYER.
- REPEAT PROCESS FOR REMAINING LAYERS. ENGINEER APPROVAL OF EACH LAYER PLACEMENT IS REQUIRED PRIOR TO PROCEEDING.



TYPICAL RIFFLE CROSS SECTION DETAIL
SCALE: NONE



TYPICAL POOL/POINT BAR CROSS SECTION DETAIL
SCALE: NONE

PRELIMINARY
NOT FOR CONSTRUCTION

REVISIONS			
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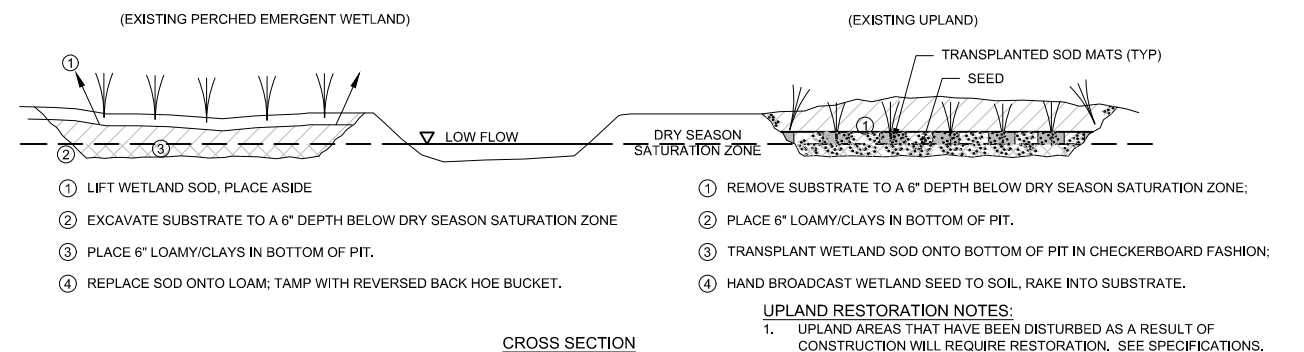
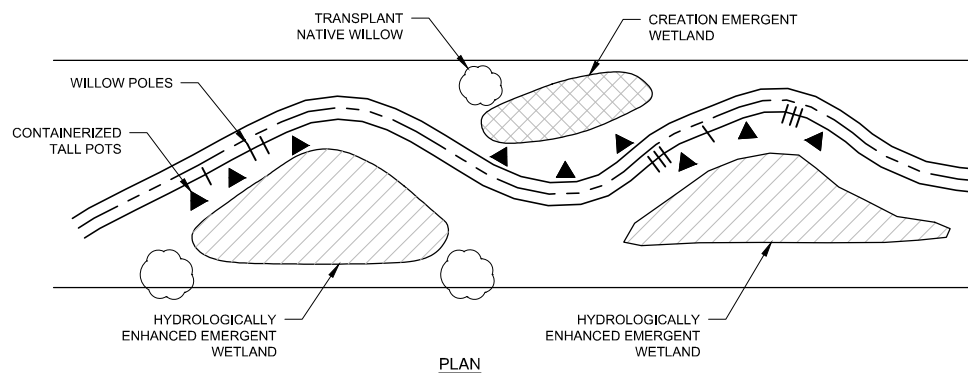
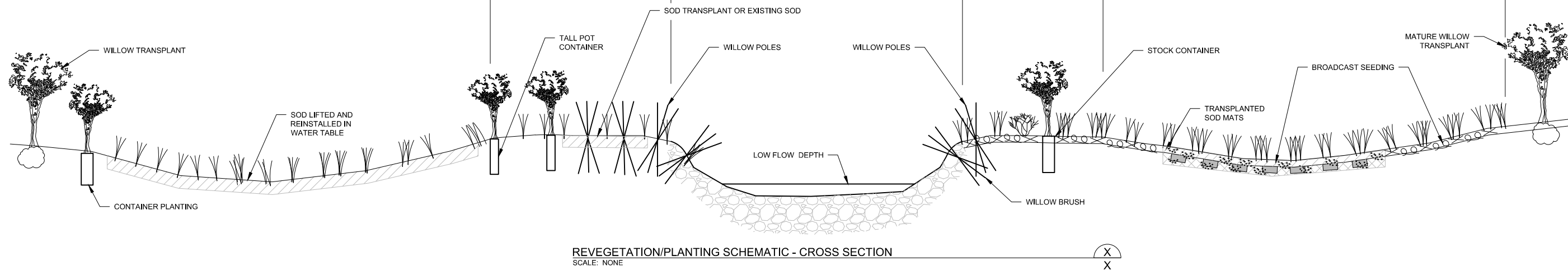
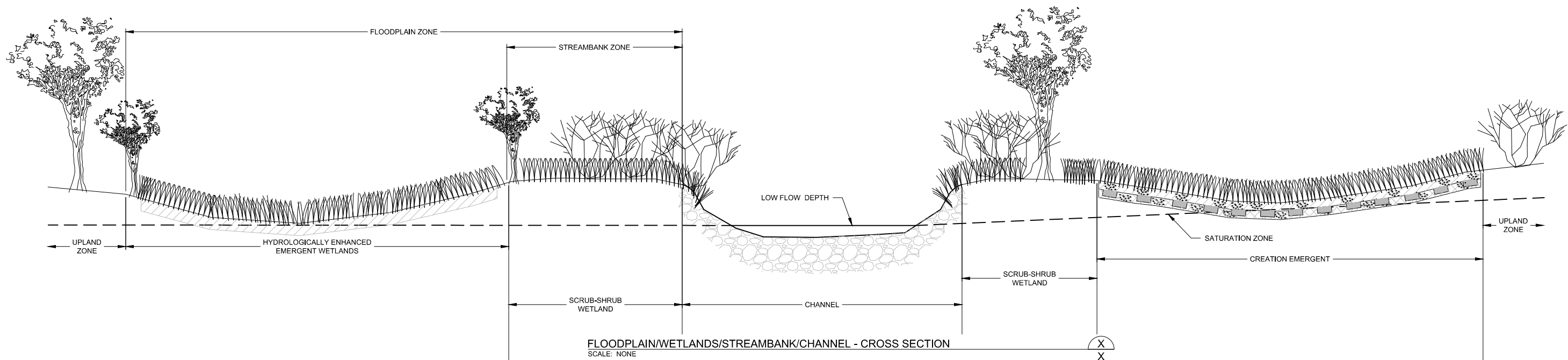
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FRENCH CREEK STREAM RESTORATION
DEER LODGE COUNTY MONTANA
CHANNEL TYPICAL SECTIONS AND DETAILS

PROJECT NUMBER
5406.004.01
SHEET NUMBER
13
DRAWING NUMBER
D-1



HYDROLOGICALLY ENHANCED EMERGENT WETLAND AND CREATION EMERGENT WETLAND

SCALE: NONE

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FRENCH CREEK STREAM RESTORATION
DEER LODGE COUNTY MONTANA
FLOODPLAIN AND WETLAND TYPICAL SECTIONS AND DETAILS

PROJECT NUMBER
5406.004.01
SHEET NUMBER
14
DRAWING NUMBER
D-2

PRELIMINARY
NOT FOR CONSTRUCTION

REVISIONS			
NO.	DESCRIPTION	BY	DATE

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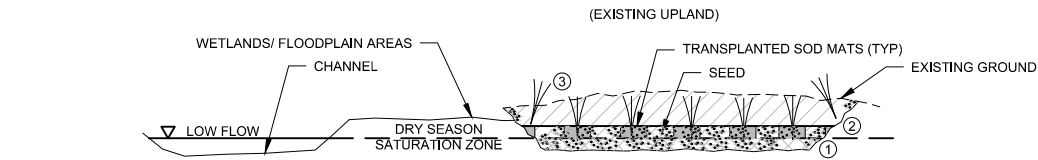
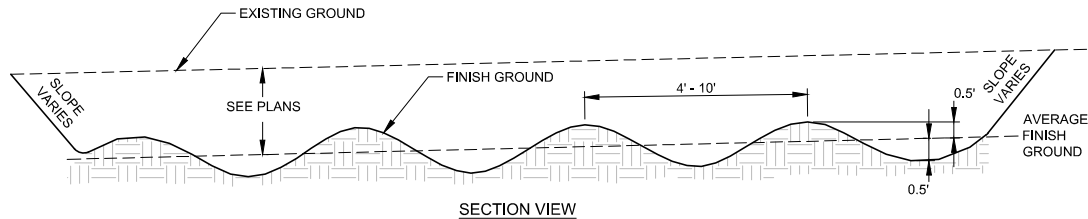
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DATE: <u> </u>

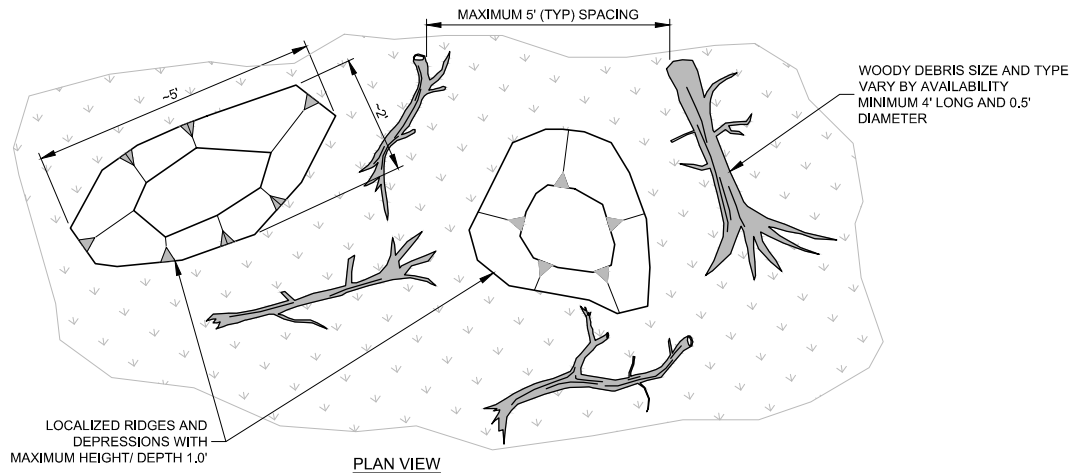
FRENCH CREEK STREAM RESTORATION	
DEER LODGE COUNTY	MONTANA
FLOODPLAIN AND ABANDONED CHANNEL DETAILS	

PROJECT NUMBER S406.004.01
SHEET NUMBER 15
DRAWING NUMBER D-3



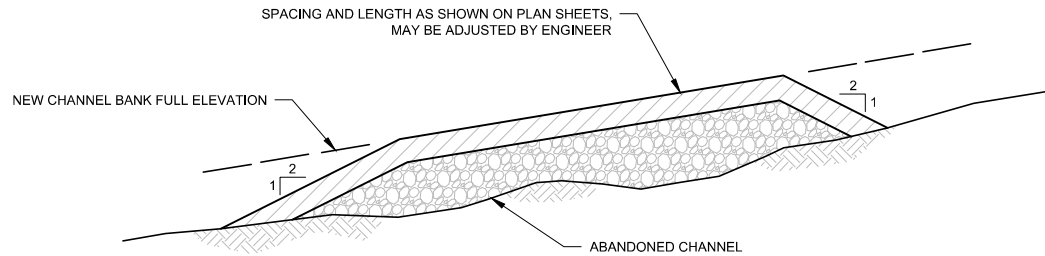
- ① REMOVE MATERIAL TO A 6" DEPTH BELOW FINISH GROUND.
② PLACE 6" LOAMY/CLAYS/ORGANICS.
③ TRANSPLANT WETLAND SOD IN CHECKERBOARD FASHION.
- UPLAND RESTORATION NOTES:
1. UPLAND AREAS THAT HAVE BEEN DISTURBED AS A RESULT OF CONSTRUCTION WILL REQUIRE RESTORATION. SEE SPECIFICATIONS.

TRANSPLANT DETAILS

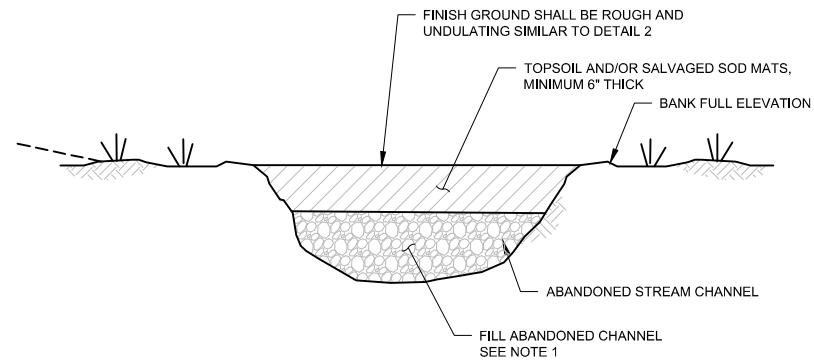


- NOTES:
1. MICRO TOPOGRAPHY SHALL BE IRREGULAR IN DIRECTION, SPACING AND MAGNITUDE TO PRODUCE NATURAL APPEARING LAND FEATURES AND TOPOGRAPHY. FINISH GROUND SHALL BE DE-COMPRESSED BEFORE SEEDING AND WOODY DEBRIS PLACEMENT.
2. DEPTH TO MATCH ADJACENT BASE FLOW ELEVATION. COORDINATE WITH ENGINEER PRIOR TO EXCAVATION OF DEPRESSION.

FLOODPLAIN DEPRESSION DETAIL
SCALE: NONE



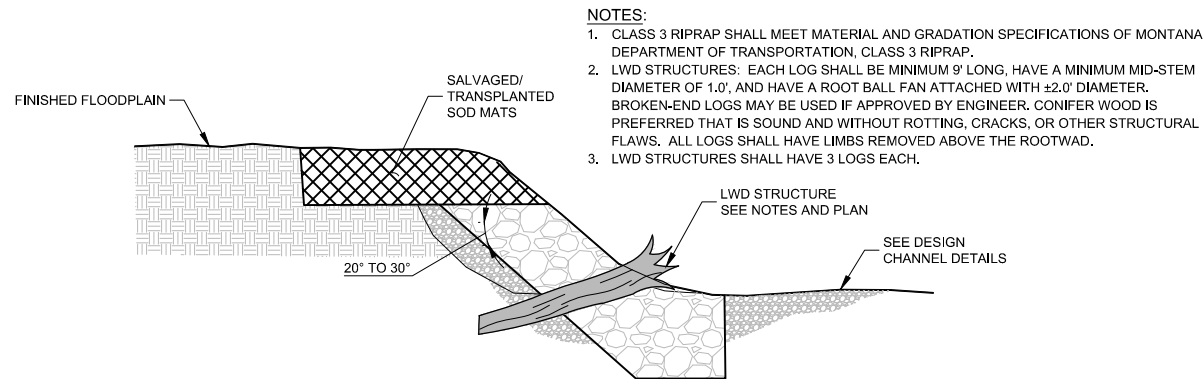
PROFILE VIEW



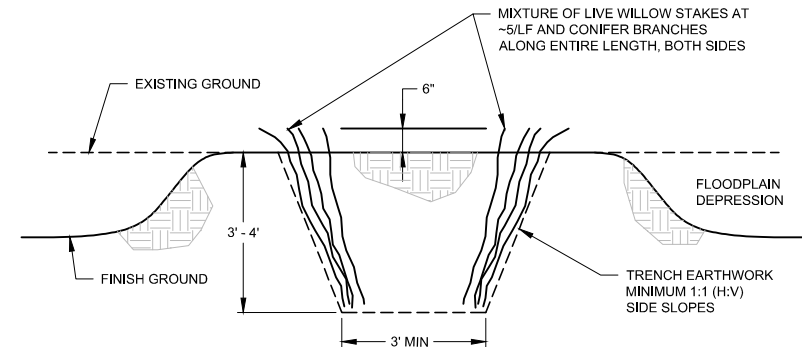
SECTION VIEW

- NOTES:
1. USE GRANULAR MATERIAL FROM ADJACENT MINE TAILINGS TO FILL EXISTING CHANNEL. COMPACT UNTIL NO VISIBLE DEFORMATION OCCURS.
2. CONTOUR AND FINISH GRADE TO PROVIDE UNDULATIONS UP TO ±6" AND PREVENT FLOW LINES PARALLEL TO EXISTING CHANNEL.
3. PRESERVE EXISTING VEGETATION ADJACENT TO RECONTOURING.

ABANDONED CHANNEL FILL DETAIL
SCALE: NONE

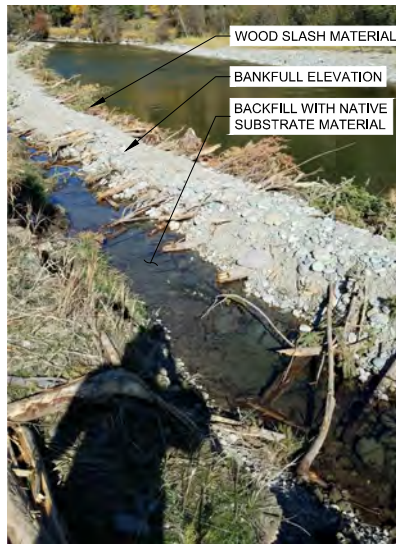


LWD STRUCTURE DETAIL
SCALE: NONE

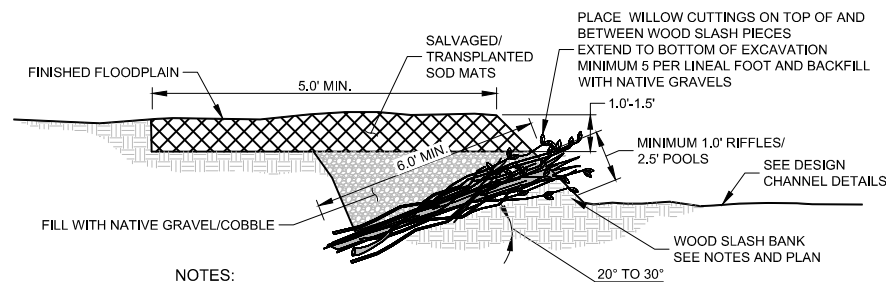


- NOTES:
1. LOCATION AND LENGTH WILL BE DIRECTED IN FIELD BY ENGINEER. GENERALLY WILL BE PERPENDICULAR TO STREAM AND OR VALLEY SLOPE AND ALONG CONTOUR TO MIMIC NATURAL FEATURES & TOPOGRAPHY.

BRUSH/WILLOW ROW DETAIL
SCALE: NONE



WOOD SLASH BANK
DURING INSTALLATION



- NOTES:
1. WOOD SLASH BANK: CREATE TOE PROTECTION WHERE SHOWN WITH MATRIX OF WOODY STEMS/LIVE WILLOWS/BRANCHES WITH MAXIMUM 6-INCH DIAMETER STEM, MINIMUM LENGTH AS SPECIFIED, AND INTER-WOVEN TO CREATE A CONTINUOUS MAT. BACKFILL AND MECHANICALLY WORK NATIVE GRAVEL/COBBLE MIX OF 6" MINUS, WELL GRADED SUBSTRATE TO CREATE A WELL-COMPACTED LIFT WITH MAXIMUM THICKNESS OF 6-INCHES UNTIL THE MINIMUM SPECIFIED DEPTH IS MET.
 2. BANK SLOPE VARIES 0.5-1.0:1 (H:V).

WOOD SLASH BANK DETAIL
SCALE: NONE

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	NO.	DESCRIPTION	BY	DATE			DEER LODGE COUNTY		SHEET NUMBER 16
							CHANNEL STABILIZATION STRUCTURE DETAILS		DRAWING NUMBER D-4

R:\5406-BHWC\00401\ACAD\SHEETS\PROJECT SECTIONS AND DETAILS.DWG PLOTTED BY:DAVID A. HALLSTEN ON Nov/29/2018

PLANTING SPECIFICATIONS PER ZONE

STREAMBANK ZONE

1. REVEGETATION TECHNIQUES WITHIN THE STREAMBANK ZONE WILL INCLUDE WILLOW BRUSH LAYERING AND POLE PLANTINGS (TABLES D-6.10, D-6.11, AND D-6.12), CONTAINERIZED TALL POT (WOODY SPECIES) PLANTING TABLE D-6.1 (SHEET D-6), TRANSPLANTED SOD MATS, AND SEEDING WITH STREAMBANK SEED MIX TABLES D-6.6 AND D-6.7 (SHEET D-6). THESE TECHNIQUES WILL BE INCORPORATED INTO THE CONSTRUCTION COIR FABRIC WRAP AND STREAMBANK WORK.

2. WOODY SPECIES PLANTINGS (WILLOW POLES AND BRUSH, AND CONTAINERIZED) AND SEEDED TREATMENT AREAS WERE CALCULATED BASED ON A MOSAIC OF PLANTING LOCATIONS WITHIN THE STREAMBANK AREA. WOODY PLANTINGS WILL BE GROUPED AT HIGHER DENSITIES, OFFERING ADDED STABILITY FOR THE STREAMBANK. APPROXIMATELY 40% TO 60% OF THE BIOENGINEERED STREAMBANK WILL BE PLANTED WITH GROUPS OF WOODY SPECIES. THE REMAINING AREAS WILL EXIST AS GRASS DOMINATED MEADOW WITHIN THE FLOODPLAIN.

3. CONTAINERIZED WOODY PLANTINGS WILL BE PROTECTED WITH BROWSE CONTROL NETTING TO PROVIDE PROTECTION FROM WILDLIFE BROWSE.
A). SPECIFICATIONS FOR BROWSE CONTROL AND GRASS COMPETITION INCLUDE THE FOLLOWING:

- PLACE A 2-FOOT DIAMETER PLASTIC MULCH MAT AROUND THE BASE OF EACH SHRUB TO REDUCE GRASS COMPETITION;
- MATERIAL: RIGID, UV1 POLYETHYLENE OR POLYPROPYLENE - MATERIAL NEEDS TO BE PHOTODEGRADABLE WITHIN 2-5 YEARS;
- MESH SHOULD COVER THE ENTIRE PLANT AND EXCEED PLANT HEIGHT BY 1 FOOT;
- DIAMETER: 10- 12 INCHES; HEIGHT: 4 FEET;
- SECURE MESH WITH 2 WOODEN STAKES ON EACH SIDE OF THE PROTECTOR;
- WOODEN STAKES POUNDED TIGHTLY IN THE INTO THE GROUND WITH ABOUT 6 INCHES IN THE GROUND AND CAN STAND ON ITS OWN;
- MESH ATTACHED TO STAKES WITH PLASTIC ZIP TIES AT TWO POSITIONS ON EACH STAKE; AND,
- MESH SECURELY PLACED ON THE GROUND AND AROUND THE BASE OF THE PLANT.

EMERGENT WETLANDS (FLOODPLAIN) ZONES

EMERGENT WETLAND TREATMENTS WILL INCLUDE BROADCAST SEEDING WITH A WETLAND SEED MIX (TABLE D-6.4 AND D-6.5, SHEET D-6), SOD MAT TRANSPLANTS FROM AREAS OF STREAM CONSTRUCTION THROUGH EXISTING WETLANDS, TALL POT CONTAINERIZED WOODY SPECIES (TABLE D-6.2), AND MATURE WILLOW TRANSPLANTS (TABLE D-6.3) AT THE WETLAND-UPLAND INTERFACE ZONE.

1. *CREATION EMERGENT WETLANDS*
THESE WETLANDS ARE CREATED FROM UPLAND (NONWETLAND) AREAS BY EXCAVATING TO A DEPTH OF 6 TO 12 INCHES BELOW THE DRY SEASON SATURATION LEVEL. THESE CREATED EMERGENT WETLANDS WILL BE VEGETATED USING ONE OF THE FOLLOWING METHODS:
A). 100% SEED: USING D-6.5 (SHEET D-6);
B). 50% SEEDED/50% WETLAND SOD:
• SOD WILL BE SALVAGED (REMOVED IN 6-FOOT STRIPS, 6 TO 8 INCHES THICK) FROM AREAS OF STREAM CONSTRUCTION THROUGH EXISTING WETLANDS AND TAMPED INTO PLACE (WITH REVERSED BACKHOE BUCKET) IN THE CREATED EMERGENT WETLAND IN A CHECKERBOARD FASHION, WITH THE HIGHEST CONCENTRATION OF SOD MATS IN THE WETTEST PORTION OF THE PREPARED PLACEMENT AREA.
• THE AREAS OF MISSING SOD AT THE SALVAGE SITE WILL BE TOP-DRESSED WITH TOPSOIL TO A DEPTH OF 6 TO 8 INCHES.
• WETLAND SEED (TABLES D-6.4 AND D-6.5) WILL BE HAND RAKED INTO THE AREAS WHERE THE SOD WAS REMOVED.
C). 100% SOD MATS: THE ENTIRE CREATED WETLAND WILL BE REVEGETATED USING SOD MATS AS DETAILED ABOVE (1.B).

2. *HYDROLOGICALLY ENHANCED EMERGENT WETLAND*
THESE WETLANDS ARE IN PLACE ALONG THE NEWLY EXCAVATED CHANNEL. BECAUSE OF CHANNEL EXCAVATION, THESE WETLANDS MAY BECOME PERCHED ABOVE AN ALTERED WATER TABLE LEVEL. AREAS THAT WILL BECOME PERCHED ABOVE APPROPRIATE SATURATION ZONES DUE TO STREAM RESTORATION WILL BE TREATED AS FOLLOWS.
A). WETLAND SOD WILL BE LIFTED AND PLACED ASIDE;
B). UNDERLYING SUBSTRATE WILL BE REMOVED TO A DEPTH OF 6 TO 12 INCHES BELOW THE WATER TABLE AND SUBSTRATE WILL BE SORTED INTO LOAM (SILT LOAM), CLAY, GRAVELS, AND COBBLES;
C). 6 TO 12 INCHES OF SUBSTRATE WILL BE RETURNED TO THE ENTIRE SURFACE OF THE EXCAVATED AREA (PRESUMING THE BOTTOM OF THE PREPARED AREA IS COBBLES): LAYER APPROXIMATELY 6 INCHES OF CLAY LOAM INTO THE LOWER LAYER, AND TOP WITH 6 INCHES OF LOAM/SILT LOAM.
D). REPLACE SOD MATS ONTO THE SURFACE OF THE SILT LOAM SUBSTRATE, TAMP INTO PLACE WITH REVERSED BACK HOE BUCKET.

BROADCAST SEEDING

1. ALL PLANTING ZONES WILL BE SEEDED WITH SITE-SPECIFIC SEED MIX TAILORED FOR THE HYDROLOGIC REGIME OF THAT ZONE (SHEET D-4): EMERGENT WETLAND SEED MIX (TABLES D-6.4 AND D-6.5), STREAM BANK SEED MIX (TABLES D-6.6 AND D-6.7), AND UPLAND SEED MIX (TABLES D-6.8 AND D-6.9). SEED MIXES WILL BE SPREAD ON THE PREPARED GROUND SURFACE WITH A BROADCAST SEEDER AND

THEN SLIGHTLY COVERED WITH SOIL BY MECHANICAL HARROWING OR HAND RAKING.

2. THE GROUND SURFACE WILL BE PREPARED BY SCARIFYING UPLAND AREAS THAT HAVE BEEN COMPACTED BECAUSE OF HEAVY EQUIPMENT TRAFFIC, OR "ROUGH-SMOOTHED" (SMOOTHING TO REMOVE UNNATURAL RUTS) IN CONSTRUCTED WETLAND AND BANK AREAS.

3. THE APPROPRIATE SEED MIX WILL BE INCORPORATED INTO THE CONSTRUCTION OF SOIL LIFTS THAT ARE WRAPPED WITH COIR FABRICS (DUAL LAYER: INNER - STRAW MATS WITH NON-PLASTIC NETTING; OUTER - COIR FABRIC) ENCASING NATIVE SOILS/SUBSTRATE. SEED MIX WILL BE APPLIED BY HAND BROADCASTING ON TOP OF SUBSTRATE PRIOR TO THE COMPLETION OF THE WRAP DURING CONSTRUCTION.

TRANSPLANTED MATERIALS

MATURE WILLOWS:
1. MATURE WILLOWS WITHIN THE PROJECT AREA WILL BE TRANSPLANTED TO PROVIDE LARGE STATURE PLANTS WITH ESTABLISHED ROOT SYSTEMS.
2. WILLOW TRANSPLANTS WILL BE PLANTED AT THE UPLAND/WETLAND INTERFACE ZONES.
3. THE MATURE WILLOW WILL BE EXCAVATED FROM AREAS WHERE THEY ARE ROOTED IN SILT/LOAM/FINES SUBSTRATE (I.E. NOT IN COBBLES, AS COBBLES WILL FALL FROM THE ROOT BALL AND EXPOSE SENSITIVE ROOT SYSTEMS).
4. A PLACEMENT HOLE WILL BE DUG AT THE UPLAND/WETLAND INTERFACE THAT EXCEEDS THE ROOT BALL DIAMETER BY 1 TO 2 FEET WITH THE BOTTOM AT THE GROUNDWATER TABLE.
5. SILT/LOAM/FINES SUBSTRATE WILL BE BACKFILLED INTO THE TRANSPLANT HOLE AND TAMPED.
6. THE STEMS WILL BE TRIMMED TO A HEIGHT OF 3 FEET.

WETLAND SOD MATS
EMERGENT WETLAND SOD MATS PRIMARILY COMPRISED OF SEDGE SPECIES WILL BE USED TO PROVIDE ESTABLISHED ROOTED VEGETATION WITHIN EMERGENT WETLANDS AND ALONG BIOENGINEERED STREAMBANKS.

1. *SOD SALVAGE METHOD:*
A). SOD WILL BE SALVAGED (REMOVED IN 6-FOOT STRIPS, 6 TO 8 INCHES THICK) FROM AREAS OF STREAM CONSTRUCTION THROUGH EXISTING WETLANDS AND/OR AN IDENTIFIED SOD SALVAGE SITE AND TAMPED INTO PLACE (WITH REVERSED BACKHOE BUCKET) IN THE TREATMENT WETLAND.
B). NO MORE THAN 50% OF SOD FROM THE SOD SALVAGE SITE WILL BE REMOVED.
C). THE AREAS OF STRIPPED SOD WITHIN THE SALVAGE SITE WILL BE TOP-DRESSED WITH TOPSOIL TO A DEPTH OF 6 TO 8 INCHES.
D). WETLAND SEED (TABLES D-6.4 AND D-6.5) WILL BE HAND RAKED INTO THE AREAS WHERE THE SOD WAS REMOVED.

2. *CREATION EMERGENT WETLANDS - SOD MAT INSTALLATION*
THESE WETLAND ZONES ARE CREATED FROM UPLAND (NONWETLAND) AREAS BY EXCAVATING TO A DEPTH OF 6 TO 12 INCHES BELOW THE DRY SEASON SATURATION LEVEL. SOD MATS (AND OR SEEDING) WILL BE PLACED IN CREATED EMERGENT WETLANDS IN A CHECKERBOARD FASHION OR USED TO COMPLETELY VEGETATE THE WETLAND (DEPENDING ON QUANTITY OF AVAILABLE SOD) USING ONE OF THE FOLLOWING METHODS:
A). NO SOD: 100% SEED (TABLES D-6.4 AND D-6.5);
B). CHECKERBOARD: 50% SEEDED/50% WETLAND SOD, WITH THE HIGHEST CONCENTRATION OF SOD MATS IN THE WETTEST PORTION OF THE PREPARED PLACEMENT AREA;
C). TOTAL SOD MATS: 100%: THE ENTIRE CREATED WETLAND WILL BE VEGETATED USING SOD MATS.

3. *HYDROLOGICALLY ENHANCED EMERGENT WETLAND - SOD MAT LIFT*
THESE WETLAND AREAS CURRENT OCCUR ALONG THE NEWLY EXCAVATED CHANNEL. BECAUSE OF CHANNEL EXCAVATION, THESE WETLANDS MAY BECOME PERCHED ABOVE AN ALTERED (I.E. LOWERED) WATER TABLE LEVEL.
A). WETLAND SOD WILL BE LIFTED AND PLACED ASIDE;
B). UNDERLYING SUBSTRATE WILL BE REMOVED TO A DEPTH OF 6 TO 12 INCHES BELOW THE WATER TABLE AND SUBSTRATE WILL BE SORTED INTO LOAM (SILT LOAM), CLAY, GRAVELS, AND COBBLES;
C). 6 TO 12 INCHES OF SUBSTRATE WILL BE BACKFILLED ONTO THE ENTIRE SURFACE OF THE EXCAVATED AREA (PRESUMING THE BOTTOM OF THE PREPARED AREA IS COBBLES), LAYERING APPROXIMATELY 6 INCHES OF CLAY LOAM ONTO THE COBBLE BASE AND TOPPED WITH 6 INCHES OF LOAM/SILT LOAM/CLAY.
D). SOD MATS WILL BE REPLACED ONTO THE SURFACE OF THE SILT LOAM SUBSTRATE AND TAMPED INTO PLACE WITH REVERSED BACK HOE BUCKET.

4. *STREAMBANK - SOD MAT INSTALLATION*
SOD MATS AT LEAST 3 FEET WIDE AND THE LENGTH OF THE TREATMENT AREA WILL BE OVERLAPPED WITH DOWNSTREAM EDGE ON TOP OF THE NEXT SOD MAT EDGE (SHINGLED). THE UPSTREAM AND DOWNSTREAM ENDS OF THE TREATMENT WILL BE KEYED INTO THE SUBSTRATE.

WILLOW COLLECTION

SPECIES SELECTION & WILLOW RECONNAISSANCE
WILLOW SPECIES USED FOR WILLOW POLES AND WILLOW BRUSH TREATMENTS SHOULD BE IDENTIFIED BY A BOTANIST. SPECIES IDENTIFICATION IS IMPORTANT TO INSURE THAT THE SPECIFIC SPECIES ARE PLANTED OR INSTALLED IN APPROPRIATELY BASED ON LEVELS OF SATURATION AND SPECIES-SPECIFIC HYDROLOGIC REGIME REQUIREMENTS.

WILLOWS HAVE DIFFERENT TYPE OF GROWTH FORMS SUCH AS SMALL TO MEDIUM-SIZED SHRUB OR CREEPING-TYPE WILLOWS THAT SPREAD ALONG STREAMBANKS. WILLOW SPECIES WITH CREEPING-TYPE (RHIZOMATOUS) ROOTS SYSTEM WILL BE UTILIZED FOR THE STREAMBANK ZONE. WILLOW SPECIES (IN THE FORM OF WILLOW POLES) WITH A DENSE BASAL AREA WILL BE UTILIZED FOR BIOENGINEERED STREAMBANK CONSTRUCTION AND ALONG EMERGENT WETLAND FRINGE.

IF WILLOW SPECIES CANNOT BE IDENTIFIED USE THE FOLLOWING CHARACTERISTICS TO DETERMINE APPROPRIATE ZONE LOCATION: SITE CONDITIONS, SOIL TYPE, WATER REGIME AND GROWTH FORM.

WILLOW POLE AND BRUSH COLLECTION METHODS:
1. COLLECT WILLOW STEMS DURING DORMANT SEASON PRIOR (PREFERABLE) TO BUD BREAK (MARCH-APRIL) OR AFTER LEAF FALL ONCE PLANT IS DORMANT AND STORE AS PER INSTRUCTIONS BELOW.

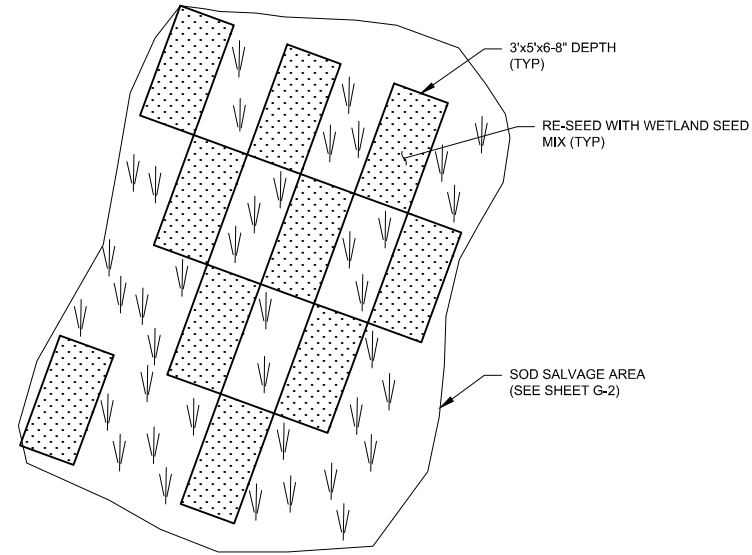
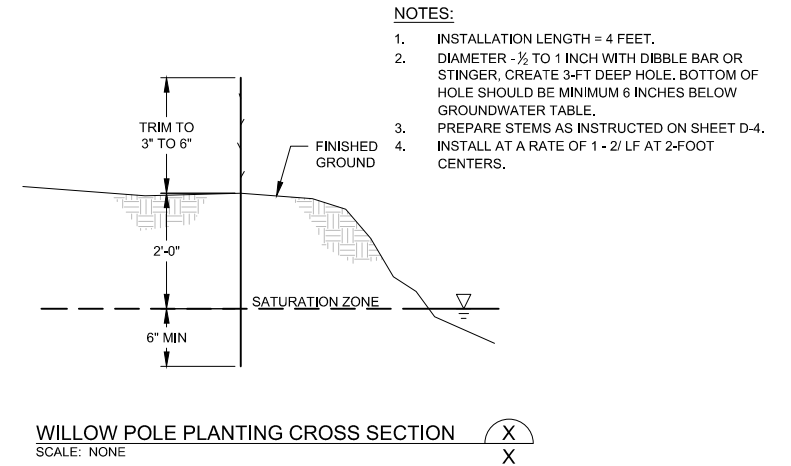
2. TRIMMING METHODS:
POLES: REMOVE ALL LATERAL SIDE BRANCHES FROM THE STEMS WITH HAND PRUNERS.
BRUSH: DO NOT REMOVE SIDE BRANCHES.

3. HARVESTING:
SEE SPECIFICATIONS FOR HARVESTING AND STORAGE REQUIREMENTS.

4. INSTALL WILLOW POLES ALONG DISTURBED OR CONSTRUCTED STREAMBANKS JUST ABOVE AND BELOW BANKFULL DISCHARGE WHERE CUTTING WILL BE IN EITHER SATURATED SOIL DURING LOW WATER OR IN CONTACT WITH GROUNDWATER DURING THE GROWING SEASON.

5. SPACING:
A). TYPICAL SPACING FOR WILLOW POLES WILL BE APPROXIMATELY 1 TO 2/LF AT 2-FOOT CENTERS.
B). SPACING FOR WILLOW BRUSH IS 5 PER LINEAR FOOT.

6. INTERSPERSE STREAMBANK GRASS SEED MIX BETWEEN WILLOW POLES AND RAKE INTO SUBSTRATE.



NOTES:

1. STRIP SOD FROM THE SALVAGE SITE IN A CHECKERBOARD FASHION (APPROX. 5 FEET LONG, 3 FEET WIDE, 6 TO 8-INCH DEPTH).
2. DO NOT REMOVE MORE THAN 50% OF THE SOD FROM A SALVAGE SITE.
3. BACKFILL AREAS OF STRIPPED SOD WITH 6 TO 8 INCHES OF TOPSOIL.
4. SEED BACKFILLED SOIL AREAS BY HAND BROADCASTING WITH EMERGENT WETLAND SEED MIX (SHEET D-4); RAKE IN SEED.

REVISIONS					DRAWN BY: <u>DAH</u> DSGN. BY: <u>MDB</u> APPR. BY: <u>MDB</u> DATE: <u>11/2018</u> Q.C. REVIEW BY: _____ DATE: _____	FRENCH CREEK STREAM RESTORATION		PROJECT NUMBER 5406.004.01
NO.	DESCRIPTION	BY	DATE			DEER LODGE COUNTY		SHEET NUMBER 17
						MONTANA		DRAWING NUMBER D-5

VERIFY SCALE!
THESE PRINTS MAY BE REDUCED.
LINE BELOW MEASURES ONE INCH
ON ORIGINAL DRAWING.

MODIFY SCALE ACCORDINGLY!

175406-BHW/C00401/ACAD/SHEETS: PROJECT SECTIONS AND DETAILS DWG PLOTTED BY:DAVID A. HALLSTEN ON Nov/29/2018

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