

Vermillion River Miners Gulch restoration  
**FUTURE FISHERIES IMPROVEMENT PROGRAM  
 GRANT APPLICATION**

**I. APPLICANT INFORMATION**

- A. Applicant Name: Green Mountain Conservation District (GMCD)
- B. Mailing Address: P.O. Box 1329
- C. City: Trout Creek State: MT Zip: 59874  
 Telephone: (406) 827-4833 E-mail: GMCD@blackfoot.net
- D. Contact Person: Leona Gollen  
 Address if different from Applicant: \_\_\_\_\_  
 City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_  
 Telephone: \_\_\_\_\_ E-mail: \_\_\_\_\_
- E. Landowner and/or Lessee Name (if other than Applicant): USFS, Kootenai National Forest, Cabinet Ranger District  
 Attn: Doug Grupenhoff  
 Mailing Address: 2693 MT Hwy 200  
 City: Trout Creek State: MT Zip: 59874  
 Telephone: (406) 827-0741 E-mail: dgruppenhoff@fs.fed.us

**II. PROJECT INFORMATION\***

- A. Project Name: Miners Gulch Stream and Riparian Restoration Project  
 River, stream, or lake: Vermillion River  
 Location: Township: T24N Range: R30W Section: S1  
 Latitude: 47.8699 Longitude: -115.391931 *within project (decimal degrees)*  
 County: Sanders
- B. Purpose of Project:  
To restore a degraded segment of stream and floodplain to improve and protect native fish habitat.
- C. Brief Project Description:  
This project will involve re-shaping of the stream channel, installation of in-stream wood and rock structures, re-construction of the floodplain surface, and an aggressive riparian planting program to re-establish native trees and shrubs in the floodplain.

D. Length of stream or size of lake that will be treated: 1,600 ft

E. Project Budget:

**Grant Request (Dollars): \$ 50,000.00**

Contribution by Applicant (Dollars): \$                      In-kind \$                       
(salaries of government employees are not considered as matching contributions)

Contribution from other Sources (Dollars): \$ 327,600.00 In-kind \$ 9,000.00  
(attach verification - See page 2 budget template)

**Total Project Cost: \$ 386,600.00**

F. Attach itemized (line item) budget – see template

G. Attach specific project plans, detailed sketches, plan views, photographs, maps, evidence of landowner consent, evidence of public support and fish biologist support, and/or other information necessary to evaluate the merits of the project. If project involves water leasing or water salvage complete supplemental questionnaire ([fwp.mt.gov/habitat/futurefisheries/supplement2.doc](http://fwp.mt.gov/habitat/futurefisheries/supplement2.doc)).

H. Attach land management and maintenance plans that will ensure protection of the reclaimed area.

The project is located on public land located in the Kootenai National Forest and the Forest Service will be responsible for long-term maintenance and continued project monitoring. See attached letter from Doug Grupenhoff, Cabinet Ranger District, confirming the agency's commitment to management and maintenance of the project site.

### III. PROJECT BENEFITS\*

A. What species of fish will benefit from this project?:

The Vermillion River is the primary spawning stronghold for federally listed "threatened" bull trout in the Lower Clark Fork River, below its confluence with the Flathead. From 2001 through 2014, the Vermillion has averaged 26 bull trout redds per year, the highest of any tributary in the Lower Clark Fork River drainage. The reach in which the proposed project is located typically supports some of the highest number of bull trout redds and juvenile bull trout densities in the Vermillion River. A strong population of westslope cutthroat trout also inhabits the area of the project site. The U.S. Forest Service (USFS), U.S. Fish and Wildlife Service (USFWS), Montana Fish, Wildlife & Parks (MFWP), Avista Corporation (Avista), and other partners involved in Lower Clark Fork water resources management view the project as critical to the long-term viability of both species in this priority watershed and the overall Lower Clark Fork system.

B. How will the project protect or enhance wild fish habitat?:

The increase in pool frequency and habitat complexity to result from this project is expected to benefit native trout species by increasing the carrying capacity in this section of river, sorting and redistributing spawning gravel, improving refuge for adults and by reestablishment of a healthy and functional riparian community.

C. Will the project improve fish populations and/or fishing? To what extent?:

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By improving habitat and increasing the carrying capacity in this section of river, this project is expected to increase fish populations over time. Prior to on-the-ground implementation of this project, baseline fish abundance and fish habitat data will have been established through monitoring efforts by MFWP and Avista. Post-restoration monitoring of fish abundance and fish habitat will also be conducted through bull trout redd surveys, electrofishing, and snorkeling. As a result of this thorough monitoring programming, changes in fish populations that result from this restoration project should be detected.

D. Will the project increase public fishing opportunity for wild fish and, if so, how?:

The project will increase the potential for native fish population growth, thereby enhancing recreational fishing opportunities for westslope cutthroat trout. Public fishing on U. S. Forest Service lands in the Lower Clark Fork watershed is popular with locals and other visitors to the Kootenai National Forest, and is expected to continue in the future.

E. The project agreement includes a 20-year maintenance commitment. If you are unable to meet this commitment, please explain why:

The Vermillion River watershed is located almost entirely on public lands in the Kootenai National Forest; therefore, the USFS (Cabinet Ranger District), in partnership with GMCD, will be responsible for the long-term maintenance and monitoring of this project.

F. What was the cause of habitat degradation in the area of this project and how will the project correct the cause?:

Historic land uses that include placer mining, timber harvest, riparian vegetation removal and roads/road construction have altered stream flows, channel stability, fish habitat and riparian plant communities throughout the Vermillion drainage. The Miners Gulch area of the Vermillion is extremely pool-limited and lacks adequate in-stream and floodplain large woody debris. Recruitment of large woody debris has been greatly reduced by the unstable, migrating channel that has removed all but a few trees in the riparian area. Instability related to the lack of a functioning riparian area, deteriorating banks and limited in-stream energy dissipation has subjected the Miners Gulch site to frequent channel migration, over-widening channel conditions, decreased wood retention, and lack of sustainable vegetative cover. Removal of riparian vegetation and destabilization of streambanks are most responsible for current conditions. Existing condition topographic surveys have verified these factors and the need for restoration. This project will address these issues by stabilizing 1,600 feet of unstable bank, installing in-stream wood and rock structures (log/boulder and debris jams) which will increase the number of pools and the amount of in-channel and floodplain woody debris, as well as re-establishing a healthy plant community in 11 acres of floodplain.

G. What public benefits will be realized from this project?:

The USFS manages lands in the Kootenai National Forest for multiple public uses and benefits, which include the sustained yield of renewable resources such as water, forage, fish and wildlife, wood and recreation. The project will improve fish and wildlife habitat and is located in a high use recreation area that is well known by recreationists and visitors to the Kootenai National Forest for its scenic value. This project will increase the potential for native fish population growth, thereby enhancing recreational fishing opportunities for westslope cutthroat trout, a popular activity for locals and other visitors to the Vermillion drainage. This project will improve the stream's energy dissipating capabilities, which will reduce the potential for downstream flooding, which threatens the safety of those people who live, work and recreate in the Vermillion drainage. The project will also provide employment for 2 to 3 local contracting firms (approximately 10 employees per firm) during the implementation phase, and the purchase of native plants from area nurseries will benefit businesses in nearby communities.

H. Will the project interfere with water or property rights of adjacent landowners? (explain):

No.

I. Will the project result in the development of commercial recreational use on the site?: (explain):

No.

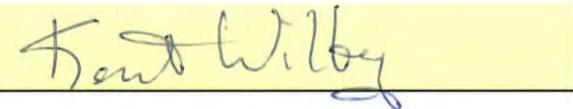
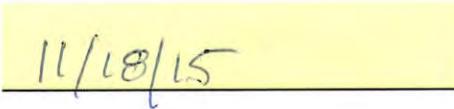
J. Is this project associated with the reclamation of past mining activity?:

Yes.

Each approved project sponsor must enter into a written agreement with the Department specifying terms and duration of the project.

**IV. AUTHORIZING STATEMENT**

I (we) hereby declare that the information and all statements to this application are true, complete, and accurate to the best of my (our) knowledge and that the project or activity complies with rules of the Future Fisheries Improvement Program.

Applicant Signature:  Date: 

Sponsor (if applicable): 

\*Highlighted boxes will automatically expand.

**Mail To: Montana Fish, Wildlife & Parks  
Habitat Protection Bureau  
PO Box 200701  
Helena, MT 59620-0701**

**E-mail To: Michelle McGree  
[mmcgree@mt.gov](mailto:mmcgree@mt.gov)  
(electronic submissions MUST be signed)**

**Incomplete or late applications will be returned to applicant.  
Applications may be rejected if this form is modified.**

**\*\*\*Applications may be submitted at anytime, but must be received by the Future Fisheries Program office in Helena before December 1 and June 1 of each year to be considered for the subsequent funding period.\*\*\***

**II.F. MINERS GULCH STREAM AND RIPARIAN RESTORATION PROJECT - BUDGET**

Both tables must be completed or the application will be returned

WORK ITEMS (ITEMIZE BY CATEGORY)	NUMBER OF UNITS	UNIT DESCRIPTION*	COST/UNIT	TOTAL COST	CONTRIBUTIONS			
					FF REQUEST	IN-KIND SERVICES**	IN-KIND CASH	TOTAL
<b>Personnel</b>								
Pre-Implementation coordination	40	hours	\$25.00	\$ 1,000.00	\$ -	\$ -	\$ 1,000.00	\$ 1,000.00
Project Manager/Re-vegetation Oversight****	5	days	\$401.17	\$ 2,005.85	\$ -	\$ -	\$ 2,005.85	\$ 2,005.85
GS-9 Hydrologist****	5	days	\$320.00	\$ 1,600.00	\$ -	\$ -	\$ 1,600.00	\$ 1,600.00
GS-9 Fish Biologist****	5	days	\$297.00	\$ 1,485.00	\$ -	\$ -	\$ 1,485.00	\$ 1,485.00
GS-5 Fencing labor****	10	days	\$132.38	\$ 1,323.80	\$ -	\$ -	\$ 1,323.80	\$ 1,323.80
GS-5 Planting labor****	24	days	\$132.38	\$ 3,177.12	\$ -	\$ -	\$ 3,177.12	\$ 3,177.12
GS-7 Biological Technician****	29	days	\$235.00	\$ 6,815.00	\$ -	\$ -	\$ 6,815.00	\$ 6,815.00
Fence mtc./repair****	10	days	\$132.38	\$ 1,323.80	\$ -	\$ -	\$ 1,323.80	\$ 1,323.80
Replanting****	4	days	\$132.38	\$ 529.52	\$ -	\$ -	\$ 529.52	\$ 529.52
Material delivery****	30	days	\$132.38	\$ 3,971.40	\$ -	\$ -	\$ 3,971.40	\$ 3,971.40
Weed control****	20	days	\$132.38	\$ 2,647.60	\$ -	\$ -	\$ 2,647.60	\$ 2,647.60
Fence removal****	8	days	\$132.38	\$ 1,059.04	\$ -	\$ -	\$ 1,059.04	\$ 1,059.04
Avista, Fisheries Monitoring, Electrofishing	1	lump sum	\$3,000.00	\$ 3,000.00	\$ -	\$ 3,000.00	\$ -	\$ 3,000.00
Avista, Fisheries Monitoring, Redd surveys	1	lump sum	\$6,000.00	\$ 6,000.00	\$ -	\$ 6,000.00	\$ -	\$ 6,000.00
Project Coordination	240	hours	\$25.00	\$ 6,000.00	\$ -	\$ -	\$ 6,000.00	\$ 6,000.00
Project Administration	1	lump sum	\$32,600.00	\$ 32,600.00	\$ -	\$ -	\$ 32,600.00	\$ 32,600.00
			Sub-Total	\$ 74,538.13	\$ -	\$ 9,000.00	\$ 65,538.13	\$ 74,538.13
<b>Travel</b>								
Mileage				\$ -	\$ -	\$ -	\$ -	\$ -
Per diem				\$ -	\$ -	\$ -	\$ -	\$ -
			Sub-Total	\$ -	\$ -	\$ -	\$ -	\$ -

**II.F. MINERS GULCH STREAM AND RIPARIAN RESTORATION PROJECT - BUDGET**

<b>Construction Materials***</b>									
3X4' Large Rock (Angular and Round)	1300	rocks	\$60.00	\$ 78,000.00	\$ -	\$ -	\$ 78,000.00	\$ 78,000.00	
16 - 24" Cobble	600	cobbles	\$50.00	\$ 30,000.00	\$ -	\$ -	\$ 30,000.00	\$ 30,000.00	
3-4' Black Cottonwood	500	plants	\$1.85	\$ 925.00	\$ -	\$ -	\$ 925.00	\$ 925.00	
Douglas-fir	150	plants	\$1.00	\$ 150.00	\$ -	\$ -	\$ 150.00	\$ 150.00	
Ponderosa Pine	150	plants	\$1.00	\$ 150.00	\$ -	\$ -	\$ 150.00	\$ 150.00	
Shrubs	1000	plants	\$1.00	\$ 1,000.00	\$ -	\$ -	\$ 1,000.00	\$ 1,000.00	
Willow cuttings	2000	plants	\$0.20	\$ 400.00	\$ -	\$ -	\$ 400.00	\$ 400.00	
Seed- Lewis Mockorange, Oz.	2	ounce	\$25.00	\$ 50.00	\$ -	\$ -	\$ 50.00	\$ 50.00	
Seed- Snowberry, Oz.	8	ounce	\$8.00	\$ 64.00	\$ -	\$ -	\$ 64.00	\$ 64.00	
See- KNF Native grass mix, lbs.	100	pounds	\$6.50	\$ 650.00	\$ -	\$ -	\$ 650.00	\$ 650.00	
5', 2x4" mesh wire fence, 100' roll	61	roll	\$125.00	\$ 7,625.00	\$ -	\$ -	\$ 7,625.00	\$ 7,625.00	
6' steel T posts	1540	posts	\$8.50	\$ 13,090.00	\$ -	\$ -	\$ 13,090.00	\$ 13,090.00	
Fence clips	3320	clips	\$0.06	\$ 199.20	\$ -	\$ -	\$ 199.20	\$ 199.20	
Cart, sled, rope	1	lump sum	\$2,150.00	\$ 2,150.00	\$ -	\$ -	\$ 2,150.00	\$ 2,150.00	
Mark 3 Wick 375 pumps	5	pumps	\$3,000.00	\$ 15,000.00	\$ -	\$ -	\$ 15,000.00	\$ 15,000.00	
Pump accessories- draft hose, foot valves, wyes, adapters	5	Accessory packs	\$254.00	\$ 1,270.00	\$ -	\$ -	\$ 1,270.00	\$ 1,270.00	
Irrigation supplies- heads, hose, standpipes, etc.	1	lump sum	\$15,655.00	\$ 15,655.00	\$ -	\$ -	\$ 15,655.00	\$ 15,655.00	
Misc. eqpt	1	lump sum	\$350.30	\$ 350.30	\$ -	\$ -	\$ 350.30	\$ 350.30	
Survey & Project Equipment (Tapes, Rods, Stakes,etc)	1	lump sum	\$333.37	\$ 333.37	\$ -	\$ -	\$ 333.37	\$ 333.37	
			Sub-Total	\$ 167,061.87	\$ -	\$ -	\$ 167,061.87	\$ 167,061.87	
<b>Equipment</b>									
Cable Yarder (Skyline)	10	days	\$2,000.00	\$ 20,000.00	\$ -	\$ -	\$ 20,000.00	\$ 20,000.00	
Lowboy	5	days	\$1,000.00	\$ 5,000.00	\$ -	\$ -	\$ 5,000.00	\$ 5,000.00	
Excavator (rootwads)	160	days	\$130.00	\$ 20,800.00	\$ -	\$ -	\$ 20,800.00	\$ 20,800.00	
Excavator (Channel work)	420	days	\$130.00	\$ 54,600.00	\$ 50,000.00	\$ -	\$ 4,600.00	\$ 54,600.00	
Dump Truck/Rubber Tired Skidder	140	days	\$90.00	\$ 12,600.00	\$ -	\$ -	\$ 12,600.00	\$ 12,600.00	
Front End Loader	200	days	\$100.00	\$ 20,000.00	\$ -	\$ -	\$ 20,000.00	\$ 20,000.00	
D8 Caterpillar	80	days	\$150.00	\$ 12,000.00	\$ -	\$ -	\$ 12,000.00	\$ 12,000.00	
			Sub-Total	\$ 145,000.00	\$ 50,000.00	\$ -	\$ 95,000.00	\$ 145,000.00	
<b>Mobilization</b>									
*Mobilization costs are included in equipment estimate									
			Sub-Total	\$ -	\$ -	\$ -	\$ -	\$ -	
<b>TOTALS</b>				\$ 386,600.00	\$ 50,000.00	\$ 9,000.00	\$ 327,600.00	\$ 386,600.00	

**II.F. MINERS GULCH STREAM AND RIPARIAN RESTORATION PROJECT - BUDGET**

\*Units = feet, hours, inches, lump sum, etc.

\*\*Can include in-kind materials. Justification for in-kind labor (e.g. hourly rates used for calculations). Describe here or in text.

\*\*\*The Future Fisheries Review Panel recommends a maximum fencing cost of \$1.50 per foot

\*\*\*\*Forest Service Labor reported here is paid for from Avista funds for Re-vegetation Implementation

**MATCHING CONTRIBUTIONS (do not include requested funds)**

<b>CONTRIBUTOR</b>	<b>IN-KIND SERVICE</b>	<b>IN-KIND CASH</b>	<b>TOTAL</b>	<b>Verified? (Y/N)</b>
Avista, Re-vegetation Implementation	\$ -	\$ 91,800.00	\$ 91,800.00	Yes
Avista, Contruction and Project Administration	\$ -	\$ 193,800.00	\$ 193,800.00	No
Avista, Fisheries Monitoring	\$ 9,000.00	\$ -	\$ 9,000.00	Yes
Sanders County Resource Advisory Committee	\$ -	\$ 22,000.00	\$ 22,000.00	No
Western Native Trout Initiative	\$ -	\$ 20,000.00	\$ 20,000.00	No
	\$ -	\$ -	\$ -	
	\$ -	\$ -	\$ -	
	\$ -	\$ -	\$ -	
<b>TOTALS</b>	\$ 9,000.00	\$ 327,600.00	\$ 336,600.00	

In addition to this reportable match, the Forest Service and Lower Clark Fork Technical Advisory Committee are contributing a total of \$44,611.65 of in-kind time on the project. This match is not reflected in the budget tables because it includes government employees' salaries.

## **II.G. Project Narrative (Supplement to the Future Fisheries Improvement Program Grant Application Form)**

### **Project Overview:**

The project's purpose is to restore a degraded segment of stream and floodplain to improve and protect native fish habitat in the Vermilion River. The project site, Miners Gulch, is a 1,600-foot zone of degraded stream channel, bank and floodplain located in a high priority reach for restoration in the Vermilion watershed, due to its importance to native bull trout and westslope cutthroat trout.

Tasks will include re-shaping of the stream channel, installation of in-stream wood and rock structures, re-construction of floodplain surface, and an aggressive riparian planting program to re-establish native trees and shrubs in the 11-acre floodplain. Monitoring of fish abundance, physical habitat, sediment and vegetation will be key components of the project. Using an upstream-to-downstream approach, restoration of the site must occur before any further efforts in this priority watershed can take place.

### **Present Baseline Conditions:**

The Vermilion Watershed Assessment (2007) conducted a comprehensive analysis of current hydrologic, geomorphic, vegetative, sediment and fisheries conditions in the Vermilion River drainage and provides a scientifically-based understanding of the current condition of renewable resources to be addressed by the project. The following is a synopsis of key points related to the proposed project:

Overall, the Vermilion River has widened and become shallower over time. The river has a high width to depth ratio, little pool habitat and is essentially a long riffle. These conditions decrease the river's ability to transport bedload, particularly larger material. The resulting braids and multiple channels are more likely to dry up during periods of low water and have reduced quality habitat for fish. Wide shallow channels also increase the water surface area exposed to solar radiation, which can increase stream temperatures that impact fish.

Above Vermilion Falls (located at approximately the river's mid-way point) the upper river's geology and hydrology have caused the stream to remain fairly resilient to anthropologic or climatic changes; only 5 sediment sites have been identified above the falls. In sharp contrast, the geologic and hydrologic conditions below Vermilion Falls have been significantly susceptible to impacts from historic placer mining and riparian harvest in the lower river as well as cumulative impacts from upstream clear-cutting. The reach (14,367 feet in length) where Miners Gulch is located is immediately downstream of Vermilion Falls. (See attached map showing location of proposed project).

The Miners Gulch reach is characterized as a C4b channel type (Rosgen Stream Classification System). Although the valley in the proposed project area tends to be more confined with a narrower floodplain, "C" stream channels typically consist of low-gradient, meandering, riffle-pool channels with broad floodplains. Channel aggradation and degradation are active in "C" stream channels, which can be significantly altered and rapidly destabilized when combined changes occur in existing upstream watershed conditions, the natural stability of streambanks, and flow and sediment regimes, upon which "C" channel types are inherently dependent.

Current conditions of the stream channel, floodplain and fish habitat include the following:

- The reach where Miners Gulch is located is the largest contributor of fine sediment in the Vermilion drainage. Subsurface sediment coring in this reach found that the percentage of fine sediments is near the threshold maximum of 30 percent and is likely reducing emergence success of bull trout.
- The stream channel at the project site is severely pool limited with an average of 0 pools per mile, which severely limits habitat quality and complexity for native trout species. Reference reach conditions have pool frequency ranges from 31 to 218 pools per mile, with a mean 97 pools per mile.
- The current amount of large woody debris at the project site is 17 pieces per mile, or 7% of mean reference conditions. Minimum reference values are 66 pieces per mile with a mean value of 238 per

mile. The potential for future recruitment of large woody debris is greatly reduced due to the unstable, migrating channel that has removed a large percentage of trees in the riparian area.

- The vast percentage of the project site’s 11-acre unstable riparian area is generally devoid of finer substrate and viable riparian vegetation (3 viable mature trees with deep binding roots per acre).

Existing dimensions, Miners Gulch project site:

XS#	STA	Bankfull Width	Floodprone Width	Entrenchment Ratio	Mean Depth	Maximum Depth	Width/Depth Ratio	Bankfull Area	Water Surface Slope	Rosgen Channel Type
1	2+00	67.99	110	1.62	2.49	5.08	27.31	169.31	0.020	B
2	5+00	65.74	203	3.09	2.59	3.41	25.38	169.97	0.018	C/B
3	7+05	53.33	200	3.75	3.14	4.68	16.98	167.35	0.018	C
4	14+55	81.23	382	4.68	2.06	3.10	39.43	167.65	0.013	D
<b>Mean</b>	-	67.07	224	3.29	2.57	4.07	27.28	168.57	0.017	C/D

Existing particle size distribution just above and within the project site:

Cumulative % and Finer	Particle Size (mm) (Riffle above project reach)	Particle Size (mm) (Riffle in depositional overwidened area of project site, STA 14+55)
D16	89	17
D50	211	96
D84	359	243
D95	731	437
<b>Silt / Clay (&lt;.062 mm)</b>	0 %	0 %
<b>Sand (.062 – 2.0 mm)</b>	0 %	0 %
<b>Gravel (2.0 – 64 mm)</b>	5 %	42 %
<b>Cobble (64 – 256 mm)</b>	60 %	45 %
<b>Boulder (256 – 2048 mm)</b>	35 %	14 %
<b>Bedrock (&gt; 2048 mm)</b>	0 %	0 %

See attached photos of channel and floodplain, and existing channel substrate.

**Project Objectives and Expected Improvements to Existing Conditions:**

- By stabilizing 1,600 feet of unstable bank that is in constant flux and improving floodplain function and health, the Miners Gulch project will benefit native fish and other aquatic resources within the restoration zone and three miles of river downstream of the site.
- The project will result in a 14% reduction to sediment—currently 207 tons/year from the Miners Gulch site—in this reach.
- Installing in-stream wood and rock structures (log/boulder and debris jams) will increase the number of pools from the existing 0 pools per mile to 75 per mile, and the amount of in-channel and floodplain woody debris from 25 to 200 pieces per mile, which will significantly improve fish spawning and rearing habitat.
- The project will re-establish a healthy plant community in 11 acres of floodplain by employing an aggressive planting program on 2,260 linear feet of stream bank.

**Project Design:**

Detailed surveys and logistical planning for the project have taken place and a project design plan has been developed by the USFS (Cabinet Ranger District) that employs proven on-the-ground techniques to reduce sediment contributions and enhance native fish habitat. Physical dimension, pattern and profile data confirm the site's instabilities and negative system trends such as aggradation and future channel abandonment. The width to depth ratio of the channel, entrenchment and other physical variables have been calculated throughout the entire reach and will serve as the baseline for initial existing condition monitoring. Subsequent to this effort, an as-built survey directly following construction will add to initial monitoring efforts.

Proper channel and floodplain geometry has been obtained from applicable reference channel conditions and applied to the design of the project site area. Variables such as channel width, channel slope, radius of curvature, feature facet slopes and velocities (riffle, run, pool and glide features), and floodplain elevation in relation to baseflow have been calculated for project design.

**Design Discharge**

The USFS (Cabinet Ranger District) has been monitoring streamflow at two locations in the Vermilion River drainage since 2002. One gaging station exists close to the mouth and the other approximately 13 miles upstream from the mouth. Manual streamflow measurements as well as electronic automation have captured daily flow information since this time. Annual water year data reports have been completed at the lower gaging station since 2008 (see USDA, 2014). The information within these reports that has been gathered over the period of record has helped with design discharge information within the Vermilion River. Flood return interval flows such as the Q1.5, Q5 have been manually measured while the Q25, Q50, and the Q100 have been calculated using this established rating information as well as empirical equations developed from the USGS in Montana and Washington. These estimations are fairly accurate as they utilize the vast amount of historic and current discharge data that has been collected over time on the Vermilion River. The bankfull discharge (Q1.5) was the most instrumental in the restoration design. The calculated bankfull flow within the project reach is 713 cubic feet per second.

**Reference Reach Descriptive Information and Location**

Applicable reference reach data has been compiled from a few nearby locations, one being directly upstream of the project site (Vermilion River Reach 7). (See attached map showing location of reference reaches and photographs of reference reaches). All of these areas display a similar channel type and substrate, as well as local slope, flow regime and bankfull characteristics. The riparian corridor within these locations is what is believed the project site was like prior to vegetation alteration. The table below displays the reference reach variables by site.

Summary of reference reach variables by site:

Reference Variables	Vermilion River B3 Channel type	West Fork Trout Creek C4 Channel Type	East Fork Bull River B3c Channel type	Upper Bull River B4c Channel type
Drainage Area (sq. miles)	49.92	19.5	26.05	37.6
Bankfull Area (Riffle)	130	91.54	45.59	126.2
Bankfull Q	585	280	228	550
Width/Depth (Riffle)	17.5	20.0	15.4	18.2
Entrenchment Ratio	1.18	4.69	5.67	3.13
Bankfull Width (Riffle)	47.6	42.7	26.4	47.9
Bankfull Mean Depth (Riffle)	2.72	2.15	1.72	2.63
Bankfull Max Depth (Riffle)	4.18	3.5	2.41	4.31
Bankfull Max Depth (Run)	3.2	4.2	3.8	4.5
Bankfull Max Depth (Pool)	6.5	5.6	4.6	5.7
Bankfull Max Depth (Glide)	4.6	3.2	4.1	3.5
Average Riffle Slope	.023	.012 - .018	.02	.015
Average Run Slope	.125	.529	.09	.23
Average Pool Slope	.02	.016	.007	.002
Average Glide Slope	.067	.030	.12	.04
Run length (RL)	17-25	15-30	6-25	10-23
Glide length (GL)	13-25	12-30	15-55	13-31
Total Pool Length (RL+GL+PL)	15-40	20-75	18-60	36-78

**Existing and Proposed Longitudinal Profile, Channel Dimensions**

The proposed restoration will include more pool habitat and will provide for a more stable grade that will maintain the long term stability within this section of the Vermilion River. Proposed channel design characteristics such as Bankfull area (BFA), Bankfull width (BFW), Bankfull mean depth (BFDMN), Bankfull maximum depth (BFDMX), Bankfull discharge (BFQ), and Bankfull mean velocity (BFU) have been calculated for the design constructed riffle, run, pool, and glide within a portion of the project area (see table below). Design depths have taken reference reach information into account as well as local scour depth calculation at the flume locations (run locations). The calculated scour depths have taken variables such as sediment density, particle size, discharge at bankfull, gravitational acceleration, water density, run slope, run width, and fall height into account. Maximum scour depths at the run locations were approaching 6 feet in the project area under a bankfull type (1.5 yr.) flood event. These calculations have provided additional insight into how, and at what elevation footer rock and logs will be installed to ensure long-term stability.

Summary of design dimensions:

Dimension Variables	Pre-Project Riffle (C3)	Design Riffle	Design Run	Design Pool	Design Glide
Drainage Area (sq. miles)	57	57	57	57	57
BFA	167	167	132	288	250
BFQ (cfs)	713	713	713	713	713
BFU (fps)	4.3	4.3	5.4	2.5	2.8
Width/Depth (Riffle)	26.04	24	19	15.0	22
Entrenchment Ratio	2.63	4.16	5.26	3.45	3.33
BFW	81	65	56	80	72
BFDMN	2.1	2.6	2.10	3.6	3.2
BFDMX	3.1	3.5	3.35	7.4	4.7
Average Slope	.018 -.02	.02 - .024	.09 - .30	.004 - .016	.030 - .12

Further project planning and design is detailed in the Vermilion River Miners Gulch Reach Stream Restoration Hydrologic Investigation Report, with appendices that include a project monitoring plan; an adaptive management strategy (i.e., how restoration success will be gauged); existing condition planform maps (see attached); and proposed in-stream structure drawings (see attached). The hydrologic investigation report includes a review of restoration alternatives for the site and rationale for selection of the preferred alternative. A site-specific re-vegetation plan (Miners Gulch Re-vegetation Plan) has also been developed.

**Proposed and Future Land Use Activities within Adjacent Riparian Areas:**

The project is located on mountainous national forest land, and there are no land use activities proposed or expected within the project site or adjacent riparian areas. The USFS has delineated a 300 ft. buffer on each side of Vermilion River as a Riparian Habitat Conservation Area, so activities in this 600 ft. riparian zone are restricted. No timber harvest activities in or near the project area are planned. There is a trail crossing below the Miners Gulch site, but the trail is not within the proposed project area.

**Project Tasks and Timeline:**

- **Winter 2015-early spring, 2016:** USFS will finalize permits (Clean Water Act Section 404 permit for construction in navigable waters, DEQ 318 water quality certification, and MFWP SPA 124 permit for streambed construction).
- **Spring, 2016:** Partners will advertise and select construction contractor(s); contracts finalized.
- **May-June, 2016:** Contractor will establish access and mobilize the site.
- **July 15-September 1, 2016:** Contractor will construct in-channel and floodplain improvements. Restoration work includes building temporary diversion channels and de-watering the site; re-shaping the stream channel; and installing in-stream wood and rock structures (bankfull bench, rootwad revetments, debris jams, overflow channels, cobble patches, and/or boulder gardens). Grade control structure will be installed in an adjacent 700 linear ft overflow channel. Work in the floodplain includes re-construction of surface and elevation.
- **Fall, 2016:** A native grass seed mix will be sown in the newly re-constructed floodplain to provide shallow soil stability and begin building organic matter for riparian plantings.
- **April-July, 2017:** Work will take place along 2,260 feet of stream (11 acres of floodplain) and includes installing an irrigation system and conducting an aggressive planting program using cuttings and containerized stock of native trees and shrubs. Fast growing tree species will be used to build deep, extensive root systems and provide future large woody debris. Work will include browse control, thinning, weed control and on-going maintenance.
- **November, 2017:** Monitoring results to date will be compiled and evaluated.

- **December, 2017:** A final report will be prepared and submitted to MFWP and other project funders and partners. The report will include photo documentation and a detailed discussion of project results and expenditures.

### **Monitoring and Evaluating Project Results:**

Prior to on-the-ground work, a baseline of data on physical habitat, sediment, flows and fish populations will have been established through monitoring efforts by MFWP and Avista (baseline fish abundance and fish habitat data), and the USFS (baseline physical data used in project design and on-going sediment, flow and temperature data). Post-restoration monitoring of fish abundance and fish habitat will be conducted by MFWP, Avista and the USFS through Bull Trout redd surveys, electrofishing, and snorkeling.

Following construction and before the first run-off event, vertical and lateral channel stability of the restored reach will be measured through 8 permanent cross sections and a permanent longitudinal profile. Cross sections will provide gauging points for long-term stability within the different habitat types (riffles, runs, pools and glides). Photo monitoring at permanent points will be conducted as cross sections and profiles are re-surveyed over time. Monitoring of riparian plantings will take place through a series of photo-points to visually assess success of plant growth and vigor measured each year by height, cover and rate of survival. On-going field observations will gauge how well vegetation is providing stream bank strength, affecting sediment load reduction and shade over time.

Following restoration activities, partners will review monitoring data to assess project results. The project-specific monitoring plan outlines data needs and criteria for measuring quantitative results. Because the project is located on the Kootenai National Forest, the USFS will be responsible for long-term project maintenance and monitoring (see attached USFS letter).

### **Project Partners and Support:**

Project implementation will be a collaborative team effort involving Green Mountain Conservation District (GMCD), the USFS, project contractor(s), and technical review and assistance from the Lower Clark Fork Technical Advisory Committee (TAC). (In addition to the USFS, MFWP, GMCD and Avista, the TAC includes Montana DEQ, USDA Natural Resources Conservation Service, and members and staff of the Lower Clark Fork Watershed Group.) GMCD will coordinate project activities, and USFS will oversee all on-the-ground work. Evaluation and reporting of project results will be conducted by a team of USFS, MFWP, Avista, GMCD and other TAC members. Letters of support from the USFS, local MFWP Fisheries Biologist, Lower Clark Fork Watershed Group, and Avista are attached.

### **Project-related and Supporting Documentation:**

- Vermilion Watershed Assessment and Preliminary Restoration Plan. USFS, Kootenai National Forest, Cabinet Ranger District. June 15, 2007.
- Chapel Slide Restoration 2014 Post Run-off Monitoring Report. USFS, Kootenai National Forest, Cabinet Ranger District. July 7, 2015.
- Vermilion River Miners Gulch Reach Stream Restoration Hydrologic Investigation Report (and appendices). USFS, Kootenai National Forest, Cabinet Ranger District. April 21, 2014.
- Miners Gulch Draft Re-vegetation Plan. USFS, Kootenai National Forest, Cabinet Ranger District. March 5, 2014.
- Water Sediment Temperature Data Report (WY 2014): Vermilion River at Red Bridge, Trout Creek, MT. USFS, Kootenai National Forest, Cabinet Ranger District. November 7, 2014.
- Recovery Plan for the Coterminous United States Population of Bull Trout (*Salvelinus confluentus*). U.S. Fish and Wildlife Service, 2015.
- Columbia Headwaters Recovery Unit Implementation Plan for Bull Trout (*Salvelinus confluentus*). U.S. Fish and Wildlife Service, 2015.

- Memorandum of Understanding and Conservation Agreement for Westslope Cutthroat Trout in Montana. Montana Fish, Wildlife & Parks, 2007.

**Budget Overview:**

The total project budget is \$431,211.65. Matching contributions total \$380,711.65 for this \$50,000 Future Fisheries proposal include verified funds, pending funds, and in-kind contributions.

Verified funds total \$117,111.65, and consist of the following:

- GMCD has received \$91,800 from Avista Corporation for this project.
- The USFS has committed \$25,311.65 in cash support.

Pending funds total \$235,800, and consist of the following:

- GMCD will be applying in December 2015 for an additional \$193,800 from Avista Corporation. Our partners there have shown strong support of watershed improvements in the Vermilion drainage and we are very optimistic that this request will be funded.
- GMCD has applied for \$22,000 from the Sanders County Resource Advisory Committee; the project is ranked 5<sup>th</sup> out of 26 projects and is expected to be funded.
- Lower Clark Fork Watershed Group has recently applied to the Western Native Trout Initiative grant program for \$20,000 to be used specifically for this project.

Verified in-kind services support totals \$28,300, and is provided by the USFS (\$17,300), the Lower Clark Fork Technical Advisory Committee (\$2,000), and MFWP (\$9,000).

- In-kind values are calculated using a rate of \$30/hr for professional labor.

**Attachments:**

- Map showing location of the proposed project (Vermilion Miners Gulch Project 2016)
- Map showing location of reference reaches (Reference Reaches for Vermilion Miners Gulch Project 2016)
- Pre-project photographs of existing channel, existing channel substrate that demonstrates scale, and reference reaches (Supporting Photographs)
- Existing condition planform map (M-1. Vermilion River Miners Gulch Reach – Existing Condition Planform)
- Proposed action planform: plan view drawing showing placement of structures and proposed treatments (M-3. Vermilion River Miners Gulch Reach – Proposed Action Planform)
- Typical drawings/photographs of proposed structures and treatments (Appendix C. Proposed In-stream structures – Vermilion River)
- Evidence of landowner consent and commitment to land management and maintenance (Letter of support from USFS)
- Letters of support from MFWP Fisheries Biologist, Lower Clark Fork Watershed Group and Avista Corporation

# Vermillion Miners Gulch Project 2016

## Project Location

47° 52' 11.64" N 115° 23' 30.95" W

Trout Creek

Vermillion River Basin



NORTH



Miles

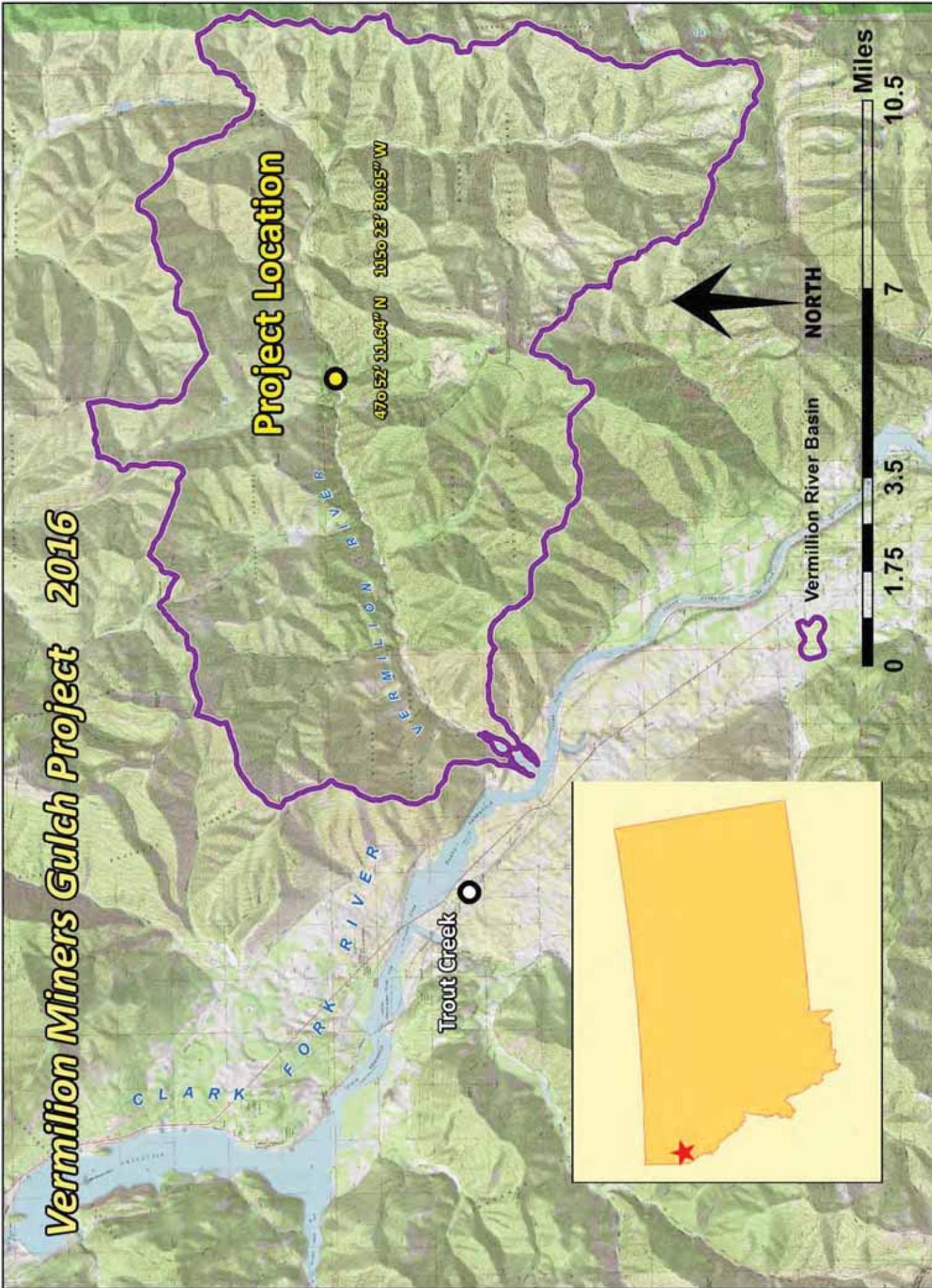
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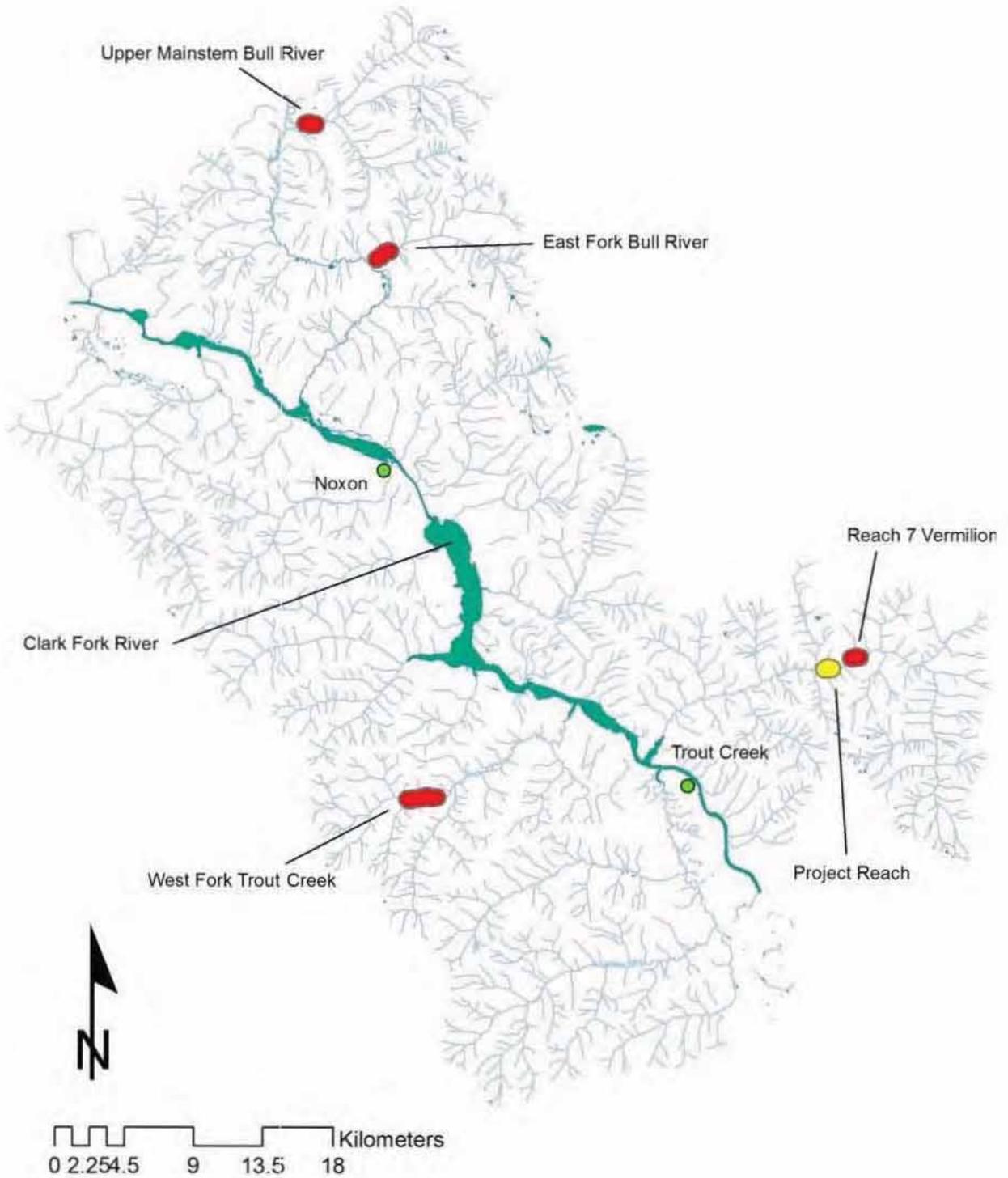
3.5

1.75

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Reference Reaches for Vermilion Miners Gulch Project 2016



Supporting Photographs:



Figure 1 Air photo shows existing condition of the Miners Gulch reach of the Vermilion River.



Figure 2 Existing channel and floodplain at the Miners Gulch reach of the Vermilion River.



Figure 3 The floodplain of the Miners Gulch reach of the Vermilion River is largely void of vegetation.



Figure 4 Existing condition floodplain substrate at the Miners Gulch reach of the Vermilion River.



Figure 5 Existing condition of in-channel substrate found in the Miners Gulch reach of the Vermilion River.



Figure 6 Reference reach on the Vermilion River.



Figure 7 Reference reach on West Fork Trout Creek.

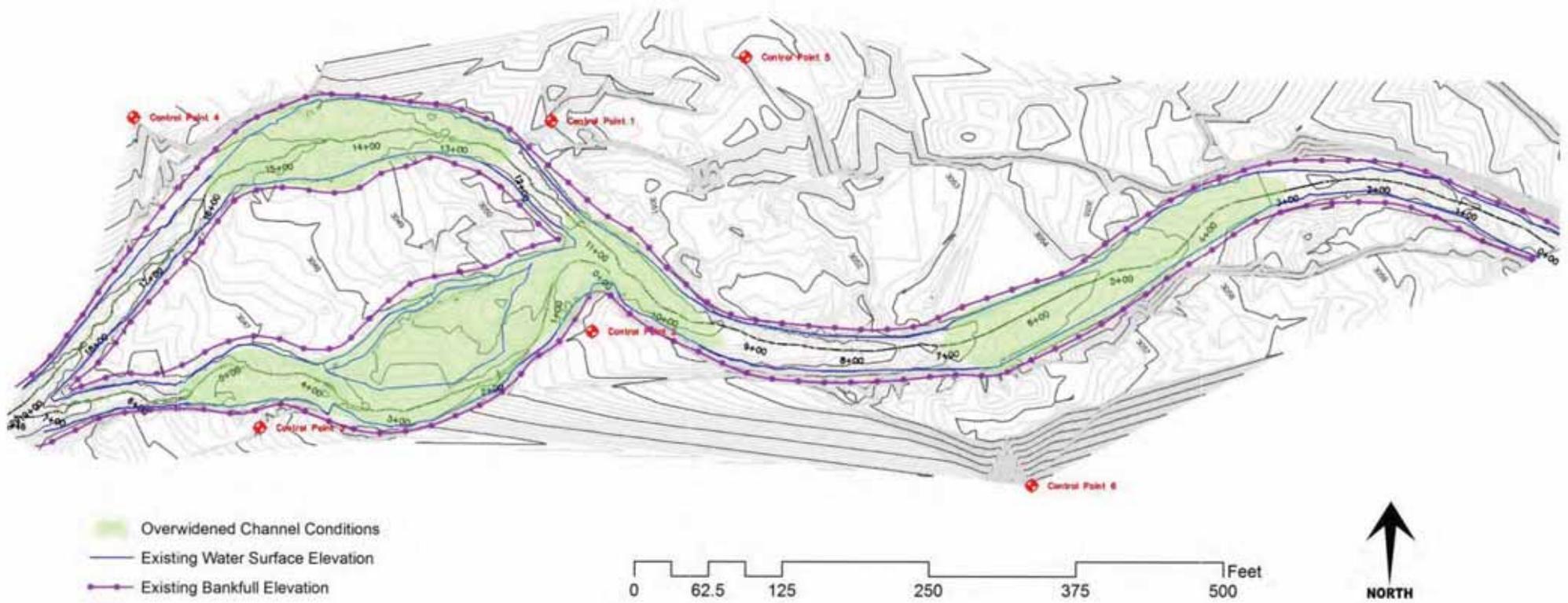


Figure 8 Reference reach on East Fork Bull River.

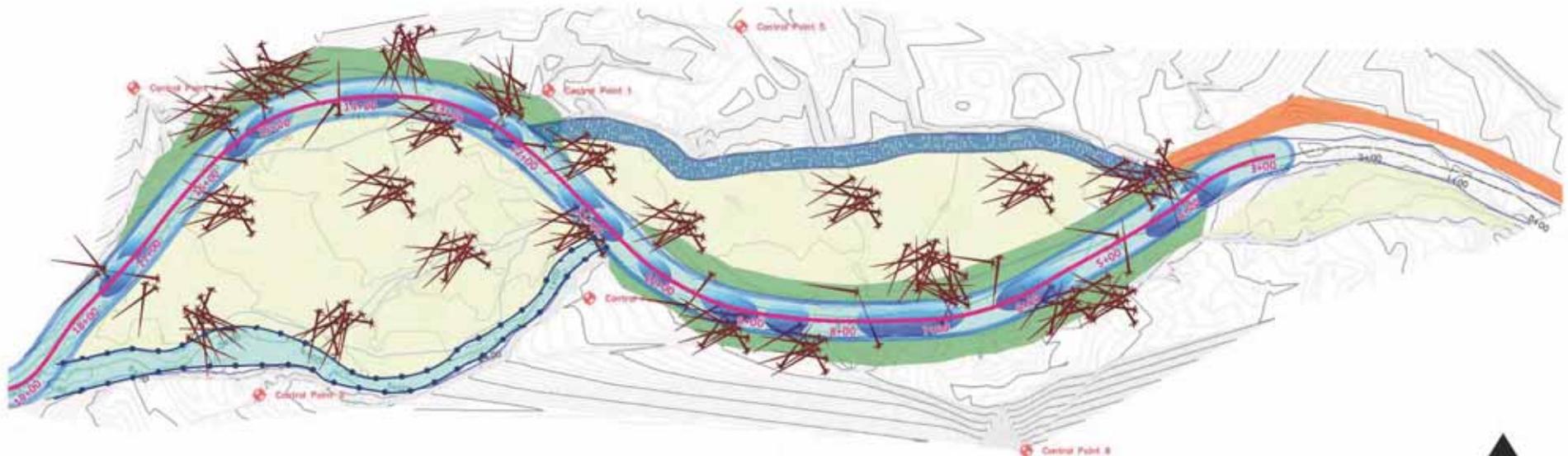
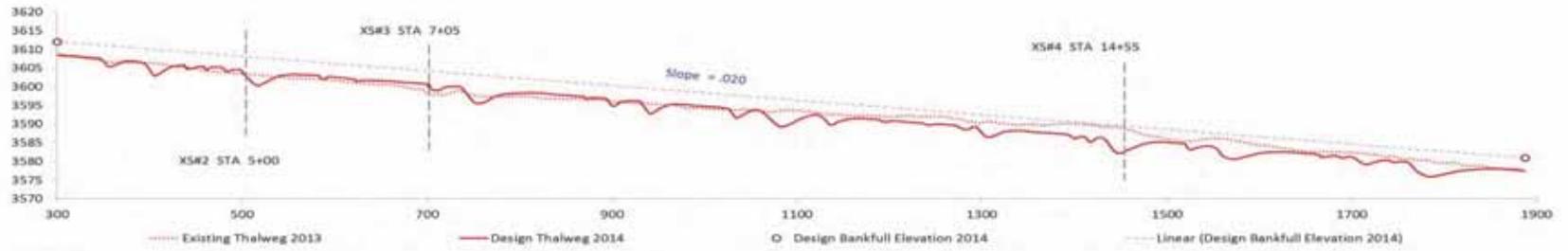


Figure 9 Reference reach on Upper Mainstem Bull River.

M-1. Vermilion River Miners Gulch Reach - Existing Condition Planform



M-3. Vermilion River Miners Gulch Reach - Proposed Action Planform



-  Design Thalweg
-  Off Channel Rearing Habitat
-  Constructed Pool Habitat
-  LWD Rootball Structures
-  Anchored Brush Bundles
-  Temporary Diversion Channel
-  Design Bankfull Channel
-  Excavated Bankfull Bench
-  Floodplain Micro-Habitat and Riparian Revegetation



## **Appendix C. Proposed In-stream structures – Vermilion River**

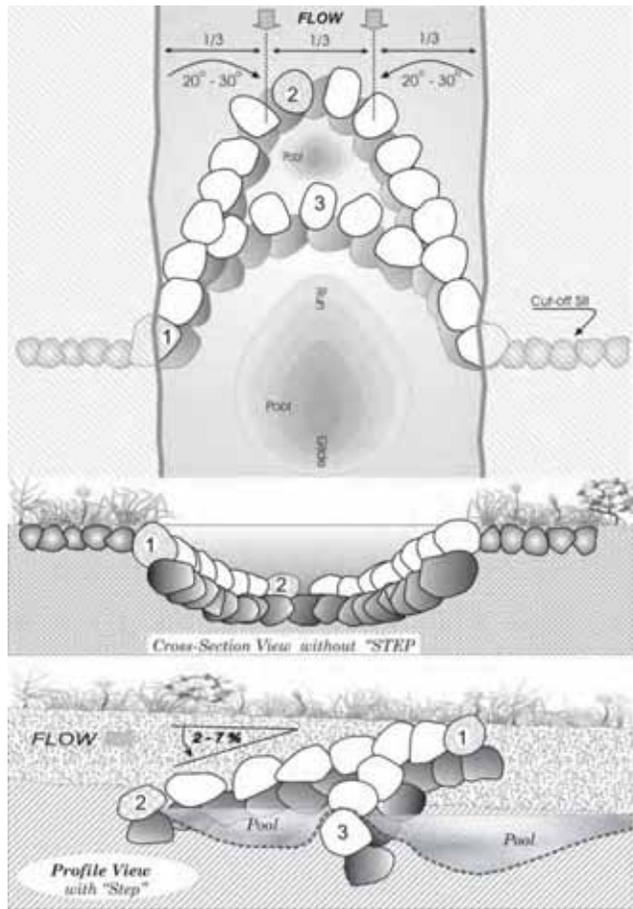


Figure C1. Cross Section, profile and planview of a Cross-Vane (From Rosgen, D.L., Updated 2006)



Figure C2. Example of a natural reference rock cross-vane type structure on the Vermilion River.

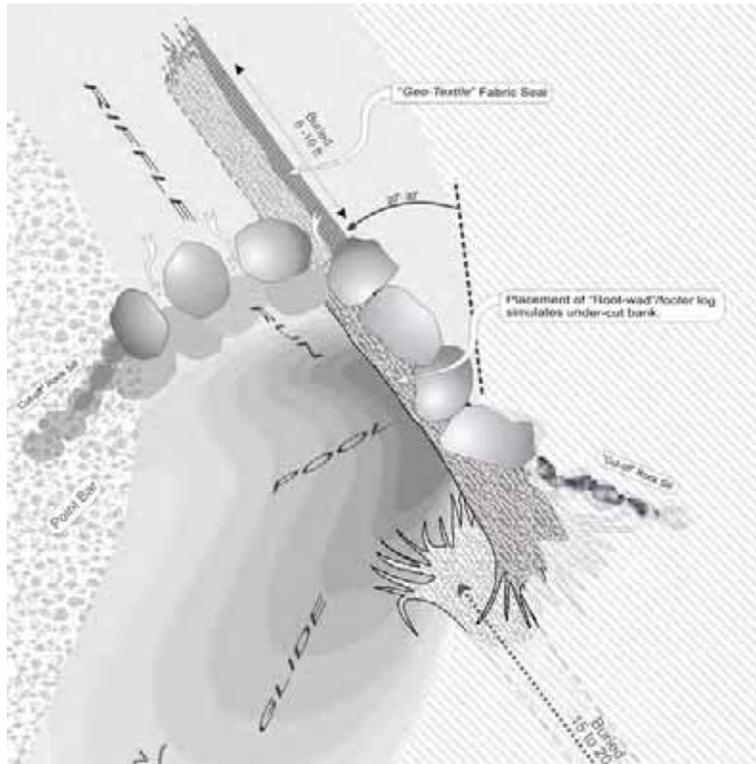


Figure C3. Root wad/log vane/J-hook combo streambank stabilization and fish habitat structure (From Rosgen, D.L., Updated 2006)



Figure C4. Constructed Root wad/log vane/J-hook combo streambank stabilization and fish habitat structure

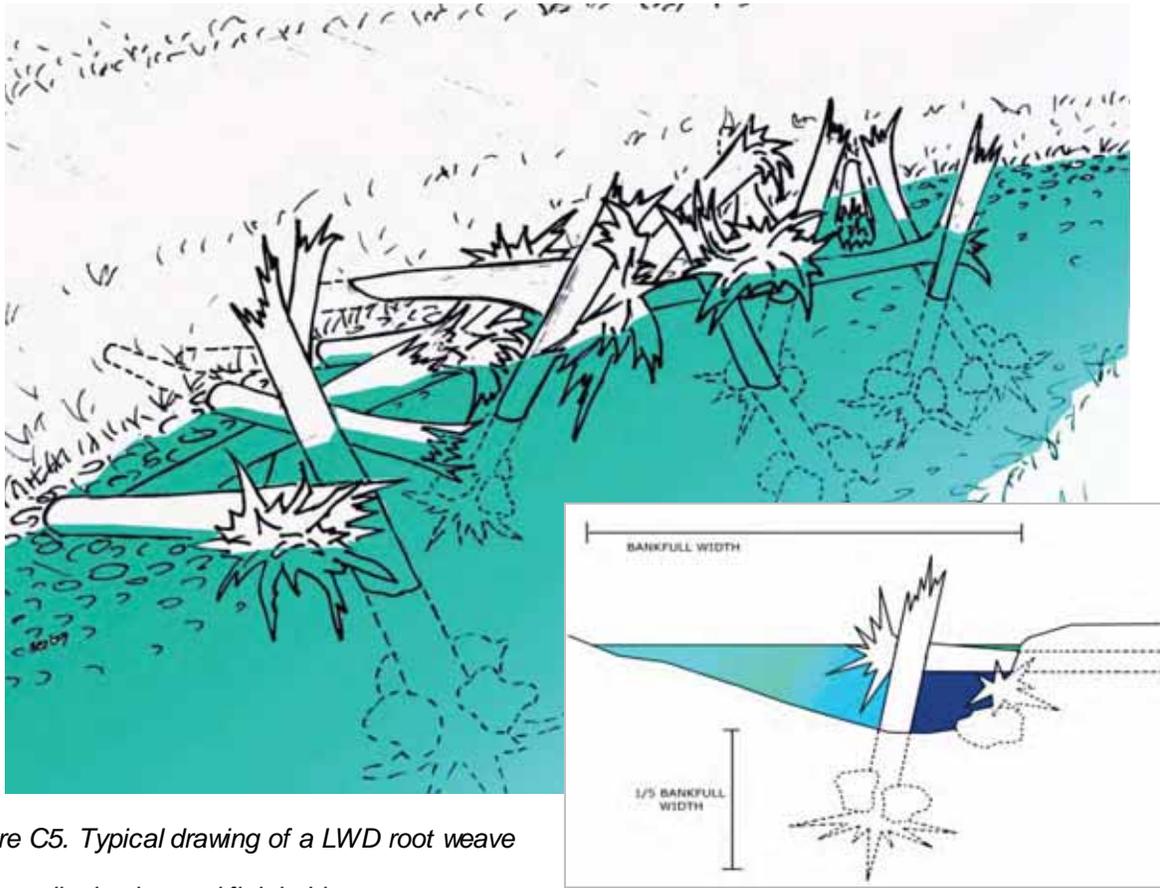


Figure C5. Typical drawing of a LWD root weave energy dissipation and fish habitat structure.



Figure C6. Example of a natural reference LWD root weave on the Kootenai National Forest (Fisher River). C4 Channel Type



*Figure C7. Example of a natural reference log jam on the Cabinet Ranger District. C4b channel type*



*Figure C8. Example of a constructed log jam on the Cabinet Ranger District. C4 channel type*

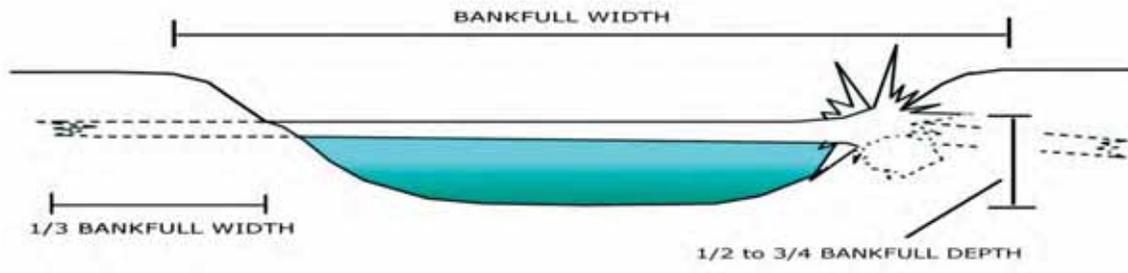


Figure C9. Typical drawing of Cross-Log energy dissipating fish habitat structure.



Figure C10. Examples of natural reference cross log structures on the Cabinet Ranger District. B4c channel type.



Figure C11. Example of a constructed cross log structure on the Cabinet Ranger District. C4 channel type.

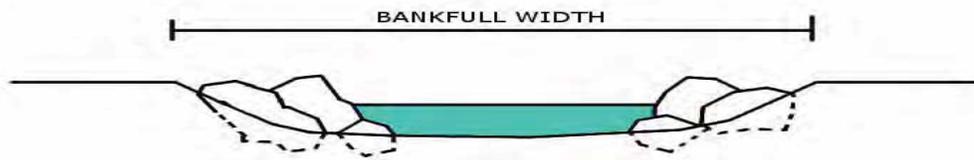


Figure C12. Typical drawing of Boulder garden pocket pool habitat structure. All boulders will be sporadically placed within the outer 2/3 of the channel.



Figure C13. Example of a natural reference boulder habitat on the Cabinet Ranger District. C3b channel type.



Figure C14. Example of a constructed boulder garden structure w/ microhab logs on the Cabinet Ranger District. C4b channel type.

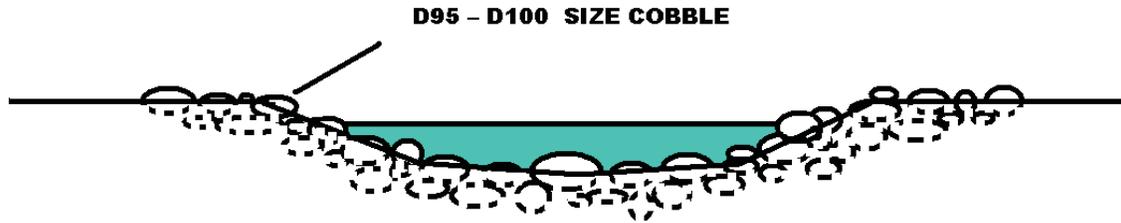


Figure C15. Typical drawing of cobble patch grade control structure. All cobble will be keyed to the channel bed below calculated scour depths.



Figure C16. Example of a natural reference cobble patch grade control structure on the Cabinet Ranger District. C4b channel type.



Figure C17. Example of a constructed cobble patch grade control structure on the Cabinet Ranger District. C4b channel type.

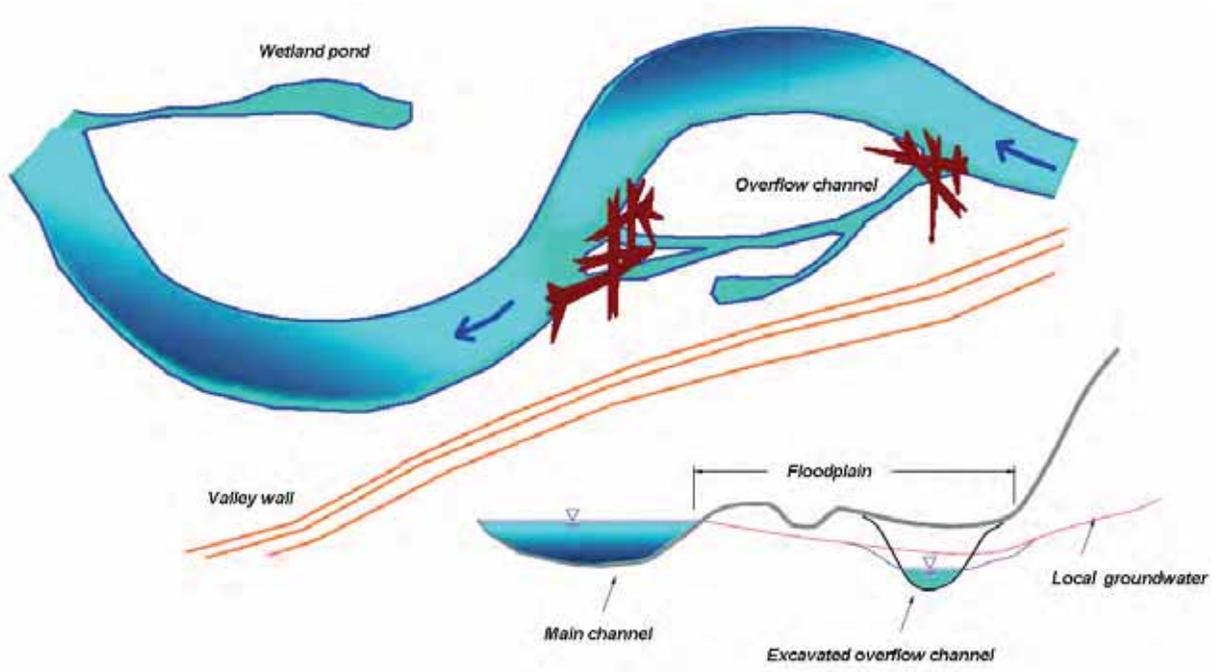


Figure C18. Typical drawing of the off-channel overflows. LWD jams as well as small cobble patches will be placed at inlet and outlet locations to deter meander cutoff.



Figure C19. Example of overflow channels on the Jocko River. C4 channel type.

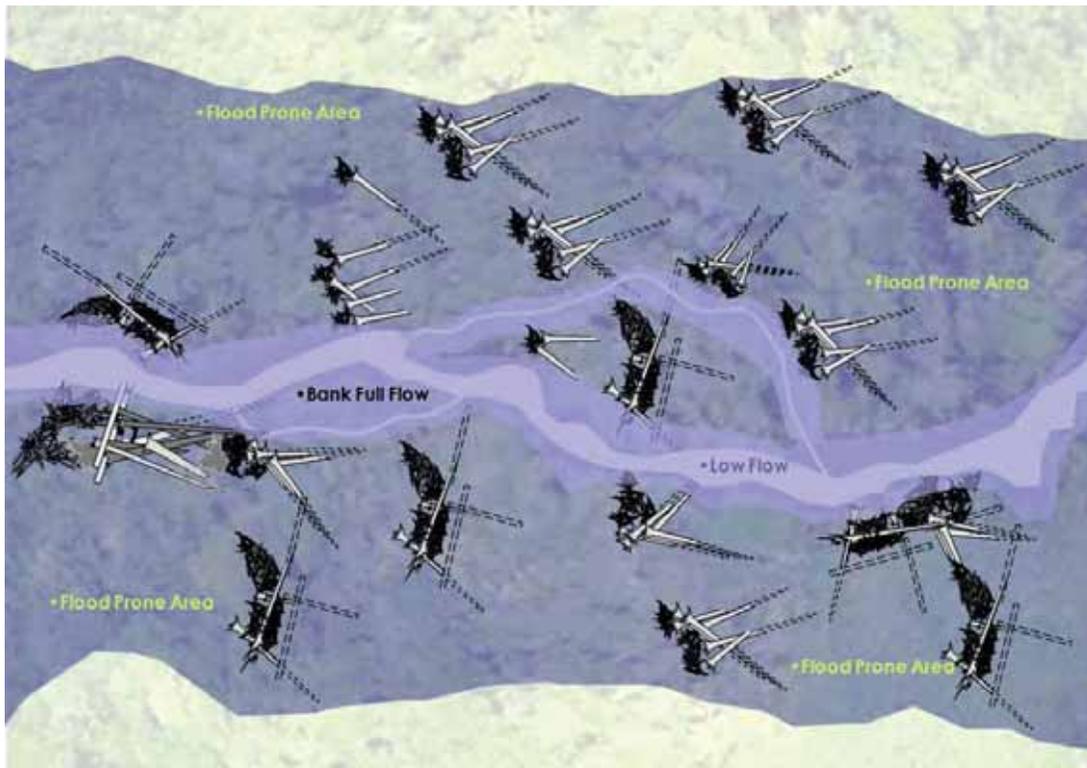


Figure C20. Conceptual drawing of Floodplain LWD jams placed at strategic locations to route water and suggest a desired channel location over a series of high flow events (Bair, 2010).

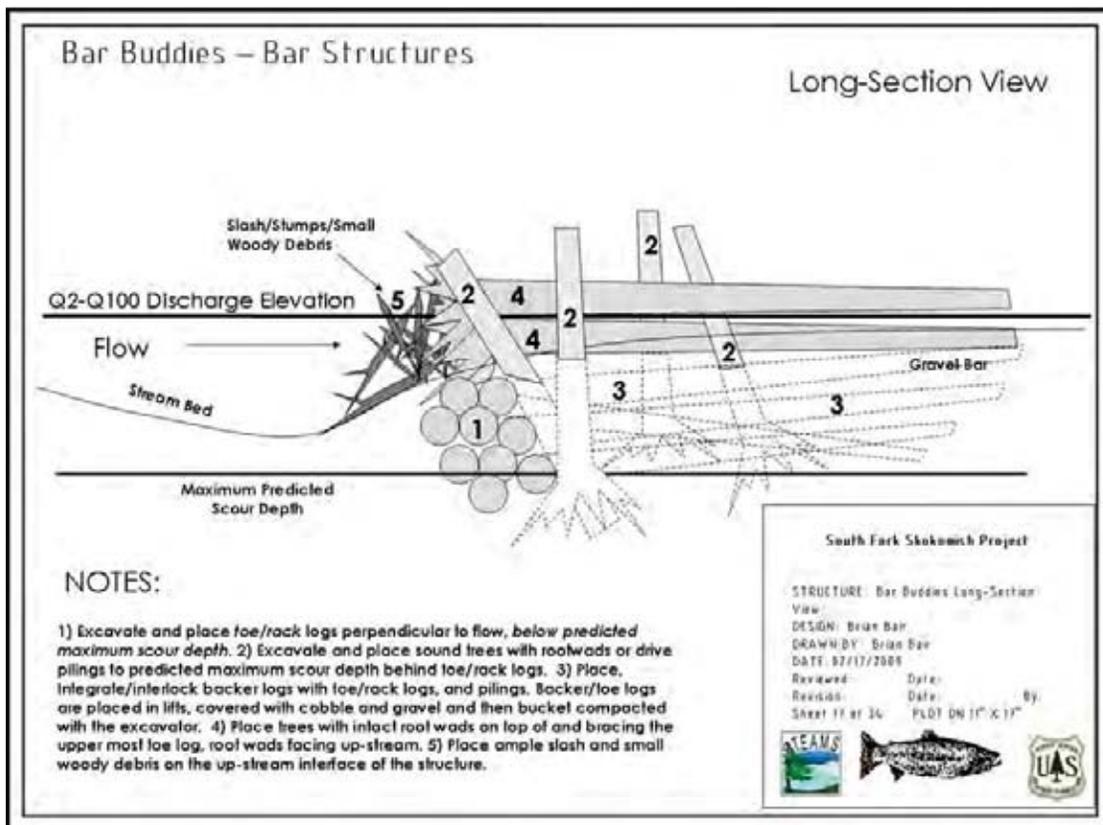


Figure C21. Typical drawing of Floodplain LWD jam (Bair,2010).

**LIVE POSTS**  
(Not to scale)

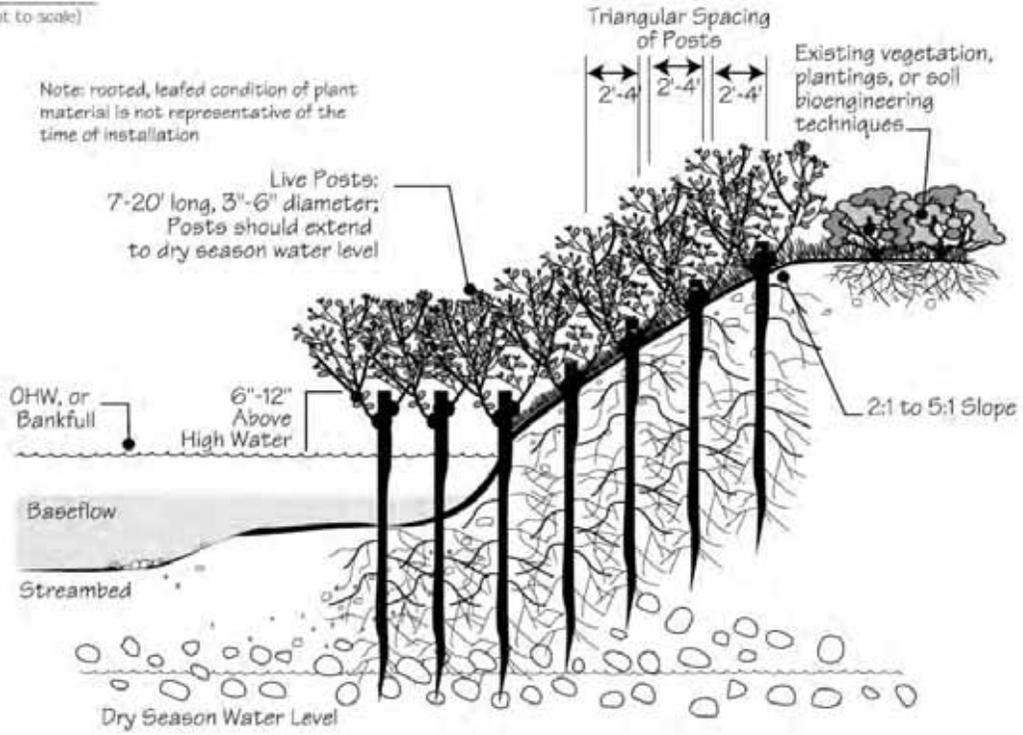


Figure C22. Typical drawing of live vegetation staking (USDA,2002).



Figure C23. Example of live vegetation staking used as bank stabilization (USDA,2002).

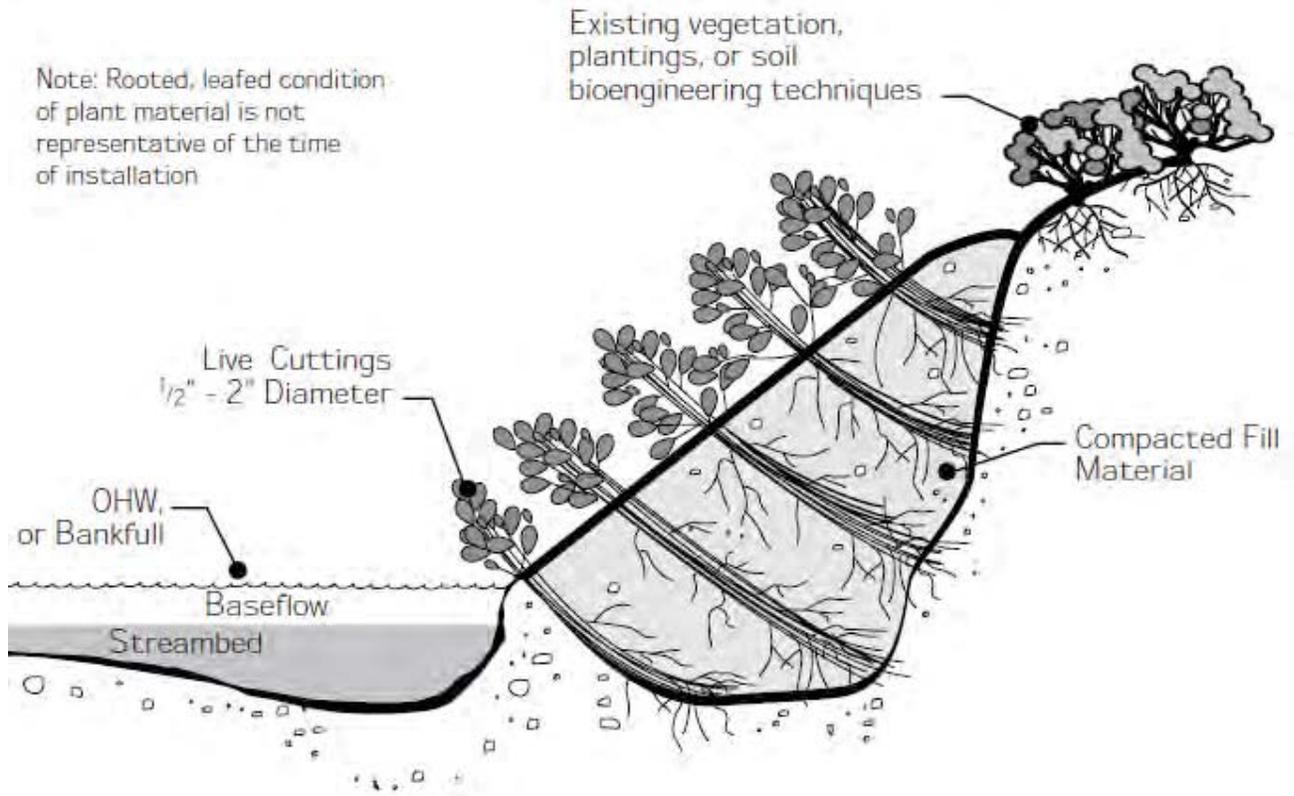


Figure C24. Typical drawing of live vegetation layering (USDA, 2002).



Figure C25. Example of live vegetation layering used as bank stabilization and installed within previously constructed bankfull terrace.

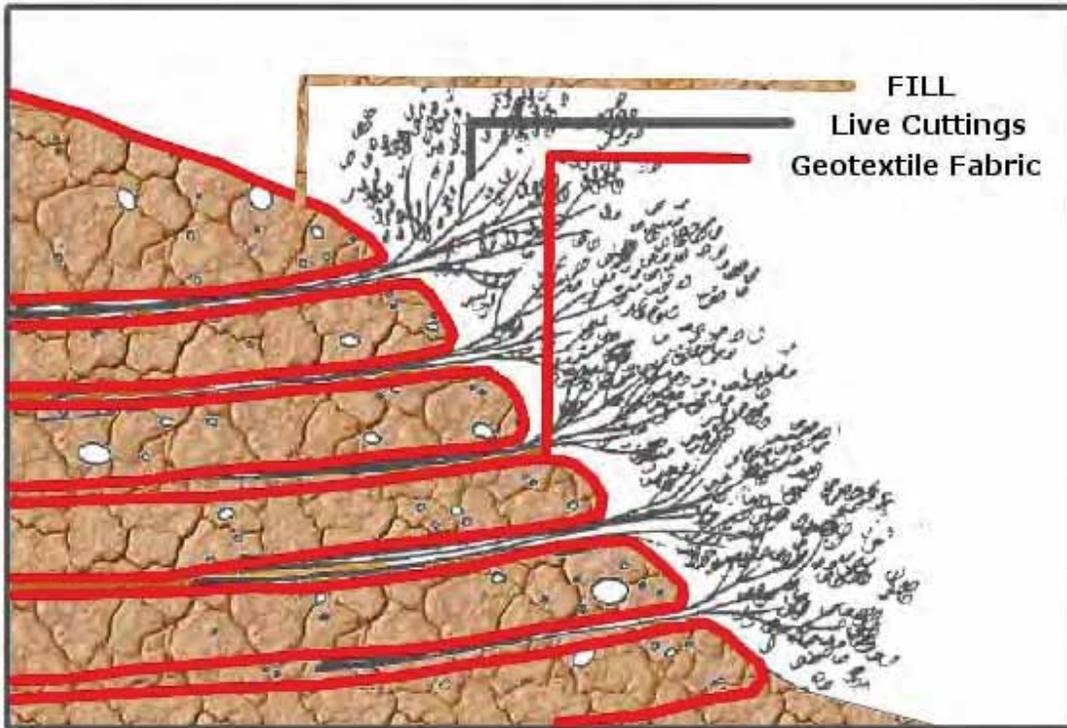


Figure C26. Typical Drawing of vegetated soil lift.



Figure C27. Example of a vegetated soil lift bank stabilization structure on the Jocko River.



**File Code:** 2520; 2670  
**Date:** November 13, 2015

Green Mountain Conservation District  
P.O. Box 1329  
Trout Creek, MT 59874

Dear Board of Supervisors,

Please consider this a letter of support from the U.S. Forest Service, Cabinet Ranger District for your funding proposal to the Montana Future Fisheries Improvement Program for the Miners Gulch Stream and Riparian Restoration Project.

In 2007, we completed a watershed assessment and preliminary restoration plan for the Vermilion River. In this document, we detailed the river reach where Miners Gulch is located as the highest restoration priority. In this reach, deteriorating streambank, limited in-channel energy dissipation and a non-functioning floodplain have caused frequent channel migration, an over-widened channel, decreased woody debris accumulation, reduction in pool frequency and lack of sustainable riparian vegetation. Our first project in this reach was at Chapel Slide, where post-restoration monitoring of the restoration completed in 2012 indicates improved channel stability, successful riparian planting and increased bull trout spawning use.

We are eager to continue top-down watershed scale restoration in Vermilion River in Miners Gulch in 2016. We have been highly involved in the planning and design of this project, which is detailed in the Vermilion River Miners Gulch Reach Stream Restoration Hydrologic Investigation Report. In addition to the time we have already invested in this project, we have also committed \$25,311.65 cash-match and are committed to seeing this project through to completion.

As landowner, we also take responsibility for the continued monitoring and maintenance required to ensure this project's success. In the long-term, we will manage the forest mindfully so as to ensure the protection of this restored area. Additionally, we will be working towards additional restoration in the Vermilion River, which we hope will amplify the benefits of past restoration for native fish.

We hope that the GMCD is successful in securing funds from the Future Fisheries Improvement Program for the completion of work on Miners Gulch.

Sincerely,

JOHN GUBEL  
District Ranger



## Future Fisheries Improvement Program –

The Vermillion River represents the single largest bull trout spawning stream in more than 100 miles of the mainstem Lower Clark Fork River drainage and is also a stronghold for westslope cutthroat trout. From a native fishery and habitat perspective, it is the most important watershed in the Lower Clark. Historically, this river has been impaired by upstream clear-cutting and significant placer mining, which has decreased the stability of this drainage.

While not the only impaired drainage in the Lower Clark Fork, the Vermillion presents one of the best opportunities for watershed scale restoration. It is located almost entirely on public lands in the Kootenai National Forest, and working with the Cabinet Ranger District and the Lower Clark Fork Watershed Group, we have developed a multi-step, top-down plan for restoring priority sites throughout the drainage. A few years ago, we implemented a large restoration project on Chapel Slide, which has since been shown to have reduced sediment and bedload inputs by 7000 tons.

Miner's Gulch is our next priority restoration site, where we plan to address a largely non-functional and altered riparian zone that has been heavily impacted by historic placer mining. This area has very little streamside cover, large woody debris or pool habitat. Due to the dynamic flashy nature of this system, the health of this stream for native fishes is unlikely to improve naturally. We plan to restore Miner's Gulch by re-shaping the stream channel and floodplain, installing grade control and large woody debris structures, and planting native trees and shrubs.

Having been involved in past restoration projects, as well as participation in discussions over permitting, design, funding requests and restoration alternatives, I fully support the Lower Clark Fork Watershed Group's project proposal at Miner's Gulch and support their long term restoration plans for the Vermillion River.

If you have any further questions regarding this project's potential to benefit native fish, please feel free to contact me.

Jason Blakney  
  
Fisheries Biologist  
Montana Fish, Wildlife, & Parks  
P.O. Box 95  
Thompson Falls, MT 59873  
[jblaknev@mt.gov](mailto:jblaknev@mt.gov)  
406-827-9282





## LOWER CLARK FORK WATERSHED GROUP

PO BOX 1329, TROUT CREEK, MT 59874 · OLSONECOSTEWARD@GMAIL.COM · (208) 304-3852

November 3, 2015

Green Mountain Conservation District  
P.O. Box 1329  
Trout Creek, MT 59874

Dear Board of Supervisors,

Please accept this letter of support from the Lower Clark Fork Watershed Group (LCFWG) for your application to the Montana Future Fisheries Improvement Program for the Miners Gulch Stream and Riparian Restoration Project.

The LCFWG has been working in partnership with the GMCD along with additional partners such as the U.S. Forest Service Cabinet Ranger District, Avista and Montana Fish, Wildlife, and Parks for over a decade. We are proud to be a part of many stream restoration projects in the Lower Clark Fork watershed which benefit native fish, wildlife and water quality.

Of all tributaries in the Lower Clark Fork watershed, the Vermilion River has been a major priority due to its importance to native fish. It has historically supported the highest number of Bull Trout redds and also supports a strong population of Westslope Cutthroat Trout. We feel that correcting the impairments to this stream caused by historic clearcutting and placer mining will benefit native fish populations by maintaining their viability in the Vermilion River and increase their resilience to other ongoing stresses such as climate change.

In 2012, another restoration project was completed upstream of Miners Gulch in the Vermilion at Chapel Slide. This project has successfully redirected the stream channel away from a large slide, reduced the amount of sediment input at this location drastically, and established vegetation that will contribute to long-term stability. While redd counts were overall low this year, we did find redds located in this reach, indicating that the reconstructed channel is providing spawning habitat even during a historically low water year.

We feel that the Miners Gulch Stream and Riparian Restoration Project will be just as successful as the Chapel Slide project has been. We hope that GMCD is successful in its application to the Future Fisheries Improvement Program as this is one of the most important projects for native fish populations in the Lower Clark Fork.

Sincerely,

A handwritten signature in black ink, appearing to read 'Brita Olson', is written over a light blue horizontal line.

Brita Olson, LCFWG Coordinator

November 3, 2015

Green Mountain Conservation District  
Board of Supervisors  
P. O. Box 1329  
Trout Creek, Montana 59874

Re: Support for Future Fisheries Improvement Program funding request, Miners Gulch.

Board of Supervisors.

This letter confirms Avista's support and financial contribution to the Miners Gulch restoration project in the Vermilion River watershed.

As you are aware, through the license for operation of hydroelectric projects at Cabinet Gorge and Noxon Rapids, Avista has committed long-term funding for aquatic and terrestrial habitat enhancements in the Lower Clark Fork River system since 1999. Due to its significance to Bull and Westslope Cutthroat trout populations in the Lower Clark Fork, the Vermilion River watershed is a top priority for implementing on-the-ground restoration and fishery habitat improvements, and will continue to be so for the remaining years of our current operating license.

Avista has already provided an upfront cost share to the Miners Gulch project and, because this project must be completed before further fishery improvements in the Vermilion watershed can take place, we anticipate providing additional 2016 funding support to enable this project to move forward. Funding requests will be due to Avista on December 1, 2015. Requests will be ranked for their benefits to Bull and Westslope Cutthroat trout, and then officially reviewed for approval at the March 2016 meeting of the Clark Fork Management Committee.

Additionally, Avista will provide technical assistance throughout the course of this project as a participant in the Lower Clark Fork Technical Advisory Committee. We look forward to furthering our work with the District and other project partners to collaboratively implement this Miners Gulch project.

We hope Green Mountain Conservation District is successful in securing funds from the Future Fisheries Improvement Program to help implement this important work to benefit native trout.

Sincerely,



Joe DosSantos  
Clark Fork Aquatic Program Manager

Cc: Lower Clark Fork Watershed Group